SPRINGER NATURE
Reference

Olaf Zawacki-Richter
Insung Jung
Editors

Handbook of Open, Distance and Digital Education

OPEN ACCESS

Springer

Handbook of Open, Distance and Digital Education

Olaf Zawacki-Richter • Insung Jung
Editors

Handbook of Open, Distance and Digital Education

With 82 Figures and 48 Tables

Springer

Editors
Olaf Zawacki-Richter
Center of Open Education Research
Carl von Ossietzky University
of Oldenburg
Oldenburg, Niedersachsen, Germany

Insung Jung
Education Research Institute
Seoul National University
Seoul, Republic of Korea

ISBN 978-981-19-2079-0 ISBN 978-981-19-2080-6 (eBook)
https://doi.org/10.1007/978-981-19-2080-6

This work was supported by German Federal Ministry of Education and Research: 16DHB2129
This work was supported by The University of Oldenburg: No Grant ID
This work was supported by Brigham Young University: No Grant ID
This work was supported by Japan Society for the Promotion of Science: 19K02983
This work was supported by The International Christian University: No Grant ID

This Springer imprint is published by the registered company Springer Nature Singapore Pte Ltd.
The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

Preface

Open, Distance, and Digital Education (ODDE) includes all kinds of teaching and learning processes in which educational technologies, digital media, and tools are used to present and deliver content, as well as facilitate and support communication, interaction, collaboration, assessment, and evaluation. With the global Covid-19 pandemic, ODDE has now entered the mainstream at all levels of education, and a renewed dialogue on ODDE has emerged, engaging many regions and countries. The Handbook of ODDE arrives at just the right time, intending to provide a comprehensive and updated overview of the field for educators, researchers, policymakers, and administrators in a wide range of sectors such as k-12 education, higher education, adult education, and workplace training. This Handbook has brought together leaders and scholars in the field of ODDE from around the world to discuss diverse perspectives and research findings on all important issues in ODDE.

In carrying out this exciting project, we have tried to make our Handbook more comprehensive, inclusive, and open by covering all important issues and themes in ODDE; encompassing the past, present, and future of ODDE; and developing it as an open-access publication for our global readership. We have also made our Handbook both theoretical and practical by discussing theories and models in ODDE at the same time as offering practical approaches and policies for the development and implementation of ODDE in various contexts based on research evidence. With our conscious effort to represent different parts of the world in author selection, we have invited authors from more than 20 countries across all regions (Africa, South and North America, Asia Pacific, Europe, and the Middle East). Most of our authors have experience in more than one national context. Moreover, we have included authors with different views and backgrounds to gain perspectives from both developed and developing countries on the macro, meso, and micro levels of ODDE research and practice. Finally, we have paid keen attention to the impact of the recent Covid-19 pandemic on ODDE research and practice and the opportunities and challenges of new and emerging technologies and methods, including artificial intelligence in education, learning analytics, and other digital transformations in the ODDE context.

We would like to express our gratitude to the six distinguished section editors – Professors Junhong Xiao, Svenja Bedenlier, Ross Paul, Tian Belawati, Vanessa Dennen, and Richard West – and to all our authors for their dedicated contributions to the Handbook. Furthermore, we thank the Springer team, Melody Zhang, Mokshika Gaur, Jacob Arun Raj, and Alice Xie, for their support and help during this project.

We hope that this Handbook will inspire coming decades of ODDE theory, research, and practice and contribute to shaping the future of ODDE.

Oldenberg, Germany Olaf Zawacki-Richter
Seoul, Korea (Republic of) Insung Jung
December 2022

Acknowledgments

The editors and authors would like to extend their sincere appreciation to the following institutions for funding the open access publication of this handbook: Carl von Ossietzky University of Oldenburg, Center for Open Education Research, and Center for Lifelong Learning (Germany), and the German Federal Ministry of Education and Research (Grant #16DHB2129), Brigham Young University (USA), and the International Christian University (Japan), the 2019-2023 Grant-in-Aid for Scientific Research from the Japan Society for the Promotion of Science.

Carl von Ossietzky Universität Oldenburg

Bundesministerium für Bildung und Forschung

BYU BRIGHAM YOUNG UNIVERSITY

ICU 国際基督教大学 INTERNATIONAL CHRISTIAN UNIVERSITY Expanding Potential

Contents

Volume 1

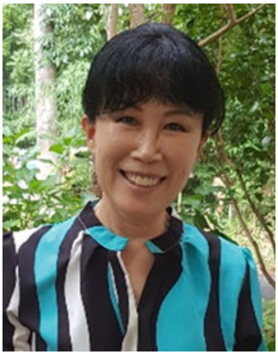
About the Editors

Olaf Zawacki-Richter
Center of Open Education Research
Carl von Ossietzky University of Oldenburg
Oldenburg, Niedersachsen, Germany

Olaf Zawacki-Richter is a professor of educational technology at the University of Oldenburg in Germany. He is the Dean of the Faculty of Education and Social Sciences and Director of the Center for Open Education Research (COER). Olaf has over 25 years of professional experience in the field of open, distance, and digital education. He has also served as a consultant and advisor, including work for the United Nations' International Labour Organization, the Office of Technology Assessment at the German Bundestag, and the German Science and Humanities Council (Wissenschaftsrat).

Dr. Zawacki-Richter has authored over 150 journal articles and edited several books, including *Online Distance Education – Towards a Research Agenda*, *Systematic Reviews in Educational Research*, *Open and Distance Education in Australia, Europe and the Americas: National Perspectives in a Digital Age* (Vol. 1), and *Open and Distance Education in Asia, Africa and the Middle East: National Perspectives in a Digital Age* (Vol. 2) – all published open access. He is an Associate Editor of *Distance Education* and the *Online Learning Journal* (OLJ) and a member of the editorial board of the *International Review of Research in Open and Distance Learning* (IRRODL), *Open Learning*, and the *Turkish Online Journal of Distance Education* (TOJDE).

His publications are available on ResearchGate and GoogleScholar.



Insung Jung
Education Research Institute
Seoul National University
Seoul, Republic of Korea

Insung Jung was formerly professor of Education at the International Christian University (ICU) in Japan. She is currently visiting research scholar at the Education Research Institute at the Seoul National University in South Korea. She has edited and authored several books with scholars from various parts of the world, including *Distance and Blended Learning in Asia*, *Quality, Quality Assurance and Accreditation in Distance Education and e-Learning: Models, Policies and Research*, *Quality Assurance in Distance Education and e-Learning: Challenges and Solutions from Asia*, *Online Learner Competencies: Knowledge, Skills and Attitudes for Successful Learning in Online and Blended Settings*, *Culture and Online Learning: Global Perspectives and Research*, *Liberal Arts Education and Colleges in East Asia: Possibilities and Challenges in the Global Age*, and *Open and Distance Education Theory Revisited: Implications for the Digital Era.* She has served as a consultant and advisor in ODE/e-learning to numerous national and international institutions, including the Korean Ministry of Education, UNESCO, the World Bank, and the APEC.

Section Editors

Svenja Bedenlier
Friedrich-Alexander-Universität Erlangen-Nürnberg
Fürth, Germany

Tian Belawati
Universitas Terbuka (Indonesia Open University)
Jakarta, Indonesia

Vanessa P. Dennen
Florida State University
Tallahassee, FL, USA

Ross Paul
University of British Columbia
Vancouver, BC, Canada

Richard E. West
Brigham Young University
Provo, UT, USA

Junhong Xiao
Shantou Radio & Television University/
The Open University of Shantou
Shantou, China

Contributors

Terry Anderson Athabasca University, Edmonton, AB, Canada

Leanna Archambault Arizona State University, Tempe, AZ, USA

Tony Bates The G. Raymond Chang School of Continuing Education, Ryerson University, Toronto, Ontario, Canada

Svenja Bedenlier Friedrich-Alexander-Universität Erlangen-Nürnberg, Fürth, Germany

Tian Belawati Universitas Terbuka (Indonesia Open University), Jakarta, Indonesia

Meg Benke School for Graduate Studies, SUNY Empire State College, Saratoga Springs, NY, USA

Nina Bergdahl Department of Learning, Halmstad University: Högskolan i Halmstad, Halmstad, Sweden

Stockholm University, Kista, Sweden

Doris U. Bolliger Richard W. Riley College of Education and Leadership, Walden University, Minneapolis, MN, USA

Melissa Bond Centre for Change and Complexity in Learning, University of South Australia, Mawson Lakes, SA, Australia

Ji Yae Bong Concordia University, Montreal, Canada

Jill Borgos State University of New York, Delhi College of Technology, Delhi, NY, USA

Jered Borup George Mason University, Fairfax, VA, USA

Carina Bossu Open University, Milton Keynes, UK

Aras Bozkurt Open Education Faculty, Distance Education Department, Anadolu University, Eskişehir, Turkey

Mark Brown National Institute for Digital Learning, Dublin City University, Dublin, Ireland

Elisa Bruhn-Zass GIZ, Bonn, Germany

Daniel Burgos Research Institute for Innovation & Technology in Education (UNIR iTED), Universidad Internacional de La Rioja (UNIR), Logroño, La Rioja, Spain

Lucila Carvalho Equity Through Education Research Centre, Massey University, Auckland, New Zealand

Linda Castañeda University of Murcia, Murcia, Spain

Zui Cheng Shenzhen University, Shenzhen, China

M. Cleveland-Innes Athabasca University, Athabasca, AB, Canada

Dianne Conrad Athabasca University, Athabasca, AB, Canada

Laura Czerniewicz Centre for Innovation in Learning and Teaching, University of Cape Town, Cape Town, South Africa

John Daniel Acsenda School of Management, Vancouver, BC, Canada

Ojat Darojat Faculty of Education, Universitas Terbuka, Indonesia Open University, Jakarta, Indonesia

Gayle Davidson-Shivers University of South Alabama, Mobile, AL, USA

Melinda dela Peña Bandalaria University of the Philippines Open University, Los Baños, Philippines

Vanessa P. Dennen Florida State University, Tallahassee, FL, USA

Daniele Di Mitri DIPF – Leibniz Institute for Research and Information in Education, Frankfurt, Germany

Stephen Downes National Research Council Canada, Casselman, Canada

Hendrik Drachsler DIPF – Leibniz Institute for Research and Information in Education, Frankfurt, Germany

Jon Dron Faculty of Science & Technology, Athabasca University, Athabasca, AB, Canada

Benedict du Boulay University of Sussex, Brighton, UK

Ulf-Daniel Ehlers Baden-Wurttemberg Cooperative State University, Stuttgart, Germany

Terry Evans Deakin University, Geelong, VIC, Australia

Luke K. Fryer Faculty of Science, The University of Hong Kong, Hong Kong, Hong Kong

Xun Ge Department of Educational Psychology, The University of Oklahoma, Norman, OK, USA

Neha Ghatak Centre for Budget and Policy Studies, Bangalore, India

Jenny Glennie Saide, South Africa, Johannesburg, Gauteng, South Africa

Charles R. Graham Brigham Young University, Provo, UT, USA

Andrina Granić Faculty of Science, University of Split, Split, Croatia

Charlotte N. Gunawardena Organization, Information & Learning Sciences, University of New Mexico, Albuquerque, NM, USA

Lisa R. Halverson Utah Valley University, Orem, USA

Tripp Harris Indiana University Learning Sciences Program, Bloomington, IN, USA

J. Hawryluk Athabasca University, Athabasca, Ab, Canada

Amir Hedayati-Mehdiabadi Organization, Information & Learning Sciences, University of New Mexico, Albuquerque, NM, USA

Piet Henderikx EADTU, Maastricht, The Netherlands

Daniel T. Hickey Indiana University Learning Sciences Program, Bloomington, IN, USA

Cindy E. Hmelo-Silver Center for Research on Learning and Technology, Indiana University, Bloomington, IN, USA

Kun Huang The University of Kentucky, Lexington, KY, USA

Thomas Hülsmann University of Oldenburg, Oldenburg, Germany

Dirk Ifenthaler University of Mannheim, Mannheim, Germany

Curtin University, Perth, WA, Australia

Viktor Jakupec Deakin University, Warrnambool, Australia

Maxim Jean-Louis Contact North | Contact Nord, Sudbury, ON, Canada

Heisawn Jeong Hallym University, Chuncheon, South Korea

Jyotsna Jha Centre for Budget and Policy Studies, Bangalore, India

Melissa K. Jones Florida State University, Tallahassee, FL, USA

Insung Jung Education Research Institute, Seoul National University, Seoul, Republic of Korea

Marco Kalz Heidelberg University of Education, Heidelberg, Germany

Heather Kanuka University of Alberta, Edmonton, AB, Canada

Kevin Kinser Pennsylvania State University, State College, PA, USA

Lindsey Kline Pennsylvania State University, State College, PA, USA

Serpil Kocdar Open Education Faculty, Distance Education Department, Anadolu University, Eskişehir, Turkey

Hyejeong Lee Indiana University Learning Sciences Program, Bloomington, IN, USA

Jihyun Lee Department of Dental Education, School of Dentistry, Seoul National University, Seoul, South Korea

Kyungmee Lee Lancaster University, Lancaster, UK

Shona Leitch Royal Melbourne Institute of Technology, Melbourne, VIC, Australia

Wei Li The Open University of China, Beijing, China

Zhichun Liu University of Massachusetts Dartmouth, Dartmouth, MA, USA

Patrick R. Lowenthal Boise State University, Boise, ID, USA

Mpine Makoe University of South Africa, Pretoria, South Africa

Victoria I. Marín University of Lleida, Lleida, Spain

Florence Martin University of North Carolina at Charlotte, Charlotte, NC, USA

Tony Mays Commonwealth of Learning, Vancouver, BC, Canada

Sanjaya Mishra Commonwealth of Learning, Burnaby, BC, Canada

Pradeep K. Misra National Institute of Educational Planning and Administration, New Delhi, India

Jenna Mittelmeier The University of Manchester, Manchester, UK

Michael H. Molenda Education, Indiana University, Bloomington, IN, USA

Michael Grahame Moore College of Education, The Pennsylvania State University, University Park, PA, USA

Wolfgang Müskens University of Oldenburg, Oldenburg, Germany

Kaori Nakao Seinan Gakuin University, Fukuoka, Japan

Clarence Ng Institute for Learning Sciences and Teacher Education, Australian Catholic University, Brisbane, QLD, Australia

Mark Nichols Open Polytechnic of New Zealand Limited, Lower Hutt, New Zealand

Dominic Orr Nova Gorica University and GIZ, Nova Gorica, Slovenia

Christopher M. Owusu-Ansah University of South Africa & College Librarian, College of Agriculture Education, Akenten Appiah-Menka University of Skills Training and Entrepreneurial Development, Mampong, Ghana

Santosh Panda Indira Gandhi National Open University, New Delhi, India

Ross Paul University of British Columbia, Vancouver, BC, Canada

Kirk Perris Principal Karte Education Consultants, Vancouver, BC, Canada

David Porter Principal DP+Associates, North Vancouver, BC, Canada

Paul Prinsloo University of South Africa (Unisa), Pretoria, South Africa

Adnan Qayyum Athabasca University, Edmonton, AB, Canada

Angela Rand University of South Alabama, Mobile, AL, USA

Tanja Reiffenrath Student and Academic Services, Internationlisation of the Curriculum, Georg-August-Universität Göttingen, Göttingen, Germany

Jean-Paul Restoule University of Victoria, Victoria, BC, Canada

Antonio da Silva Rodrigues Department of Information Science, University of South Africa, Pretoria, South Africa

Jan Schneider DIPF – Leibniz Institute for Research and Information in Education, Frankfurt, Germany

Claudia Schrader School of Education, Bergische Universität Wuppertal, Wuppertal, Germany

Alex Shum Faculty of Science, The University of Hong Kong, Hong Kong, Hong Kong

Kathy Snow University of Prince Edward Island, Charlottetown, PEI, Canada

Christian M. Stracke Center for Higher Education (BZH), University of Bonn, Bonn, Germany

António Moreira Teixeira Department of Education and Distance Learning, Universidade Aberta, Lisbon, Portugal

Angelika Thielsch Student and Academic Services, Teaching and Learning in Higher Education, Georg-August-Universität Göttingen, Göttingen, Germany

Ahmed Tlili Smart Learning Institute, Beijing Normal University, Beijing, China

Belinda Tynan Deloitte, Melbourne, VIC, Australia

George Ubachs EADTU, Maastricht, The Netherlands

Daniel Villar-Onrubia Coventry University, Coventry, UK

Christine von Prümmer Consultant on Gender Issues in ODL and e-learning, Darmstadt, Germany

Martin Weller The Institute of Educational Technology, The UK Open University, Milton Keynes, UK

Richard E. West Brigham Young University, Provo, UT, USA

Laura Widger School of Education and Lifelong Learning, South East Technological University, Waterford, Ireland

Junhong Xiao Shantou Radio & Television University/The Open University of Shantou, Shantou, China

Yasin Yalçın Recep Tayyip Erdoğan University, Rize, Turkey

Olaf Zawacki-Richter Center of Open Education Research, Carl von Ossietzky University of Oldenburg, Oldenburg, Niedersachsen, Germany

Part I

Introduction

1 Shaping the Field of Open, Distance, and Digital Education

An Introduction

Olaf Zawacki-Richter and Insung Jung

Contents

O. Zawacki-Richter (✉)
Center of Open Education Research, Carl von Ossietzky University of Oldenburg, Oldenburg, Niedersachsen, Germany
e-mail: olaf.zawacki.richter@uni-oldenburg.de

I. Jung
Education Research Institute, Seoul National University, Seoul, Republic of Korea
e-mail: isjung33@gmail.com

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_94

Abstract

This chapter provides a brief overview of the overall structure by the Chief Editors of the Handbook of Open, Distance, and Digital Education (ODDE) published in Springer's Major Reference Series. The handbook is organized along the lines of the 3M-Framework covering all important issues related to ODDE at the macro- (ODDE systems, theories, and methods), meso- (ODDE educational management and institutions), and micro- (teaching and learning) levels. Each level is addressed in one volume with two sections. Informed by the historical roots of ODDE, the editors and authors of this handbook are shaping the field of ODDE scholarship, theory, and practice.

Keywords

Open learning · Distance education · Digital education · 3M framework

Introduction

Planning for the publication of this *Handbook of Open, Distance, and Digital Education* (ODDE) began in the early months of 2020. Who would have predicted what has happened in the meantime due to the global Covid-19 pandemic? Suddenly and somewhat unexpectedly, online learning and teaching has now entered the mainstream of education at the same time as many educational institutions from K-12, higher education, professional and vocational training, and continuing education were forced into the digital world of online teaching and learning without being well prepared for it (Bozkurt & Sharma, 2020; Zawacki-Richter, 2021). In such "emergency remote teaching" (ERT, see Hodges et al., 2020) situations, teachers had often transferred what they knew from face-to-face teaching directly to the online environment as if there were no differences between them even though ERT had little in common with carefully designed ODDE.

However, ODDE is by no means a new phenomenon. It has evolved through several historical stages, from correspondence or distance education traced back to the nineteenth century with the introduction of the postal system to the use of print, radio, and TV, to the use of teleconferencing, computers, and multimedia, and up to the most recent development in online learning, including Massive Open Online Courses (MOOCs). Over the past decades, ODDE, especially online learning, has been seen as a main or alternative mode of delivery to widen access to education, provide flexibility and openness in school education, satisfy continuing educational needs of adults, expand the trained workforce, train teachers to improve the quality of schooling, and/or increase cross-border traffic in education. It has also been considered as an innovation to bring about pedagogical changes in various levels and sectors of education.

In a similar vein, digital education, an approach to the use of digital tools and technologies in the process of teaching and learning, has been introduced at all levels of education. Educational institutions now offer digital learning opportunities of some kind that are flexible in terms of time and space to reach new target groups (e. g., international students or working adults) or to better serve the needs of their conventional student body in a blended or technology-enhanced format.

With the emergence of the Internet in the 1990s, online teaching and learning, as a form of open and distance education, became more widely accepted in education as Alan Tait, the former Pro-Vice-Chancellor (Academic) at the Open University UK, wrote around 23 years ago: "The secret garden of open and distance learning has become public, and many institutions are moving from single conventional mode activity to dual-mode activity, that is to say offering a range of modes of study from the full-/part-time and conventional/distance spectrum" (Tait, 1999, p. 141).

Moreover, since the beginning of the new Millennium, the range of international online degree programs has expanded greatly. An impressive example is Australia, where international online programs generate the highest export income in the service sector on the international, particularly Asian, market (Latchem, 2018). Despite concerns of education being treated as a commodity, open and distance education combined with digital education has contributed to the growth of borderless, transnational education.

As Jung (2019, p. 1) stated, ODDE is complex in nature and scope as it involves a wide range of nontraditional ways of teaching and learning that are mediated by various media and technologies. As ODDE developed, various theories and models have emerged to understand and explain its different aspects and practices, and many empirical studies have been conducted in a wide range of contexts (see Zawacki-Richter & Naidu, 2016; Zawacki-Richter & Latchem, 2018). Against this historical background, it is critical that we learn from the theory, research, and practice in open and distance learning to avoid reinventing the wheel for digital and online education.

We, therefore, hope that this Handbook of ODDE arrives at the right time. Considering changes of educational trajectories, it aims to provide a comprehensive and solid overview of the field for educators, researchers, policymakers, and administrators in such sectors as k-12 education, higher education, adult education, and workplace training. We hope that the handbook will offer a one-stop-shop for both early-career and established researchers, educators, policymakers, and administrators in the field of ODDE to gain a comprehensive overview of the history, theory, and practice at all levels of ODDE, and at the same time stimulate in-depth discussions on various themes and issues of ODDE for today and the future. We hope that, over time, the handbook will lead ODDE researchers to develop meaningful questions and undertake investigations to answer them, while at the same time informing practitioners and policymakers of best practices and future directions of ODDE. Researchers, scholars, and students in the field of ODDE can use this handbook as a major reference and source of inspiration in their research and course of study. Our ambition is to describe and define the structure of ODDE that will shape the *gestalt* of ODDE as an academic discipline and field of educational practice.

ODDE Terminology

Remote learning, distance learning, open learning, e-learning, flexible learning, hybrid learning, blended learning, web-based learning, online learning, mobile learning, and technology-enhanced learning – these terminologies may be confusing for many readers. We decided to choose "Open, Distance, and Digital Education" as the title for this handbook, combining *open and distance education* to clearly mark the historical origin of recent online education, and *digital education* to capture newer manifestations of teaching and learning with digital media in the process of digital transformation of educational institutions.

We conceptualize ODDE as an overarching term to refer to all kinds of learning and teaching processes in which knowledge and skill base of educational technology, digital media, and tools are used to present and deliver content, as well as facilitate and support communication, interaction, collaboration, assessment, and evaluation. Thus, ODDE is not monolithic in form. It includes various practices, from technology-enhanced education, to flipped learning and blended learning to fully online education.

Closely related to ODDE is open education, a multifaceted construct with elements of openness to reach nontraditional groups of learners. It is manifested in open education practice and scholarship, Open Educational Resources (OER) and Massive Open Online Courses (MOOCs), and connected to the impact of technology in internationalization (see Zawacki-Richter et al., 2020, for a deconstruction of open education).

Another concept related to ODDE is distance education. In distance education, learners are separated from their teachers and the teaching institution. Hence, educational media are used to bridge the distance between the parties involved in the learning process (Keegan, 1980). The capability of media to afford two-way communication for interaction between learners and teachers and among learners is essential in this process. This is also reflected in the definition by Simonson et al. (2011): "Distance education is institution-based, formal education where the learning group is separated, and where interactive telecommunications systems are used to connect learners, resources, and instructors" (p. 126).

Open learning is often used as a synonym for distance education. However, Moore and Kearsley (1996, p. 2) argued that: "[. . .] the concept of open learning is different from distance education since it embraces the idea of students being able to take courses or programs without prerequisites and being able to choose to study any subject they wish. Indeed, most of the" Open Universities "were founded upon this basic premise. While some distance education programs may involve open learning, most do not." Open learning, therefore, holds a philosophy of widening access to educational opportunities by minimizing academic and administrative restrictions.

With the emergence of networked, personal computers, and digital media and tools, the traditional boundaries between distance and conventional education have been fading since the end of the 1990s. Naidu (2003) observed that "The proliferation of information and communications technology (ICT) in conventional campus-based educational settings is clearly blurring the traditional boundaries between distance education and campus-based face-to-face educational practices" (p. 350). Hence, terms such as blended learning (Osguthorpe & Graham, 2003), flexible learning (Collis & Moonen, 2001), or distributed learning (Lea & Nicoll, 2002) became prevalent at the beginning of the new Millennium. The experience and practice with online learning and teaching during the Covid-19 pandemic then gave rise to other terms such as remote and hybrid learning.

In the handbook, we have not attempted to use clear definitions of ODDE and other similar terminologies. Instead, we have encouraged the chapter authors to adopt their own approach to defining ODDE and related terms in a teaching and learning context of their interest. We believe that this flexibility will expand our understanding of the complex dimensions of ODDE and allow us to discuss diverse ways in which ODDE and other terminologies have been defined and used in research and practice.

The Structure and Content of the Handbook

The chapters of this handbook provide a foundation for considering both accumulated knowledge and the future steps to understand and improve ODDE. To help readers understand the field of ODDE in a more systemic and comprehensive manner, we structure the handbook following the 3M framework proposed by Zawacki-Richter (2009) and Zawacki-Richter and Anderson (2014). The framework categorizes the major areas of theory, research, and practice along the lines of three broad perspectives, i.e., the macro, meso-, and micro levels:

- Macrolevel: ODDE systems and theories (the level of national, regional, and global systems)
- Meso-level: management, organization, and technology in ODDE (the level of educational institutions)
- Microlevel: teaching and learning in ODE (the level of individual learners and teachers)

Accordingly, the handbook is divided into three volumes with two sections in each volume. The six sections are edited by an international team of distinguished section editors with vast experience in ODDE as scholars and researchers, leaders, and administrators. Each section is introduced by the section editor with a chapter that provides an overview of major topics and developments in that area and how it relates to the broader field of ODDE. Based on the chapters in their respective sections, the section editors draw conclusions, discuss open questions, and elaborate on implications for theory, research, and practice.

Here is a brief overview of the content and major issues covered in the six sections of this handbook.

Macrolevel: Theories and Systems

Each section begins with an Introduction chapter by the section editor. The chapters in Sections 1 and 2 examine theories and systems of ODDE from historical, cultural, and global perspectives.

Section 1: History, Theory, and Research in ODDE (Section Editor: Junhong Xiao)

The first section lays the theoretical foundations of ODDE and provides an overview of the historical development, from correspondence education in the nineteenth century to current forms of digital education and technology-enhanced learning. Theoretical underpinnings which have changed over time are explored in the chapters dealing with the classical theories of the predigital era and new and emerging theories for digital learning spaces. The professionalization of ODDE as an academic discipline and field of practice has produced scholarly journals, professional networks, and associations, which are introduced in this section. Further chapters describe major research trends, methods, and digital tools for research into ODDE.

Section 2: Global Perspectives and Internationalization (Section Editor: Svenja Bedenlier)

This section takes on a global perspective on national systems and networks in the context of the globally occurring digital transformation, resulting in the conceptualization of the different facets of internationalization in the context of ODDE. Digital education offers many opportunities for international learning experiences, physical but also virtual student mobility as well as program mobility. Chapters in this section tackle national and transnational policies for ODDE, international partnerships, and consortia as well as infrastructures and platforms for (open) educational resources. Special emphasis is placed on developing a critical reflection on the challenges and opportunities of ODDE in the Global South and the business of international education.

Meso-level: Institutional Perspectives, Management, and Organization

Followed by an Introduction chapter written by each section editor, the chapters in Sections 3 and 4 examine issues in ODDE at institutional levels.

Section 3: Organization, Leadership, and Change (Section Editor: Ross Paul)

This section discusses practices and changes in various types of ODDE institutions with a special focus on leadership, management strategies, and support systems. The chapters analyze the development and innovations in open universities, nonformal distance teaching institutions, and open and virtual schools around the globe. The various chapters explore how those ODE institutions have developed and managed strategic plans, change processes, and technology acceptance as well as examine various economic models of ODDE, effective leadership, and staff development practices in a wide range of institutional and sociocultural contexts.

Section 4: Infrastructure, Quality Assurance, and Support Systems (Section Editor: Tian Belawati)

This section analyzes another important set of institutional issues including organizational and technology infrastructure, quality assurance and evaluation, accreditation, and support systems. The first chapters examine both common and unique models and features of organizational and technology infrastructure of various ODDE institutions. The next three chapters focus on ODE institutions' quality assurance, evaluation, and accreditation systems in relation to national and international frameworks. The last three chapters look into ODE institutions' support systems particularly for three categories of stakeholders: learners, faculty, and administrative staff.

Microlevel: Learning and Teaching

Followed by an Introduction chapter in each section, the chapters in Sections 5 and 6 discuss issues related to open, distance, and digital teaching and learning, including learners, teachers, media and technologies, and instructional design, implementation, and assessment.

Section 5: Learners, Teachers, Media, and Technology (Section Editor: Vanessa Dennen)

This section focuses on the profiles of students and teachers and on the media and technologies that are applied to facilitate teaching and learning in ODDE. In terms of students' characteristics, the chapters analyze issues related to their socioeconomic background, gender, and media usage behavior for learning. This leads to an overview of the various synchronous and asynchronous tools for interaction and collaboration, video-based approaches to teaching and learning, as well as new and emerging applications of learning analytics, AI in education, and assistive technologies for learners with disabilities. Against the background of the various educational media and technologies, the remaining chapters deal with models and methods for their pedagogically meaningful application and the associated digital skills and literacy for teaching and learning in ODDE.

Section 6: Design, Delivery, and Assessment (Section Editor: Richard West)

The final section starts with an overview of the various delivery modes of ODDE, which differ according to the degree of digitization and the degree of flexibility they allow. Special emphasis is placed on OER, MOOCs, and the development and delivery of online programs. The following chapters focus on the instructional design and pedagogical models and approaches to teaching and learning in digital environments to facilitate interaction, communication, collaboration, and assessment.

An Invitation to Knowledge Sharing and Future Research

As the chapters of the handbook show, ODDE is becoming richer in theories and research, broader in practice and more influential at all levels and in all sectors of education. The discipline of ODDE has developed strong theories and advanced practice in a wide range of educational contexts, supported and informed by theories and concepts from multiple disciplines, including education, educational technology, media studies, computer science, learning science, and psychology. ODDE has combined many disciplinary approaches to the study of open and distance learning and digital learning. ODDE scholars who are chapter authors of the handbook conduct ODDE research in various academic fields and settings. They study ODDE from different perspectives and with different philosophies. The final result of their transdisciplinary endeavor is this handbook.

Thus, the handbook offers a transdisciplinary knowledge base in ODDE. The knowledge base offered here is what ODDE, as an academic and practical field, has learned about itself over time. It helps us identify and define problems in the field, and take certain positions or actions to solve those problems. At the same time, it influences, and is influenced by, advances in other fields and surroundings, and thus it is always growing and evolutionary in nature (Richey et al., 2010, p. 4). And eventually, this knowledge base in ODDE will help us create a coherent framework of ODDE to address unique problems involved in innovative and dynamic processes and products in open and distance learning, and technology-enhanced learning environments as Ren (2013, p. 10) similarly argued in the field of educational technology.

Given the urgent need for sharing knowledge and experiences in ODDE in light of the digital transformation and the current shift toward online teaching and learning, we are very proud that the handbook is published in an open access format and thus freely available to a global readership. We gratefully acknowledge the funding provided by the University of Oldenburg (Germany), Brigham Young University (USA), the International Christian University Tokyo (Japan), and the German Federal Ministry of Education and Research) that made this open publication possible. It would have been an irony to publish a volume on ODDE in a closed, conventional format, hidden behind a paywall.

We believe that the notable strength of this handbook is in the diversity of perspectives presented by our international authors who have created a comprehensive knowledge base to examine the effects and issues of ODDE. With a broad range of authors and editors coming from over 20 different countries in all parts of the world, this handbook offers truly international perspectives on ODDE. It brings together diverse views from the authors who have been involved in ODDE in various settings at all levels of education. In this way, the international community of scholars contributing to this handbook is shaping the field of ODDE by building on its historical roots – distance education.

We hope that these diverse views engage our readers in scholarly discussions of ODDE, and expand their knowledge as they explore the many issues raised in this handbook.

Olaf Zawacki-Richter and Insung Jung
Oldenburg and Seoul, July 2022

References

Bozkurt, A., & Sharma, R. C. (2020). Emergency remote teaching in a time of global crisis due to CoronaVirus pandemic. *Asian Journal of Distance Education, 15*(1), i–vi. https://doi.org/10.5281/ZENODO.3778083.

Collis, B., & Moonen, J. (2001). *Flexible learning in a digital world*. London: Kogan Page.

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020, 27 March). The difference between Emergency Remote Teaching and Online Learning. *EDUCAUSE Review*. https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning

Jung, I. (Ed.). (2019). *Open and distance education theory revisited*. Singapore: Springer.

Keegan, D. J. (1980). On defining distance education. *Distance Education, 1*(1), 13–36. https://doi.org/10.1080/0158791800010102.

Latchem, C. (2018). Australia. In A. Qayyum & O. Zawacki-Richter (Eds.), *Open and distance education in Australia, Europe and the Americas* (pp. 9–24). Singapore: Springer. https://doi.org/10.1007/978-981-13-0298-5_2.

Lea, M. R., & Nicoll, K. (2002). *Distributed learning—Social and cultural approaches to practice*. London: Routledge/Falmer.

Moore, M. G., & Kearsley, G. (1996). *Distance education: A systems view*. Belmont, CA: Thomson Wadsworth.

Naidu, S. (2003). Designing instruction for e-learning environments. In M. G. Moore (Ed.), *Handbook of distance education* (pp. 349–365). Mahwah, NJ: Lawrence Erlbaum Associates.

Osguthorpe, R. T., & Graham, C. R. (2003). Blended learning environments: Definitions and directions. *Quarterly Review of Distance Education, 4*(3), 227.
Ren, Y. (2013). Foreword. In J. M. Spector, M. D. Merrill, J. Elen, & M. J. Bishop (Eds.), *Handbook of research on educational communications and technology* (pp. vii–xi). New York, NY: Springer.
Richey, R. C., Klein, J. D., & Tracey, M. W. (2010). *The instructional design knowledge base: Theory, research, and practice*. New York, NY: Routledge.
Simonson, M., Schlosser, C., & Orellana, A. (2011). Distance education research: A review of the literature. *Journal of Computing in Higher Education, 23*, 124–142. https://doi.org/10.1007/s12528-011-9045-8.
Tait, A. (1999). The convergence of distance and conventional education. In R. Mills & A. Tait (Eds.), *The convergence of distance and conventional education: Patterns of flexibility for the individual learner* (pp. 141–148). London: Routledge.
Zawacki-Richter, O. (2009). Research areas in distance education: A Delphi study. *The International Review of Research in Open and Distributed Learning, 10*(3). https://doi.org/10.19173/irrodl.v10i3.674.
Zawacki-Richter, O. (2021). The current state and impact of Covid-19 on digital higher education in Germany. *Human Behavior & Emerging Technologies, 2*(5), 1–9. https://doi.org/10.1002/hbe2.238.
Zawacki-Richter, O., & Anderson, T. (Eds.). (2014). *Online distance education—Towards a research agenda*. Athabasca: Athabasca University Press. http://www.aupress.ca/index.php/books/120233.
Zawacki-Richter, O., & Latchem, C. (2018). Exploring four decades of research in Computers & Education. *Computers & Education, 122*, 136–152. https://doi.org/10.1016/j.compedu.2018.04.001.
Zawacki-Richter, O., & Naidu, S. (2016). Mapping research trends from 35 years of publications in *Distance Education*. *Distance Education, 37*(3), 245–269. https://doi.org/10.1080/01587919.2016.1185079.
Zawacki-Richter, O., Conrad, D., Bozkurt, A., Aydin, C. H., Jung, I., Kondakci, Y., . . . Xiao, J. (2020). Elements of open education: An invitation to future research. *The International Review of Research in Open and Distance Learning, 21*(3), 319–334. https://doi.org/10.19173/irrodl.v21i3.4659.

Part II

History, Theory, and Research

Introduction to History, Theory, and Research in ODDE

2

Towards an Informed Approach to ODDE

Junhong Xiao

Contents

Abstract

This introductory chapter explores the interrelationship and interplay between history, theory, and research in ODDE, demonstrating how they inform research and practice covered in the handbook. It is argued that lack of historical knowledge about ODDE, unawareness of ODDE theories, and negligence of the abundant research literature on ODDE have contributed to the marginalization of and prejudice against the field in the wider education eco-system, despite the fact that it has entered the "mainsteam" of education now. Compelling arguments are advanced for the relevance of history, importance of theories, and necessity of research to the sustainable growth of ODDE. The chapter then goes on to explain the structure of the section, drawing the readers' attention to issues worthy of further attention. It concludes with several implications from the other chapters in the section and a call for using them as a stepping stone to reimagining ODDE for the twenty-first century.

Keywords

ODDE · History · Theory · Research · Practice

J. Xiao (✉)
Shantou Radio & Television University/The Open University of Shantou, Shantou, China
e-mail: frankxjh@outlook.com

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_1

Introduction

Open, distance, and digital education (ODDE) has entered the "mainstream" of education (Xiao, 2018) and even becomes "normalized" during the COVID-19 pandemic (Bond, 2020; Bond, Bedenlier, Marín, & Händel, 2021). However, it has yet to be heartily embraced as a "normal" form of education in the way campus-based education is referred to, by default, as education. The bias against ODDE exists, whether we like it or not.

For years, the prejudice against ODDE is also embodied in its ownership. Education, including ODDE provided by conventional higher education institutions (HEIs), especially elite universities, tends to be more favorably perceived simply as a result of their high reputation as an academic institution, while ODDE offered by dedicated ODDE institutions continues to be questioned one way or another. The logic behind this prejudice is that conventional HEIs are inherently superior to ODDE institutions and that elite universities are the best in all fields, including areas where they do not have expertise. In the eye of many colleagues from conventional HEIs, ODDE is massive open online courses (MOOCs), and vice versa because they turn a blind eye to what ODDE institutions and researchers have been doing in the past decades. Due to this negligence and unfair treatment, even MOOCs or ODDE programs offered by elite universities leave much to be desired, a tendency which contributes to further stigmatization of ODDE by dedicated institutions (Bozkurt et al., 2020).

ODDE is a branch of the wider education sector with a much shorter history. However marginalized and stigmatized, ODDE has survived for over one century either as an alternative to "normal" education or as a "normal" model of education for many people. It will continue to "disrupt" education even if its Cinderella status remains unchanged. On the other hand, the role of ODDE as a savior during the COVID-19 pandemic is widely recognized (Bond, 2020; Bond et al., 2021) and its presence in campus-based education will be as robust in the post-COVID era as in the COVID-19 days, if not more deeply rooted. It will be here to stay and its value is unquestionable.

Nevertheless, it should be borne in mind that the presence of ODDE in the ecology of education does not ensure the realization of its affordances and fair treatment. To what extent can ODDE give full play to its value? How will it evolve in response to emerging situations? Will it be referred to as education rather than be distinctively labeled, as is the case of campus-based education? The answers to these questions depend on how much it is historically rooted, theoretically underpinned, and research-informed.

Relevance of ODDE History

Education is a social enterprise and does not exist in a vacuum. Learning from the history of ODDE enables us not only to avoid making the same mistakes occurring in the past (Moore, 2014) and/or new mistakes but also to revisit existing theories and develop new theories when the situation so requires (Jung, 2019). Unfortunately, history is an under-researched topic in the literature of ODDE (Moore, 2008). Having paid heavy prices for this lesson, we have yet to learn from it and are continuing to repeat past mistakes and making new ones.

ODDE was an innovation in education in the first place. Each generation of ODDE emerged and evolved out of specific contextual considerations. For example, in addition to the availability of new and emerging media, which is often deemed to be an essential characteristic of each generation of ODDE (Garrison, 1985), what was its value proposition? What was its mission? Who were its target beneficiaries? What pedagogy was advocated? What (learning) culture was it situated in? What role was expected of the institutions, teachers, and learners, respectively? What social support (e.g., infrastructure, government policy, funding opportunity, and so on) was available? How open and resilient was the "mainstream" education system? Things like these interact with each other and help define ODDE in a specific period of history and in a specific context, which in turn helps shape specific ODDE theories. It goes without saying that ODDE practice and theories are not uniform across time and context. Historical knowledge of a specific model of ODDE or a specific ODDE theory is essential for it to be used in another historical period and/or in another context. Only with historical knowledge can we make necessary adaptation, adjustment, and refinement in our own practice. What has proved to be effective in the past and/or in a certain context may not be equally effective at present and/or in another context. Similarly, what proved to be ineffective in the past in a specific context may turn out to be adequate today and/or in another context. This is the contextualization-generalization-recontextualization cycle of ODDE theory building and application as proposed by Jung (2020). And as more and more changes have taken place, new theories may be in need, hence, for example, the emergence of connectivism, rhizomatic learning, and heutagogy for contemporary networked learning (Blaschke, Bozkurt, & Cormier, 2021).

On the other hand, it is worth emphasizing that there are elements that are applicable to all contexts and in different historical periods. In fact, the core of an ODDE model or theory tends to be "universally true." Many lessons, both successes and failures, are relevant across time and context due to similarities in human learning patterns. For example, exclusive emphasis on learner-centered methods is doomed to be short of expectations despite the hype around this concept in recent decades. A typical case in point is the programmed learning advocated in the 1960s and 1970s which was designed to cater for learners' varying needs and enable learning in flexible sequences and at varying paces (Kay, Dodd, & Sime, 1968). Programmed learning did not survive in the ecology of education because of its lack of direct human interaction which is essential to successful education. Even the radical newer theory of connectivism acknowledges the necessity of some form of mediation (Downes, 2022). Similarly, over-emphasis on teacher-centered or lecture methods has led to failure of many technology-assisted innovations, from the 1926 Pressey Teaching Machine to the later computer-based teaching such as Computer-Aided Instruction (CAI), Computer-Based Training (CBT), and Intelligent Tutoring Systems (ITS) (Harasim, 2015). MOOCs are another case in point. Ignoring lessons learnt from decades of online education research, researchers are still looking for answers to questions, some of which were already answered by educational television researchers in the 1960s to the 1980s according to Baggaley (2017) who lamented the time and effort wasted by MOOC researchers in failing to learn from previous literature. For example, the failure of American radio and television in education was attributed mainly to the commercial broadcasters' attempt to prioritize advertising in their programs and teachers' unwillingness to adapt their pedagogy to take advantage of the technology. This remains one of the root causes of the failure to benefit from subsequent technologies today (Moore, 2014). Therefore, it is not surprising that "there has been a clear pattern of technologies that were going to change and save education but never did—over-promising and then under-delivering. The pattern goes back decades, and yet we continue to make the same mistakes" (Baggaley, 2014, p. 130).

Technologization of education, among other things, is a key factor contributing to the widespread disregard for ODDE history and its relevance to current research and practice in that "the mere thought of digital technology compels many people to look forward rather than back," an ahistorical approach – "anticipating what is about to happen with technology rather than attempting to make sense of what has already happened" (Selwyn, 2012, p. 216). A simplified view of education has prevailed in the education community in recent years, taking education for an issue of transmission of content, hence merely a technological issue (Harasim, 2015). MOOCs are the ultimate in this narrative. Located in the historical context of ODDE, MOOCs, especially the so-called xMOOC, are not a new concept at all (Bates, 2013; Romiszowski, 2013), not to mention small private online courses (SPOCs) championed by Harvard University (Coughlan, 2013). As pointed out by Daniel (2013), massive open courses have existed for over four decades. Both MOOCs and SPOCs are the norm of open universities around the world. So are flipped classroom and blended learning. For example, with an enrolment of around four million students at the Open University of China, it is not uncommon that certain courses are studied by tens of thousands or even hundreds of thousands of students at the same time. Yet, even such a respectable figure as Hunter Ripley Rawlings III, the President of the Association of American Universities, was surprisingly ignorant of the abundance of literature on online education contributed by the ODDE community in the past decades. He was quoted as saying ". . .there is very little good research on the best forms of online learning, and . . . there are no good studies on what constitutes bad online pedagogy, of which there is a fair amount" (O'Neil, 2013).

Importance of ODDE Theories

"There is nothing so practical as a good theory" (Lewin, 1952, p. 169). Unfortunately, theory is often associated with anything but practical and (even deliberately) neglected today. Theory is about how to "organize our knowledge... the reduction of our knowledge to the basic ideas, presented in a way that shows their underlying patterns and relationships" (Moore, 1991, p. 2). Good theories are applicable across time although adaptation and extension and even new theory building may be necessary to respond to emerging circumstances. The practical value of theory is self-evident. Theory can inform practice, help us see where we are and what we need to do, and keep moving the field forward. Unless theoretically underpinned, practice cannot stand the test of time, even if it is seemingly effective at the moment, and neither can it feed and advance theory in return. Only when theory and practice are mutually informed can ODDE be quality-assured. It is absurd that the importance of theory to the development of ODDE needs to be discussed and reiterated among academics. Such discussion and reiteration is absolutely necessary today, though.

Despite "clear evidence of a strong theoretical underpinnings and considerations" in decades of ODDE research (Prinsloo, 2018, p. 8), the field has been under-theorized or a-theoretical in recent years, a concern supported by numerous large-scale systematic literature reviews (e.g., Bartolomé, Castañeda, & Adell, 2018; Bond, Zawacki-Richter, & Nichols, 2019; Hew, Lan, Tang, Jia, & Lo; 2019; Zawacki-Richter, Marín, Bond, & Gouverneur, 2019). This a-theoretical phenomenon is also echoed by responses from "research active" researchers in the field of educational technology and educational media (Bulfin, Henderson, & Johnson, 2013) and Prinsloo's (2018) observation of the 2017 World Conference on Online Learning.

Are we entering a post-theory age? ODDE is not short of theories. There are classic theories and newer theories which are the results of dedicated research by the ODDE community ever since the beginning of ODDE practice. There are even theories and models of technology adoption and acceptance because ODDE has always been technology-mediated one way or another and to varying degrees throughout its history. The a-theoretical syndrome may be attributed to various factors. Disrespect for or unwillingness to learn from the ODDE history and its theories may be a major factor. Historically, academics treated ODDE with contempt, refusing to accept ODDE as part and parcel of the educational ecology and acknowledge its significant contributions to socio-economic development of the global community. The "deficiency" theory proposed by Hunter Ripley Rawlings, as mentioned above, exemplifies this mindset. Another major factor may be the popularity and hence predominance of Silicon Valley solutionism (Morozov, 2013), or the above-mentioned technologization of education, which, often accompanied by commercial motives, preaches the omnipotence of technology. According to this ethos, all educational problems are technological in nature and can be fixed by technology. Moreover, the more advanced a technology is, the more powerful and effective it is in enhancing learning outcomes. This groundless assumption is particularly prevalent today.

Necessity of Rigorous Research

Is a pedagogical intervention effective? Can it deliver its intended objectives? Have its hypotheses been verified? How well does it align with a theory? How can it be improved? What lessons can be learnt from it? In what ways does it contribute to the knowledge base of ODDE? How can it advance relevant ODDE theories? Such questions can only be answered through rigorous research. Nonetheless, it often happens that "the research we have is not the research we need," as this title of a journal article suggests (Reeves & Lin, 2020). Take the affordances of technology, for example. They have yet to be tested by rigorous research despite all the hype. For example, a review of 252 studies on learning analytics in higher education (2012–2018) indicates a paucity of evidence for large-scale deployment (6%), learning outcome improvement (9%), ethical use (18%), and learning and teaching support (35%) (Viberg, Hatakkab, Bältera, & Mavroudia, 2018). In addition to theory exemplification and advancement, rigorous research and practice inform and enhance each other. However, only when research is rigorously designed will this interplay ensue.

Rigorous research should be intended to solve meaningful problems, underpinned by a theoretical framework, grounded in relevant literature, and designed to be fit for the research purpose with proper data collection instruments and data analysis procedures to ensure the validity and reliability of the results. Unfortunately, it is not uncommon that research in ODDE lacks methodological rigor (Bulfin, Henderson, Johnson, & Selwyn, 2014; Panda, 1992; Simonson, Schlosser, & Orellana, 2011), is under-theorized (Jones & Czerniewicz, 2011; Markauskaite & Reimann, 2014; Saba, 2000), and/or concerns "isolated studies focused on new things rather than significant problems" (Reeves & Lin, 2020, p. 1999; also see Bulfin et al., 2013). For example, according to a systematic mapping review of 282 primary empirical studies on emergency remote teaching by HEIs during the COVID-19 pandemic (Bond et al., 2021), only 10.6% were built on a theoretical framework, 2.5% were designed as (quasi-)experiments, and 55.7% did not indicate even the time of data collection while 92.9% were cross-sectional studies. It should be noted, though, that these studies were mostly hasty in nature in an attempt to respond to the rapidly worsening COVID-19 crisis. However, this does not justify their lack of rigor. Results and conclusions from research of this kind beg the question of whether they are trustworthy and generalizable. These findings are shocking because what used to be the problems in ODDE research remain unsolved today or have deteriorated. For example, the reviews of Berge and Mrozowski (2001) and Lee, Driscoll, and Nelson (2004) show 6% and 12% of their samples (n = 890 and 383, respectively) adopted an experimental method. However, only 2.5 are found to be (quasi-) experimental in Bond et al. (2021). This phenomenon echoes Baggaley's (2017) argument that in online education, the problems of 10 years ago have grown worse today.

As an academic gatekeeper, I am fully aware of and deeply concerned about these counterproductive issues. The causes of this situation may be many and various. Still, I want to emphasize the imperative of fostering and enhancing research literacy among the academia. Only rigorous research can promote one's professional development both in terms of mastery and advancement of theory and improvement of practice; only rigorous research can add to the knowledge base of a field or discipline and advance theoretical evolution. Oftentimes, in my capacities as a regular reviewer of major journals and conferences as well as journal and book editor, I have the impression that many researchers are keen to take a shortcut to "success." For example, instead of taking great but absolutely necessary pains to familiarize oneself with key theories and seminal works in a particular field of study and keep updated on new research outputs by regularly following publications through rigorous peer-reviewed venues, there is a tendency to make a last-minute effort to catch up on relevant knowledge, for example, by conveniently turning to blogs, un-vetted online publications and conference papers/presentations (Baggaley, 2014) for "theory" and "research findings," quoting from sources with no expertise in ODDE such as *Harvard Business Review* and *MIT Review* or authoritative figures in fields other than ODDE (Prinsloo, 2018). These people seem to take it for granted that everything needed for research is just a click away from the Internet.

Some 35 years ago, the founding father of distance education, Charles A. Wedemeyer commented that "without it [research], we cannot pick up our field, raise its level, and improve its practicality" (Moore, 1986, p. 62). The importance of rigorous research cannot be over-emphasized.

Structure of the Section

The section starts with Michael Grahame Moore's account of key developments, trends, and players of ODDE in the past one-and-a-half century. Readers should be aware that Moore's account is primarily situated in the United States of America and Great Britain. Following Moore's chapter is Marco Kalz's review of open education (OE) from the perspective of social movement theory and his argument for an alternative direction for the development of OE. Knowledge of the ODDE history may inform the interpretation of OE as a social movement. The point is to what extent and in what aspects OE is a social movement and can draw on the latter theory to promote future work. Instructional design and technology have gone hand in hand in ODDE ever since its initial days. Michael H. Molenda traces the origins and development of instructional technology and design. The history of this area is embedded in and shaped by the larger societal system and practice, a point to be borne in mind today. Given that education is increasingly digitalized, Martin Weller's chapter explores the way in which digital education overlaps with OE and illustrates this intersection with five popular educational technologies. Readers are advised to further explore the interplay between educational technologies and OE by transferring Weller's arguments to other and/or emerging technologies. The history part of this section is wrapped up by Benedict du Boulay's chapter on artificial intelligence (AI) in education and ethics (▶ Chap. 7, "Artificial Intelligence in Education and Ethics"). Readers are encouraged to explore the open questions raised in the chapter and in particular to tackle AI in ODDE by building on du Boulay's brief account of implications for ODDE.

Since the 1960s, several ODDE theories have been well established in the field. Terry Evans and Viktor Jakupec analyze the contexts in which Otto Peters, Börje Holmberg, and Michael Grahame Moore built their theories and recent scholars validated, interpreted, and developed these theories. A key thread woven throughout the chapter is the interplay between theory and (contextualized) practice. With increasing popularity of digital learning, new theories have been built. This is what the chapter by Stephen Downes is about (▶ Chap. 9, "Newer Theories for Digital Learning Spaces"). Anchored to the historical context of ODDE development, Jon Dron and Terry Anderson analyze three pedagogical paradigms – objectivist, subjectivist, and complexivist – in the field and discuss three emerging paradigms – theory-free, cultural, and theory-agnostic. This is evidence of how theory shapes and is shaped by evolutions in practice. Given that motivation is essential to the success of ODDE, a chapter is devoted to motivation theories in which Clarence Ng introduces key theoretical perspectives on motivation, namely sociocognitive theories, sociocultural theories, and the concept of perezhivanie and discusses how each of them can inform understanding of ODDE and its practice. Ng's new insights into the interrelationship between motivation, empowerment, and ODDE can lead to new directions for research and practice. Like motivation theories, technology acceptance theories and models play an instrumental role in research and practice of ODDE. Andrina Granić gives a brief account of basic concepts and identifies major research themes and findings. Of particular value to readers may be the future research directions suggested.

The remaining two chapters focus on research trends in ODDE and research tools and methods. Olaf Zawacki-Richter and Aras Bozkurt use various bibliographic analyses to identify research trends. Their observation of the impact of COVID-19 on ODDE research and practice is worth further exploring. The last chapter by Heather Kanuka discusses research tools and methods from the perspectives of big science and little science (▶ Chap. 14, "Big Science and Little Science in Open and Distance Digital Education"). Given the emerging nature, these new tools and methods need to be validated, improved, or adapted through continuing empirical research.

Conclusions and Implications for Theory, Practice, and Research

This section aims to expound on the relevance of history, the necessity of theory, and the imperative of research to ODDE researchers and practitioners. By providing comprehensive, up-to-date overviews of the topics involved, the authors also draw on their expertise as renowned experts in their respective area of research to suggest directions for further research and practice.

Several implications can be drawn from this section. First, ODDE has a rich history, the lessons learnt from which are valuable to policy-makers, researchers, practitioners, and administrators alike. An adequate knowledge of this history enables us not only to avoid making mistakes, both old and new, but also to put theory into better use and enhance practice more effectively. Second, ODDE has developed its own theories and borrowed theories from other disciplines. There will be new theories to cater for the changing landscape. A-theoretical research is not research at all and a-theoretical practice is at most a one-off attempt. Third, ODDE is contextualized in terms of theory, research, and practice as well as in historical sense.

When adopting a theory, drawing on previous research findings, and/or following proven practice, contextual factors need to be taken into account. This contextualized nature also requires continuous innovation in theory enhancement/building, research, and practice in order to keep moving the field forward. Finally, research needs to be rigorously designed and conducted to inform practice while practice needs to build on relevant research to inform research. In summary, any improvisation of ODDE is doomed to failure.

Now is the best of all time for ODDE. ODDE has an unshakeable presence in the so-called mainstream education ecosystem. Moreover, pedagogically, it fits in with an increasingly technology-enhanced/mediated reality better than the traditional face-to-face mode of education. That said, there are and will be new issues to be addressed. For example, ODDE involves far more stakeholders, including micro-, meso-, and macrolevel actors, than it used to; the context in which it is implemented is far more digitalized and "intelligent" than in the past; it targets a whole spectrum of learners from K-12 to higher education instead of only those "nontraditional" learners; ODDE skills are a must to all instructional staff; newer technologies may be developed and used in education; new research findings from other fields may contribute to a better understanding of ODDE; national education policies may change to stimulate the expansion of ODDE scale and reach. The list can go on and on. It is time to reimagine ODDE. Each aspect of ODDE needs rethinking and re-inquiring to see whether it remains adequate or how it can evolve and adapt to the dynamic new context. The chapters in this section can serve as the starting points for ODDE's new journey in the twenty-first century.

References

Baggaley, J. (2014). MOOC postscript. *Distance Education, 35*(1), 126–132. https://doi.org/10.1080/01587919.2013.876142.

Baggaley, J. (2017). Where did online education go wrong? *Distance Education in China*, (4), 5–14. https://doi.org/10.13541/j.cnki.chinade.2017.04.001.

Bartolomé, A., Castañeda, L., & Adell, J. (2018). Personalisation in educational technology: The absence of underlying pedagogies. *International Journal of Educational Technology in Higher Education, 15*(14). https://doi.org/10.1186/s41239-018-0095-0.

Bates, T. (2013, June 26). MOOCs, MIT and magic [Blog post]. *Online learning and distance education resource*s. Retrieved from http://www.tonybates.ca/2013/06/26/moocs-mit-and-magic/

Berge, Z. L., & Mrozowski, S. (2001). Review of research in distance education, 1990 to 1999. *The American Journal of Distance Education, 15*(3), 5–19. https://doi.org/10.1080/08923640109527090.

Blaschke, L. M., Bozkurt, A., & Cormier, D. (2021). Learner agency and the learner-centred theories for online networked learning and learning ecologies. In S. Hase & L. M. Blaschke (Eds.), *Unleashing the power of learner agency* (pp. 47–56). EdTech Books. Retrieved from https://edtechbooks.org/up/pp

Bond, M. (2020). Schools and emergency remote education during the COVID-19 pandemic: A living rapid systematic review. *Asian Journal of Distance Education, 15*(2), 191–247. https://doi.org/10.5281/zenodo.4425683.

Bond, M., Bedenlier, S., Marín, V. I., & Händel, M. (2021). Emergency remote teaching in higher education: Mapping the first global online semester. *International Journal of Educational Technology in Higher Education, 18*, 50. https://doi.org/10.1186/s41239-021-00282-x.

Bond, M., Zawacki-Richter, O., & Nichols, M. (2019). Revisiting five decades of educational technology research: A content and authorship analysis of the British Journal of Educational Technology. *British Journal of Educational Technology, 50*(1), 12–63. https://doi.org/10.1111/bjet.12730.

Bozkurt, A., Jung, I., Xiao, J., Vladimirschi, V., Schuwer, R., Egorov, G., … Paskevicius, M. (2020). A global outlook to the interruption of education due to COVID-19 pandemic: Navigating in a time of uncertainty and crisis. *Asian Journal of Distance Education, 15*(1), 1–126. https://doi.org/10.5281/zenodo.3878572.

Bulfin, S., Henderson, M., & Johnson, N. (2013). Examining the use of theory within educational technology and media research. *Learning, Media and Technology, 38*(3), 337–344. https://doi.org/10.1080/17439884.2013.790315.

Bulfin, S., Henderson, M., Johnson, N. F., & Selwyn, N. (2014). Methodological capacity within the field of "educational technology" research: An initial investigation. *British Journal of Educational Technology, 45*(3), 403–414. https://doi.org/10.1111/bjet.12145.

Coughlan, S. (2013, September 24). Harvard plans to boldly go with "Spocs". *BBC Business News*. Retrieved from http://www.bbc.co.uk/news/business-24166247

Daniel, J. (2013). MOOCs: What lies beyond the trough of disillusionment? In *LINC 2013 conference*. Boston, MA: MIT. Retrieved from http://linc.mit.edu/linc2013/presentations/LINC2013Daniel.pdf

Downes, S. (2022). Connectivism. *Distance Education in China*, (2), 42–56. https://doi.org/10.13541/j.cnki.chinade.2022.02.005.

Garrison, D. R. (1985). Three generations of technological innovations in distance education. *Distance Education, 6*(2), 235–241. https://doi.org/10.1080/0158791850060208.

Harasim, L. (2015). Collaborative learning theory and practice: The missing link in effective online education. *Distance Education in China, 8*, 5–16. https://doi.org/10.13541/j.cnki.chinade.2015.08.002.

Hew, K. F., Lan, M., Tang, Y., Jia, C., & Lo, C. K. (2019). Where is the "theory" within the field of educational technology research? *British Journal of Educational Technology, 50*(3), 956–971. https://doi.org/10.1111/bjet.12770.

Jones, C., & Czerniewicz, L. (2011). Theory in learning technology. *Research in Learning Technology, 19*(3), 173–177. https://doi.org/10.1080/21567069.2011.632491.

Jung, I. (Ed.). (2019). *Open and distance theory revisited: Implications for the digital era*. Singapore, Singapore: Springer.

Jung, I. (2020). A contextualization-generalization-recontextualization cycle in open and distance education theory building and application: A cultural perspective. *Distance Education in China*, (8), 33–44. https://doi.org/10.13541/j.cnki.chinade.2020.08.005.

Kay, H., Dodd, B., & Sime, M. (1968). *Teaching machines and programmed learning*. New York, NY: Penguin.

Lee, Y., Driscoll, M. P., & Nelson, D. W. (2004). The past, present, and future of research in distance education: Results of a content analysis. *The American Journal of Distance Education, 18*(4), 225–241. https://doi.org/10.1207/s15389286ajde1804_4.

Lewin, K. (1952). *Field theory in social science: Selected theoretical papers*. London, England: Tavistock.

Markauskaite, L., & Reimann, P. (2014). Editorial: e-Research for education: Applied, methodological and critical perspectives. *British Journal of Educational Technology, 45*(3), 385–391. https://doi.org/10.1111/bjet.12154.

Moore, M. G. (1986). Speaking personally – With Charles Wedemeyer. *The American Journal of Distance Education, 1*(1), 59–64. https://doi.org/10.1080/08923648709526573.

Moore, M. G. (1991). Editorial: Distance education theory. *The American Journal of Distance Education, 5*(3), 1–6. https://doi.org/10.1080/08923649109526758.

Moore, M. G. (2008). Where is the historical research? *American Journal of Distance Education, 22*(2), 67–71. https://doi.org/10.1080/08923640802035014.
Moore, M. G. (2014). From radio to the virtual university: Reflections on the history of American distance education from one who was there! *Distance Education in China*, (1), 24–34. https://doi.org/10.13541/j.cnki.chinade.2014.01.008.
Morozov, E. (2013). *To save everything, click here: Technology, solutionism, and the urge to fix problems that don't exist*. London, England: Allen lane.
O'Neil, M. (2013, November 11). New council to develop standards, best practices for online learning. The Chronicle of Higher Education. Retrieved from http://chronicle.com/blogs/wiredcampus/new-council-to-develop-standards-best-practices-foronline-learning/48171
Panda, S. (1992). Distance educational research in India: Stock-taking, concerns and prospects. *Distance Education, 13*(2), 309–326. https://doi.org/10.1080/0158791920130211.
Prinsloo, P. (2018). What I heard and what I did not hear: Reflections on the world conference on online learning, Toronto, 2017. *Distance Education in China*, (12), 5–11. https://doi.org/10.13541/j.cnki.chinade.20180125.002.
Reeves, T., & Lin, L. (2020). The research we have is not the research we need. *Educational Technology Research and Development, 68*, 1991–2001. https://doi.org/10.1007/s11423-020-09811-3.
Romiszowski, A. (2013). What's really new about MOOCS? *Educational Technology: The Magazine for Managers of Change in Education, 53*, 48–51. Retrieved from http://www.mecd.gob.es/dctm/biblioteca/sumarios/pdf/educational-technology/2013n4.pdf?documentId=0901e72b816fb99b
Saba, F. (2000). Research in distance education: A status report. *The International Review of Research in Open and Distance Learning, 1*(1). https://doi.org/10.19173/irrodl.v1i1.4.
Selwyn, N. (2012). Ten suggestions for improving academic research in education and technology. *Learning, Media and Technology, 37*(3), 213–219. https://doi.org/10.1080/17439884.2012.680213.
Simonson, M., Schlosser, C., & Orellana, A. (2011). Distance education research: A review of the literature. *Journal of Computing in Higher Education, 23*(2–3), 124–142. https://doi.org/10.1007/s12528-011-9045-8.
Viberg, O., Hatakkab, M., Bältera, O., & Mavroudia, A. (2018). The current landscape of learning analytics in higher education. *Computers in Human Behavior, 89*, 98–110. https://doi.org/10.1016/j.chb.2018.07.027.
Xiao, J. (2018). On the margins or at the center? Distance education in higher education. *Distance Education, 39*(2), 259–274. https://doi.org/10.1080/01587919.2018.1429213.
Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education – Where are the educators? *International Journal of Educational Technology in Higher Education, 16*(39). https://doi.org/10.1186/s41239-019-0171-0.

From Correspondence Education to Online Distance Education

3

Michael Grahame Moore

Contents

Abstract

This chapter is about the history of open, distance, and digital education, with the primary focus on its evolving in the USA and Great Britain. A selection of key developments, trends, and players of more than 150 years includes reference to the nineteenth century correspondence schools, the American Land Grant universities, the pedagogical revolution in Charles Wedemeyer's Articulated Instructional Media project, and its influence on the teaching model developed in the UK's Open University. Brief coverage is included of the history of educational radio and television, the early computer networks, and the virtual classrooms. Knowledge of past achievements and failures is essential when planning for the future, and so the chapter aims to encourage research into personalization of learning in the correspondence tradition, most importantly research into institutional change and the reform of national systems.

M. G. Moore (✉)
College of Education, The Pennsylvania State University, University Park, PA, USA
e-mail: mgmoore@psu.edu

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_2

Keywords

History · Correspondence education · Broadcasting · Virtual classroom · Wedemeyer · Open University · Systems, Reform

Introduction

The history of open, distance, and digital education (ODDE) has been shaped by two complementary forces. One has been the ambition of a few educators in each generation to open opportunities for learning for anyone unable to attend a conventional school or university. Since this includes almost the whole adult population, distance education has featured largely in professional continuing education and other forms of lifelong learning. The other driving force in the history of distance education has been the use of communication technologies that bridge the distance between learners and educators.

Seen from this perspective, the modern field has evolved from a fusion of three traditions. These are the correspondence tradition of the nineteenth and early twentieth century, the "industrialized" tradition of the later twentieth century, and the digital virtual classroom of the twenty-first century.

The Correspondence Tradition

> *The teacher-pupil relation in correspondence study becomes very real, very personal, and indeed very intimate, surpassing that which is possible in mass instruction.* (Lighty, 1915)

Correspondence education, in which learners and teachers communicated by printed and written text, has been the dominant form of ODDE throughout history. This section summarizes some of the history between 1840 and 1970.

Correspondence education began in the middle of the nineteenth century, when the new technology of the railway made it possible for documents to be distributed at low cost to any destination. The first to use the mail for teaching were Isaac Pitman in the United Kingdom (UK), Charles Toussaint in France, Gustav Langenscheidt in Germany, H. S. Hermod in Sweden, and Anna Eliot Ticknor in the United States of America (USA). Correspondence teaching was a revolution in education. For the first time in history, it became possible to learn from a teacher without leaving home or moving to "a seat of learning," i.e., a university or school. It is doubtful if any other invention since the printing press has done more to open the benefits of learning to the majority of the population.

After nearly two centuries, correspondence courses have changed in many ways, but their fundamentals remain and are universal. The typical course is a series of lessons sent to each student by mail, with each lesson including an assignment to be completed by the student and returned by mail to the teaching institution, nowadays most likely by electronic mail or via the learning management system. The assignment becomes the basis for a dialogue between instructor and student, which makes the lesson, in the words of William Lighty (above), “very real, very personal.” However, to create lessons that introduce many students to the same content in ways that also enable a high degree of individualization and person-to-person dialogue requires sophisticated instructional design capabilities. This is what differentiates the good correspondence course providers.

Most early correspondence courses were, as we would say today, “noncredit” continuing education courses, taken by young adults seeking advancement in trade and professions. The for-profit institutions that sprang up to provide such courses were “open,” to the extent that there were no entrance requirements other than the ability to pay a tuition fee. Examples in the UK include Skerry’s College (1878); Foulks Lynch (1884); University Correspondence College, Cambridge (1887); and the Diploma Correspondence College (1894).

Universities in the UK and in Europe were uninterested in correspondence education, with one exception. Beginning in 1858, the University of London – at that time an examining body, not a teaching institution – made its degrees available to anyone who passed its examinations, regardless of where and how they studied, including study by correspondence; from 1920 it provided its own correspondence courses, in commerce.

A different view prevailed in the USA. A law passed in 1862, the Land-Grant College Act, together with the 1887 Hatch Act, provided the foundation for a uniquely American university culture, more “open” than the European. In the words of Governor LaFollette of Wisconsin in 1900: “The state will not have discharged its duty to the University, nor the University fulfilled its mission to the people until adequate means have been furnished to every young man and woman to acquire an education at home in every department of learning” (Hansen, 1998, p. 29). The funding of what became known as Land-Grant universities depended on their progress in this democratizing mission, and for that reason correspondence education became a strategically important tool.

Correspondence teaching at the degree level was already established in several private colleges, most prominent being the University of Chicago, where “... even courses in science, usually taught in a laboratory were carried by the postman” (Storr, 1966, p. 201). By the year 1930, correspondence courses in 39 American universities enrolled “about two million students ... four times the number of all the students enrolled in all the colleges, universities and professional schools” (Bittner & Mallory, 1933, p. 31). There was a boom also in courses taught by for-profit schools. Most famously, in Scranton, Pennsylvania, Thomas J. Foster established his Colliery Engineer School of Mines, renamed in 1891 the International Correspondence Schools (ICS), which by 1930 had four million enrollments. (ICS today practices under the name Penn Foster.) In 1902, ICS opened a school in the UK, which now operates as ICS Learn. Another boom – of fraudulent correspondence schools – led to the establishment in 1926 of the National Home Study Council (now the Distance Education and Training Council), set up to monitor the quality and business practices of for-profit schools.

Distance education was also used extensively in teaching children. As a forerunner of what is today called “blended learning” and was then called supervised correspondence study "the local high school secures the lessons, provides periods in the regular school day for study, supervises the pupils' work, and returns the lessons to the correspondence study center" (Broady, Platt, & Bell, 1931, p. 9). A conference on such supervised correspondence study held in Victoria, Canada, in 1938 was the founding of today's International Council for Open and Distance Education (ICDE) (Bunker, 2003). The Proceedings of ICDE conferences from 1938 until the present are a valuable source of information about correspondence education around the world (https://sites.psu.edu/acde/resources/international-museum-of-distance-education/).

Elsewhere in the world, correspondence courses featured prominently in several English-speaking countries with rural populations dispersed over large regions.

In Canada, courses began at Queen's University (1889), McGill University, and the universities of Saskatchewan (1912) and Alberta (1920). Their focus was the training of schoolteachers, while courses for children were run by the provincial departments of education. Eventually, correspondence courses were available from all ten provincial governments, thirteen universities, four institutes of technology, and from private schools. The prominent role played by government schools in Canadian correspondence education is revealed in a 1968 report, showing 87,692 students in schools run by the provincial governments compared to 16,048 in university courses (MacKenzie & Christensen, 1971, p. 281).

In Australia, the state of Victoria began courses for student teachers in 1910, the same year that courses in commercial subjects such as "health, meat or food inspectors or as local government clerks" began in New South Wales (ICCE, 1938, p. 26). The University of Queensland began its program in 1911. The Correspondence School at Blackfriars in Sydney was established in 1916, and by 1938 it had 6500 pupils and 150 teachers (ICCE, 1938, p. 20). In 1937, a Melbourne newspaper described "Victoria's largest school" of 2,300 correspondence pupils who "learn their lessons in lighthouses and circus tents, in lonely farmhouses and in mission stations," adding that "the teachers know each pupil more intimately than if he were one of a large class in a city school" (Preston & Campbell, 2019). In 1994 this school was renamed the Distance Education Centre of Victoria and in 2019 as the Virtual School of Victoria. From the 1930s, Australia's state education departments used broadcast radio programs and two-way shortwave radios to supplement their correspondence teaching.

The New Zealand Correspondence School Te Kura was established in 1922 to provide lessons to primary school children. The enrolment in 1938 was 2750 (ICCE, 1938, p. 57). Each university had a small program, until 1960, when Massey University began a national program. The Technical Correspondence School was set up after World War II to provide resettlement training for military personnel returning from service and later became the Open Polytechnic of New Zealand. A film "A Letter to the Teacher" offers an entertaining demonstration of the merits of correspondence teaching for children (NZonscreen, 1957).

In the Republic of South Africa (RSA), the history of correspondence education is dominated by one institution. The University of South Africa (UNISA) began its correspondence courses in 1946. The most prominent of African students during the years of apartheid were Nelson Mandela himself who obtained his BA degree and Robert Mugabe who earned a BA in Education. UNISA was always big. By 1970, six million parcels were mailed each year to 22,000 students taught by over 400 full-time academic staff (Diehl, 2011, p. 113). After its democratic system was set up in 1994, South Africa became one of the few countries to produce a national policy for open and distance education (SAIDE, 1995), assisted in the early years of its implementation by the World Bank's Telematics for African Development Consortium.

China's correspondence education began in the early 1900s when Yuanji Zhang, a publisher, established his Commercial Press Correspondence School (Jiang, 1954, p. 395, cited by Kang, 2010, p. 37). About the same time, America's International Correspondence Schools of Scranton established a branch in Shanghai (Jiang, 2008). The first university to offer correspondence courses was Renmin University of China, in 1953. A national program, with students in fourteen provinces, was started in 1958 by Beijing University of Posts and Telecommunications. By 1985, correspondence courses were offered by about one-third of all higher education institutions, with correspondence students making up one-third of total enrollment in higher education (Kang, 2010, p. 48).

In Sweden, Hermods Kerrespondensintitut, founded by H. D. Hermod in 1898, was the largest correspondence school in Europe in the 1960s enrolling 100,000 students a year. Hermods was Europe's pioneer of blended learning, which it called the "Robertsfors Method," with tutorial centers across Sweden to provide face-to-face support of the correspondence lessons. For much of its history Hermods' costs were borne by philanthropists, but in 1975 it became a for-profit company (Hermods, 2021).

In Russia, there were correspondence programs in the nineteenth century, but after the Soviet revolution, the method acquired strategic importance as a means of mass education and became integrated into the national educational system (Zawacki-Richter & Kourotchkina, 2012). In 1931 a special correspondence section was created in the Ministry of Education, and "correspondence institutes" were established in universities. By 1963 "The number of correspondence students . . . exceeded that of regular day enrollments . . .. 1.3 million in regular day classes . . . 1.4 million in correspondence education." " In the postwar period the preparation of educational specialists in the sciences was carried out largely through the correspondence graduate work" (Mackenzie & Christensen, 1971, pp. 351–352). It was reported that British Prime Minister Harold Wilson's interest in distance education – which led to his championing the idea of an Open University – was influenced by his visits to Russia, where he learned that 60% of Russian engineers earned their degrees through correspondence and radio courses (MacArthur, 1974, cited in Diehl, 2011, p. 48).

Radio and Television: A Bridge Between Correspondence Study and the Open Universities

Radio and television broadcasting helped to open educational opportunity in many countries but were most effective when married to correspondence teaching, most notably in the open universities of the 1970s.

The gold-standard for educational radio and television broadcasting was set in the 1970s by the UK's Open University (OUUK) (see more below) in its partnership with the British Broadcasting Corporation (BBC). The highest quality achieved in the USA was in the courses produced during the 1980s under the auspices of the Annenberg Foundation in partnership with the federal Corporation for Public Broadcasting (CPB). Some of these productions, such as "Destinos" and "Economics U$A," may still be viewed online (Annenberg Learner, 2021).

Radio broadcasting in the USA fell short of expectations. Between 1910 and 1930, at least thirteen universities offered university credit for classes on radio, and yet by 1940 all had collapsed (Pittman, 1986). Among reasons for this failure was the unwillingness of academics to accept the technical direction needed to produce a quality program. Frequently, a broadcast was merely the live transmission of a lecture from a traditional classroom.

The situation with television was not much better. Although broadcasts from the universities began in the 1930s, they were little more than televised classroom presentations. In 1956 the Chicago City Colleges established a TV College, the first to offer a baccalaureate degree through a telecourse, but it was not until the 1980s that television became a serious teaching medium. Dissatisfied with what had been characterized as "dull grey professors reading their dull grey notes on dull grey screens" (Brock, 1987, p. 36), several community colleges banded together to share production costs and so produce courses that exploited the strengths of the television medium – location footage, a variety of expert opinion, movement, and drama. Among the most successful were the thirty-seven colleges of the Southern California Consortium, the Dallas County Community College District in Texas, and the University of Mid-America, a consortium of eleven institutions in seven Midwestern states. In 1981 the Adult Learning Service (ALS) was established. This was a partnership between colleges and universities, local and national non-commercial broadcasters, and was America's "first nationally coordinated initiative designed to make college credit courses and other formal learning opportunities available through television to adults" (Brock, 1987, p. 34). Over 1200 post-secondary institutions – one-third of all in the USA – participated in offering 200 college-level courses, including those of the Annenberg/CPB Project, delivered to 600,000 students.

In Great Britain, in contrast to the USA, universities had no more interest in educational broadcasting than in correspondence teaching. The national broadcaster, the BBC, began a Schools Radio service in 1928, and by the 1970s around 90% of schools tuned into its programs (BBC School Radio, 2011). Radio programs for adults were directed at listening groups set up by organizations like the Women's Institutes, the YMCA, and the public libraries (BBC Yearbook, 1939). Television programming ceased during the Second World War, so television for schools only started in 1957 (BBC, 2021).

In China, Tianjin Radio and Correspondence University was founded in 1958, Beijing Television College and Shenyang Television University (TVU) in 1960, and Guangzhou TVU in 1961.

Radio has been widely used in literacy and adult basic education projects. UNESCO reported programs in nineteen African countries, seven South American, four Asian, three European, and five North American. Among many examples, in Congo Brazzaville, radio courses were followed by 53,147 persons, including those in "organized radio club groups" (Maddison, 1971, p. 6). In Mexico, programs were broadcast by 150 radio stations, and "about two million people are estimated to have derived real benefit from the courses" (Maddison, 1971, p. 10).

In the USA, a form of television that received much attention during the 1960s and 1970s was called Instructional Television Fixed Service (ITFS). This was a closed-circuit distribution system with a radius of about 25 miles (40 kms), used by school systems to share specialist teachers and cover low enrollment subjects.

The "Industrialized" Tradition and Open Universities

> *in traditional education, the teacher teaches; in distance education, the institution teaches.* (Keegan, 1980, p. 19)

This section describes two experiments that tested the concept of "articulating" technologies and specialists into a teaching system, thus contributing to the invention of open universities.

In writing about new perspectives on correspondence teaching, Wedemeyer and Childs (1961) devoted a chapter to the idea of linking technologies and people with different skills into a teaching system and quoted a speaker at the 1960 meeting of the National University Extension Association, R. C. Carpenter of the Pennsylvania State University, whose questions uncannily predicted the shape of distance education in the future open universities.

> What would result if the activity of correspondence studies were staffed . . . and serviced by highly qualified faculty members fully assigned and dedicated to correspondence work . . . if a concerted effort was made to design and produce the highest quality of course materials . . . if radio, television and practical audio-visual materials were used to compose a new platform . . . and utilize small student groups to reinforce learning? . . .. If correspondence could be freed from restrictive academic machinery . . . and given a chance for full development? (Wedemeyer & Childs, 1961, p. 73)

Two experiments were of prime importance in testing this idea about linking technologies. They have been widely overlooked in official histories, although their results helped determine the eventual shape of the OUUK and thus of modern distance education.

In the UK itself, the key project was a course in economics, taught by the department of adult education at the University of Nottingham in 1964. It consisted of 13 lessons, each of which linked a television program, printed study guide, and access to a local tutor. Key players in the project were department director, Professor Harold Wiltshire and course writers John Bayliss and Walter James. Television programs were broadcast on a commercial television channel. Assignments were mailed to the university and returned after evaluation and comment (Wiltshire & Bayliss, 1966).

In the USA, also in 1964, another project was underway, at the University of Wisconsin. The Articulated Instructional Media Project (AIM) offered courses in a variety of subjects, using correspondence and broadcast technologies, but also a wider range of technologies, such as audio tapes, home experiment kits, and mobile laboratories. However, the historical importance of AIM is not its technologies but its invention of a new way of organizing teaching. This was based on the idea that as well as linking (i.e., "articulating") a variety of technologies – it was also necessary to link the knowledge and skills of a variety of experts. Thus, AIM tested the idea of deconstructing the teaching process into its many component skills and re-assembling them into a *system*. Courses were first designed and then taught, not by individual teachers but by teams of specialists. Course design teams included specialists in instructional design and in each technology, together with content experts and specialists in learning and learner support – who later became known as tutors (Wedemeyer & Najem, 1969). Viewed from the perspective of the teacher-centered, "sage on the stage" tradition of higher education, this was revolutionary, demonstrating that "in traditional education, the teacher teaches; in distance education, the institution teaches" (Keegan, 1980, p.19).

In 1965 the creator and director of AIM, Charles Wedemeyer, arrived in England to meet with Nottingham's Wiltshire, Bayliss and James, and to these and others, he pointed out what he considered to be three flaws in his own project and the lessons to be learned. AIM, he said:

> had no control over its faculty, and hence its curriculum: it lacked control over its funds; and it had no control over academic rewards (credits, degrees) for its students. The implications were clear: a largescale, non-experimental institution of the AIM type would have to start with complete autonomy and control. (Wedemeyer, 1982, p. 23)

In September 1967, the Planning Committee of the OUUK began its work, with Wiltshire as a prominent member. In 1969 the university's first Vice-Chancellor Walter Perry invited Wedemeyer back to England to join him in planning the new distance teaching university. A unique and historically invaluable film of conversation between Wedemeyer, Perry, and James is available at International Museum of Distance Education & Technology | American Center for the Study of Distance Education (distanceeducationmuseum.com).

Other institutions that featured prominently as models during that planning included the University of South Africa (UNISA), the UK's National Extension College, and the University of New South Wales at Armidale, Australia (Sherow & Wedemeyer, 1990).

More than any other institution, the OUUK proved the viability of a systems model of distance education. What Nottingham and AIM demonstrated on a small scale, it demonstrated on a grand scale the effectiveness of pedagogical practices that were revolutionary in the freedoms they permitted the learner. These included not only access to instruction in places of the learner's choosing but a previously unheard-of freedom to choose content and even to choose among alternative teaching methods. Such freedoms became possible in a program of many courses, all structured in modules, in which the student can earn "credits" to accumulate toward a degree. The credit system that was an integral part of American higher education represented a massive reform in British practice. Not only could the student build a personal study package from the various courses offered but could also postpone study for a period, or even fail a course yet complete the degree – all eminently sensible options for adult, part-time learners, but foreign to the brutally competitive and selective higher education systems of Europe. Another American practice adopted (and spread) by the OUUK was that of "formative evaluation," determining a student's grade on a course by evaluating performance throughout the duration of the course, instead of evaluating solely on performance in a final examination.

Given the genesis of the OUUK in the idea of a University of the Air, it is noteworthy that the core teaching method was correspondence instruction – at first using traditional paper documents and later using digital technology. It should also be noted that since blended learning is such a popular concept today, face-to-face meetings between students and instructors at local study centers were designed into the budgets of every course.

With the success of the OUUK, many other countries followed in setting up similar national publicly funded, autonomous, distance teaching universities. They included: Spain (1972), Israel (1974), Germany (1974), Pakistan (1974), Canada – Alberta (1975), Costa Rica (1977), Venezuela (1977), Thailand, (1978), the Netherlands (1981), Sri Lanka (1981), Korea (1982), Turkey (1982), Japan (1983), Indonesia (1984), India (1985), Taiwan (1987), Jordan (1987), and Portugal (1988).

In China, the Radio and TV University (RTVU) was established by (then) Vice-Premier Xiaoping Deng, who is said to have been impressed by what he heard about the OUUK, described to him by former British Prime Minister Edward Heath (Wei, 2008, p. 45). The Central Radio and Television University (CRTVU) and 28 provincial RTVUs began teaching in 1979 with 115,200 students enrolled in diploma programs and 302,700 students in single courses (Yin, 1986).

Not all countries set up autonomous distance teaching universities, and in those that did not, distance education programs were embedded in their traditional institutions. Such programs could not enjoy the economies of scale that are essential to amortize the large investments needed to support high quality in designing and delivering technology-based programs. In some countries, institutions banded together to share their resources. Examples include: Federation Interuniversitaire de L'Enseignement a Distance in France, the Consorzio Per L'Universita a Distanza in Italy, and Contact North in Ontario, Canada. In Brazil, a unique consortia saw institutions from across the country contribute their specialists to virtual course teams assembled by the Ministry of Education to tackle a teacher education problem, the result being a high-quality distance education program that, in its first year, trained 27,000 rural school teachers (Moore, 2016).

In the USA, several consortia were set up, and most eventually broke up. One, a consortium of nine Midwestern universities called the University of Mid-America, put forward plans for an American Open University modelled on the British example, but their plans were thwarted (McNeil, 1993). Similarly, a proposed consortium of providers to build an "Open School" in Wedemeyer's own state of Wisconsin (Wedemeyer, Woods, & Moore, 1971) met political resistance and was stillborn.

Instead of building new systems, America experienced a frenzy of activity in satellite videoconferencing, more teaching by "dull gray professors reading their dull gray notes on dull grey screens." Examples include the National University Teleconferencing Network, a network of 250 universities, colleges, vocational and technical schools, and the National Technological University which delivered courses from some 50 institutions to downlinks in 500 locations. Many business corporations used satellite delivered teleconference programs for staff training. For example, IBM's Interactive Satellite Education Network had originating studios in four cities and receiving sites in twenty others. Teleconferencing was promoted for schools when a 1987 Act of Congress authorized $100 million to support the so-called Star Schools network, which covered 3,000 schools in 45 states.

Digital Technology: From the Virtual Classroom Back to Independent Study

With distance education embedded in conventional institutions, the concept of distance education as a personal tutorial was replaced by a focus on social interaction in virtual classrooms.

With the ubiquity of digital devices and the vast majority of educational institutions having some kind of embedded distance teaching program, distance education of a kind entered the educational mainstream. The role of the distance educator was no longer primarily that of a personal tutor but became one of managing learning as a social activity. Of course, these were not face-to-face groups, but "virtual groups," of individuals in different locations connected through digital networks. Managing learning as a social activity meant that teachers could perform more as they did in a traditional classroom, and virtual classes could be administered much like traditional classes in institutions' organizational structures. This trend gained momentum and foundational underpinning from the popular and widely disseminated theory of constructivism (Jung, 2019). Consequently, the virtual classroom became the dominant model of distance education in the twenty-first century.

The history of the virtual class can be traced back to the first computer-based educational networks in the early 1980s. These included BITNET ("Because It's Time Network"), founded by the City University of New York (CUNY) and Yale University, the (US) National Science Foundation Network (NFSNET), Australia's Academic and Research Network (AARNet), the UK's Joint Academic Network (JANET), and the China Education and Research Network (CERNET). Although these networks were used more for research than for teaching, a trickle of research studies began to build awareness of their potential as a medium of distance education. Examples of such early reports are those by Hiltz and Turoff (1981) about students' attitudes in the Electronic Information Exchange network and that of

Siegel et al. (1986) who described communication efficiency, user participation, and interpersonal behavior. The late 1980s also saw experiments at the Pennsylvania State University that explored the pedagogy of teaching in virtual groups, focusing on group dynamics, constructivist pedagogy, and what later became known as "social presence" (on this, see Garrison, Anderson, & Archer, 2003).

Following the invention of the World Wide Web, the Web browser Mosaic, high-speed networks, and handheld communications devices, the 1990s saw a scramble by universities and many school systems to set up their own web-based distance education programs. Some of these succeeded, such as Penn State's World Campus (2000), Oregon State University (2000), and University of Florida (2001). Others failed. The UK E-University closed in 2004, University of Illinois' Global Campus in 2009, and Columbia University's Fathom Knowledge Network in 2012. In universities and school systems that did not set up a dedicated system, classroom teachers were simply told to go online and teach. The quality of most such programs was, inevitably, dismal. This was dramatically exposed during the Corona virus pandemic of 2020–2021 when teachers were ordered to teach homebound students in what was called "remote learning," using live-streaming applications like Zoom and Skype. Faced by universal dissatisfaction with the results, politicians and administrators deflected attention from their failure to provide training and resources with promises of a swift return to the brick-and-mortar classroom. One invention that ameliorated the resulting chaos was the Learning Management System. For institutions that had established systems like Blackboard and WebCT, it was possible to not only distribute study materials but also give teachers support in basic instructional design, such as writing learning objectives, managing learner-learner interaction, and handling of assignments.

The end of the twentieth century saw the first steps in educational application of virtual reality. The Quantum Computer Service (later America Online) established a multiusers environment that allowed as many as 500 participants to interact through avatars – graphical representations of bodies and objects. Other early virtual learning environments included the Virtual Reality Multiuser Dungeon (VRMUD) and the Virtual European School Project (Bouras, Philopoulos, & Tsiatsos, 2001). Several desktop and web-based multiuser environments that "mimic a real university" are described by Monahan, McArdle, and Bertolotto (2008).

The first decade of the twenty-first century saw the universal take-up of what became known as Web 2.0, the social web. Using online platforms such as Facebook, Twitter, YouTube, Instagram, Snapchat, LinkedIn, and Pinterest, students could, in theory, participate in creating and distributing their own knowledge through such activities as blogging, tagging, and podcasting. The first decade of the twenty-first century also saw the invention of another form of web-based distance learning, Massive Online Open Courses (MOOCs). Beginning at the University of Manitoba in 2008, and boosted in the public eye by offerings from Stanford University and Massachusetts Institute of Technology, MOOCs soon became commercialized, leading companies being Udacity and Coursera. Udacity, by the end of 2012, had 370,000 students studying 18 different courses, while Coursera boasted 62 university partners in 11 countries. Most MOOC courses were for technical and professional training and continuing education (Brown, 2013).

An intriguing development in the early years of the twenty-first century was a revived interest in independent study, now referred to as personalized learning, reflected in such documents as the Organisation for Economic Co-operation and Development (OECD) report on Personalization in the School System (OECD, 2006). Notable among the pedagogical tools that support such personalization of learning were techniques associated with learner analytics, adaptive learning, competency-based education, and assessment of prior learning. It appears that the same digital technologies that spurred the development of online courses that mimicked the classroom might also offer tools to facilitate the kind of individualized learning that characterized the oldest form of distance learning, namely, the correspondence course.

A Note on History of Theory and Scholarship

The idea of distance education as a special field of study and research can be traced to G. B. Childs and Charles A. Wedemeyer (Diehl, 2019) in the USA and to Börje Holmberg and Otto Peters in Europe. Holmberg's (1960) treatise on teaching by correspondence was an early expression of a pedagogy of distance education, and his proposition that teaching by correspondence was a "guided didactic conversation" is widely cited as one of the founding theories. For his part, Peters published, as early as 1967 (in German), his theory of "industrialized education" (Peters, 2007). This theory, although independently arrived at, had much in common with Wedemeyer's theory of teaching as an articulated system. Wedemeyer also redefined correspondence education as "independent study," to show that learners are not only independent of teachers geographically but also, in those circumstances, may control much of their own learning (Wedemeyer, 1971). This idea of the learner's potential autonomy was taken up by M. G. Moore and linked to Peters' ideas about structure and Holmberg's concepts about dialog, in what became known as the theory of transactional distance (Moore, 1973, 2012). An exhaustive history of theory is found in Black (2004, 2019). Also refer to the chapter on theories in this handbook.

The history of distance education research and scholarship owes much to the research centers and scholarly journals that were established during the 1970s and 1980s. Research centers included: the Institute of Educational Technology (IET) at the OUUK; the DIFF at Tübingen, Germany; Central Institute for Distance Education Research (ZIFF) at the FernUniversität, Hagen, Germany; Centre for Distance Education (CDE) at Athabasca University, Canada; and the American Center for the Study of Distance Education (ACSDE) at the Pennsylvania State University, USA. The first scholarly journals, also established in the 1980s, were *Distance Education*, published by the Australian and South Pacific External Studies Association – the predecessor of the Open and Distance Learning Association of Australia, Inc. (ODLAA), the *Journal of Distance Education* by the

Canadian Association of Distance Education, the OUUK's *Open Learning*, and the *American Journal of Distance Education*, founded at the Pennsylvania State University.

Conclusion: The New Must Be Informed by the Old – Lessons from History

> If we, as distance educators today, are to have a rich knowledge base on which to construct, understand, and evaluate future choices, we must consider the important work done by distance educators from the last century. . . .. As stated by Thomas Mann (1965), the best response to the question of what to do in situations presenting many new choices is to "assist the new without sacrificing the old." (Bunker, 2003, p. 63)

The history of distance education provides many lessons to guide future practice and research. One is that, recognizing that every learner is different, educators must break free from the ancient preoccupation with the classroom and use well-tested instructional design and communication technologies to address that diversity. The lesson for researchers is that while continuing to inquire about the *social* dynamics of learning, more research is needed into the *personal* dynamics of learning, i.e., what goes on *inside* each student.

However, there is one lesson from history that stands out above all others. It is that only modest gains can be achieved by adopting new technology without changing teaching itself, from a single-person craft to a team process within a delivery system, and this requires broad and deep reform of educational institutions, especially their budgets and human resource management. Consequently, the most important historical research in the near future will be the study of institutional change, and the reform of national educational systems. In this, lessons may be learned from study of past successful innovations, and even more from the many failures. Why did the American Open University fail, and why was Wisconsin's Open School not implemented? What can be learned about successful national planning from Brazil's Proformacao teacher education project and South Africa's ODL policy, and why were these not sustained? Questions like these are questions about policy, leadership, and politics, and on the answers to these questions depends the future of distance education.

References

Annenberg Learner. (2021). Retrieved from https://annenberg.org/initiatives/annenberg-learner/

BBC. (2021). Television for schools begins. Retrieved from https://www.bbc.com/historyofthebbc/anniversaries/september/bbc-television-for-schools

BBC School Radio. (2011). In Wikipedia. Retrieved from https://en.wikipedia.org/wiki/BBC_School_Radio

BBC Yearbook (1939). Retrieved from https://worldradiohistory.com/UK/BBC-Annual/BBC-Year-Book-1939.pdf

Bittner, W. S., & Mallory, H. F. (1933). *University teaching by mail*. New York, NY: Macmillan.

Black, L. M. (2004). A living story of the origins and development of scholarship in the field of distance education (Order No. 3157520). Available from ProQuest Dissertations & Theses A&I. (305153532). Retrieved from http://ezaccess.libraries.psu.edu/login?url=https://www-proquest-com.ezaccess.libraries.psu.edu/dissertations-theses/living-story-origins-development-scholarship/docview/305153532/se-2?accountid=13158

Black, L. M. (2019). A history of scholarship. In M. G. Moore (Ed.), *The handbook of distance education* (4th ed., pp. 3–19). New York, NY: Routledge.

Bouras, C., Philopoulos, A., & Tsiatsos, T. (2001). E-learning through distributed virtual environments. *Journal of Network and Computer Applications, 24*(3), 175–199.

Broady, K. O., Platt, E. T., & Bell, M. D. (1931). *Practical procedures for enriching the curriculums of small schools*. Lincoln, NE: University of Nebraska.

Brock, D. (1987). And six to grow on. *The American Journal of Distance Education, 1*(2), 34–43. Retrieved from https://doi.org/10.1080/08923648709526582

Brown, S. (2013). Back to the future with MOOCs? *Proceedings 2013* ICICTE (237–246).

Bunker, E. L. (2003). The history of distance education through the eyes of the International Council for Distance Education. In M. G. Moore & W. G. Anderson (Eds.), *The handbook of distance education* (1st ed., pp. 49–66). Mahwah, NJ: Lawrence Erlbaum Associates.

Diehl, W. C. (2011). Learning at the back door: Charles A. Wedemeyer and the evolution of open and distance education (Ph.D. dissertation, The Pennsylvania State University). Retrieved from https://etda.libraries.psu.edu/files/final_submissions/6491

Diehl, W. C. (2019). Charles Wedemeyer: Visionary pioneer of distance education. In M. G. Moore & W. C. Diehl (Eds.), *The handbook of distance education* (4th ed., pp. 19–31). New York, NY: Routledge.

Garrison, D. R., Anderson, T., & Archer, W. A. (2003). Theory of critical inquiry in online distance education. In M. G. Moore & W. Anderson (Eds.), *The handbook of distance education* (1st ed., pp. 113–120). New York, NY: Routledge.

Hansen, W. L. (Ed.). (1998). *Academic freedom on trial*. Madison, WI: University of Wisconsin Press.

Hermods. (2021). Retrieved from https://de.wikipedia.org/wiki/Hermods

Hiltz, S. R., & Turoff, M. (1981). The evolution of user behavior in a computerized conferencing system. *Communications of the ACM* 24–11. Retrieved from https://dl.acm.org/doi/10.1145/358790.358794

Holmberg, B. (1960). *On the methods of teaching by correspondence*. Lund, Sweden: Gleerup.

ICCE. (1938). *Report of the first international conference on correspondence education*. Victoria, BC: The Department of Education, British Columbia.

Jiang, J. M. (2008). The genesis and evolution of correspondence in China. *Journal of Zhejiang Education College, 3*, 69–76.

Jiang, W. (1954). The early development of the Commercial Press and Zhonghua Shuju. In J. Zhang (Ed.), *The modern publication history in China* (Vol. IV, pp. 390–410). Beijing, China: Zhonghua Shuju Press.

Jung, I. (Ed.). (2019). *Open and distance theory revisited: Implications for the digital era*. Singapore: Springer.

Kang, H. (2010). *A comparative study of the distance education history in China and The United States: A socio-historical perspective*. Proquest Information & Learning No AAI3380928. Retrieved from https://etda-libraries-psu-edu.ezaccess.libraries.psu.edu/files/final_submissions/2324#

Keegan, D. (1980). On defining distance education. *Distance Education, 1*(1), 13–35.

Lighty, W. H. (1915). Correspondence-study teaching. In *Proceedings of the First Conference* (pp. 75–83). Madison, WI: National University Extension Association.

MacArthur, B. (1974). An interim history of the Open University. In J. Tunstall (Ed.), *The Open University opens* (pp. 3–17). London, UK: Routledge & Kegan Paul.

MacKenzie, O., & Christensen, E. L. (Eds.). (1971). *The changing world of correspondence study: International readings*. University Park, PA: The Pennsylvania State University Press.
Maddison, J. (1971). *Radio and television in literacy.* Paris, France: UNESCO. Retrieved from https://eric.ed.gov/?id=ED061493
McNeil, D. (1993). The rise and fall of a consortium. The story of the University of Mid-America. In L. Moran & I. Mugridge (Eds.), *Collaboration in distance education* (pp. 123–131). London: Routledge.
Monahan, T., McArdle, G., & Bertolotto, M. (2008). Virtual reality for collaborative e-learning. *Computers & Education, 50*, 1339–1353.
Moore, M. G. (1973). Towards a theory of independent learning and teaching. *Journal of Higher Education, 44*, 661–679.
Moore, M. G. (2012). The theory of transactional distance. In M. G. Moore (Ed.), *The handbook of distance education* (3rd ed.). New York, NY: Routledge.
Moore, M. G. (2016). Brazil's PROFORMAÇÃO project: A case study of an integrated virtual system for delivering in-service teacher education. *The American Journal of Distance Education, 30*(4), 272–274. Retrieved from https://doi.org/10.1080/08923647.2016.1232998
NZonscreen. (1957). *A letter to the teacher*. Film retrieved from https://www.nzonscreen.com/title/a-letter-to-the-teacher-1957
OECD. (2006). *Personalizing education: Schooling for tomorrow.* Paris, France: OECD Publishing. Retrieved from https://www.oecd-ilibrary.org/education/personalising-education_9789264036604-en
Peters, O. (2007). The most industrialized form of education. In M. G. Moore (Ed.), *The handbook of distance education* (2nd ed., pp. 57–68). Mahwah, NJ: Lawrence Erlbaum Associates.
Pittman, V. (1986, March/April). Station WSUI and the early days of instructional radio. *The Palimpsest*. Retrieved from https://ir.uiowa.edu/cgi/viewcontent.cgi?article=4778&context=palimpsest
Preston, L., & Campbell, J. (2019). Correspondence School of Victoria – Its first 60 years. *Dictionary of educational history in Australia and New Zealand*. Retrieved from https://dehanz.net.au/entries/correspondence-school-of-victoria-its-first-60-years/
SAIDE. (1995). *Open learning and distance education in South Africa*. Manzini RSA: Macmillan Boleswa.
Sherow, S., & Wedemeyer, C. A. (1990). Origins of distance education in the United States. In D. R. Garrison & D. Shale (Eds.), *Education at a distance: From issues to practice* (pp. 7–22). Malabar, FL: Robert E. Krieger.
Siegel, J., Dubrovsky, V., Kiesler, S., & McGuire, T. (1986). Group processes in computer-mediated communication. *Organizational Behavior and Human Decision Processes, 37*, 157–187.
Storr, R. J. (1966). *Harper's university, the beginnings: A history of the University of Chicago*. Chicago, IL: Chicago University Press.
Wedemeyer, C., Woods, C., & Moore, M. G. (1971). *The Open School*. Madison WI: State Department of Education.
Wedemeyer, C. A. (1971). Independent study. In L. C. Deighton (Ed.), *The encyclopedia of education* (Vol. 4, pp. 548–557). New York, NY: Free Press.
Wedemeyer, C. A. (1982). The birth of the Open University, a postscript. *Teaching at a Distance, 21*, 21–27.
Wedemeyer, C. A., & Childs, G. B. (1961). *New perspectives in university correspondence study.* Chicago, IL: The Center for the Study of Liberal Education for Adults.
Wedemeyer, C. A., & Najem, R. E. (1969). *AIM – From concept to reality: The Articulated Instructional Media program at Wisconsin*. Syracuse, NY: Syracuse University.

Wei, R. F. (2008). *China's radio and TV universities and the British Open University: A comparative study*. Nanjing, China: Yilin Press.
Wiltshire, H., & Bayliss, F. (1966). Teaching through television. In C. A. Wedemeyer (Ed.), *The Brandenberg memorial essays on correspondence instruction II* (pp. 3–49). Madison, WI: University of Wisconsin Extension.
Yin, W. Z. (1986). An overview of the development of the Central Radio and Television University. *Television University, 2*, 45–47. Retrieved from https://kns.cnki.net/kcms/detail/detail.aspx?FileName=DDJY198602017&DbName=CJFQ1986
Zawacki-Richter, O., & Kourotchkina, A. (2012). The development of distance education in the Russian Federation and the former Soviet Union. *The International Review of Research in Open and Distributed Learning 13*(3), 165–184. Retrieved from https://doi.org/10.19173/irrodl.v13i3.1165

4 Open Education as Social Movement? Between Evidence-Based Research and Activism

Marco Kalz

Contents

Abstract

This chapter analyzes open education initiatives through the lens of social movement theory. Open education is introduced as a field with multiple dimensions, activities, and perspectives. Social movement theory is used to discuss along the dimensions of conflict and protest, cultural representation, values and collective action, and the influence of the social, political, and cultural context. Accordingly, epistemic communities are proposed as an alternative development direction for the field.

Keywords

Open education · Open educational resources · MOOCs · Social movement theory · Epistemic community · Research

M. Kalz (✉)
Heidelberg University of Education, Heidelberg, Germany
e-mail: kalz@ph-heidelberg.de

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_3

Introduction

Open education has developed as an emerging field of research and practice in higher education. Building on the work of open and distance teaching universities, the field has launched several initiatives to open up higher education to learners outside of the educational institutions (Sabadie et al., 2014). The main patterns of work in the open education community in recent times have been related to open educational resources (OER) and massive open online courses (MOOCs). While the first theme focuses mainly on licensing questions of learning resources, the second theme concentrates mostly on open educational practices (OEP) in large-scale open online courses. Several citation analyses have shown that only a relatively weak connection exists between these two thematic communities of interest (Park & Shea, 2020; Weller, 2020; Weller et al., 2018). Furthermore, a recent study analyzed the commonalities and differences of implementation dynamics of OER and MOOC projects in Dutch higher education (Schophuizen et al., 2020), revealing some subtle but important differences when it comes to implementation strategies for open education in higher education.

The work on OER was initiated by the OpenCourseWare Movement and recently translated into a recommendation by UNESCO (UNESCO, 2019). The focus of the OER community has been on the publication of learning resources under an open license to allow the reuse and adaptation of (digital) learning resources. While in early stages of research on OER multiple forms of reuse were explored (Rensing et al., 2005), the prominent 5R framework is frequently used to discuss the dimensions of openness and reuse (Wiley, n.d.), covering five aspects of the use and development of OER: **r**etain, **r**euse, **r**evise, **r**emix, and **r**edistribute.

Research on MOOCs has focused mainly on challenges arising from large-scale openly accessible courses provided by (formal) higher education institutions (through open-source or commercial platforms) but used for nonformal learning by a variety of learners (Kalz & Specht, 2013). Prominent research questions in this subcommunity deal with design challenges for feedback and assessment (Joksimović et al., 2018; Kasch et al., 2021), self-regulated learning in open courses (Jansen et al., 2020), and last but not least, the fundamental question of how learning can be analyzed and success can be defined in this specific educational context (Henderikx et al., 2017; Rabin et al., 2020a).

Overall, the development of and research on open education is labelled as dynamic and multifaceted, more than just about OER and/or MOOCs (Zawacki-Richter et al., 2020). The underlying theoretical rationale is not without its criticisms, and more empirical evidence is needed in favor of open education. In an assessment of the OER research hub, Shear et al. (2015, p. 21) state that a “critical mass of high-quality and empirical OER research was not available [in 2012],” questioning the overall impact of activities around OER. Knox (2013) criticizes the missing educational concept or vision of OER, the strong emphasis on freedom leading to a devaluation of teachers and educational institutions and finally the unquestioned assumption of an independent and self-regulated learner. Edwards (2015) analyzes the discourse around openness in education and concludes that every definition of openness also implies a definition of closedness and the value proposition surrounding this dichotomy. Bayne et al. (2015, p. 248) complain that the open education discussion "too often tended towards optimism, advocacy, and conviction." On the other hand, MOOCs have been criticized for not contributing to democratization of (higher) education (Hansen & Reich, 2015) and for favoring a dominant Western model of education and knowledge (Altbach, 2014).

Despite the tensions identified in the research themes, the term of "open education movement" was coined (Baraniuk, 2008; Conole & Brown, 2018; Farrow, 2017), suggesting a systematic and concerted body of activities around the opening of (higher) education with digital technologies. Weller (2014) even speaks of an "open movement," stressing the importance of involving activities far beyond the education sector. In this chapter, the existence of an "open education movement" will be analyzed from the perspective of social movement theory (SMT). An analysis will be conducted of the extent to which we can speak of open education movement as a social movement. While this question may seem to be purely academic, the intention is to show its relevance to the identity of the open education community and to help develop a stronger theoretical basis. In addition, some practical consequences of this question will be identified.

The chapter is structured as follows: In the next section, SMT is introduced as the theoretical lens through which open education as a scholarly community will be analyzed. Based on this theoretical foundation, a research framework will be proposed. This framework will then be used to analyze the discourse and activities pertinent to open education. Finally, results of the analysis will be discussed, and implications be drawn for future research and practices in the domain.

Social Movement Theory

SMT is a sociological theory with the aim of understanding and explaining how social movements as collective actions of multiple individuals are formed, developed, and transformed. A working definition of social movements is provided by van Stekelenburg and Klandermans (2009, pp. 20–21) who define social movements as "interlocking networks of groups, social networks and individuals and the connection between them with a shared collective identity who try to prevent or promote societal change by non-institutionalized tactics." The authors provide a comprehensive overview of SMT and differentiate between structural approaches and social constructivist approaches to social movements.

Structural approaches to social movements study how the social and political context influences the establishment of social movements. Main research directions include the distribution of resources (resource mobilization) and the political environment. Resource mobilization research focuses mainly on internal processes of a social movement and puts less emphasis on grievances. This theoretical stance has been criticized for drawing its assumptions mainly from economic frameworks. Scholars focusing on the political environment of social movements look mainly at external factors influencing social movements. Their main assumption is that social movements are adapting according to changes in political environments. In contrast, the new social movement (NSM) approach falls under the social constructivist approaches and deals with effects of modernization on marginalized groups of the society. Identity and the construction of identity by these groups are the core topic of this research direction which focuses on the perception and interpretation of material and sociopolitical conditions by individuals and groups. Reality, including threats and opportunities, is socially constructed from this perspective, and group identification plays an important role in the participation in social movements.

Della Porta and Diani (2015) summarize the common research interests of the field of social movement studies as follows:

1. “individuals critical of the status quo and prepared to engage in protest;
2. organizational forms intent on encouraging rank and file participation and bottom-up forms of deliberation;
3. public challenges to powerholders, often linked in chains of protest events;
4. actions providing goods to movement constituencies, and facilitating experimentation with alternative lifestyles” (pp. 4–5).

This summary shows that SMT consists of multiple perspectives to explain human action and social change. In this chapter, SMT will be used as a research framework to analyze whether and to what extent open education can be seen as a social movement. As a research framework, the guiding questions proposed by Della Porta and Diani (2020) will be employed and those four categories are applied to the open education theme. According to the authors, any study of a social movement needs to answer the following questions:

1. **Conflict and protest**: What are the underlying conflicts which open education focuses on? Do these conflicts change over time?
2. **Cultural representations**: What are the cultural representations used by actors in open education in the social conflict? How are problems in open education identified as objects for collective action? How are actors becoming involved in the collective action in open education? How are specific events recognized as part of the same social conflict? Where do cultures and values of open education come from?
3. **Values and collective action**: Which values, interests, and ideas get turned into collective action in open education? What are the mode and costs of this protest? How are the identities, symbols, emotions, organizations, and networks in open education perceived when explaining the initiation and persistence of the collective action? What forms do organizations take to maximize their strength and collective outcome?
4. **Influence of social, political, and cultural context**: How do social, political, and cultural contexts affect the success and forms of activities in open education? How does collective action work against holders of power? How is protest manifested and how does the form of protest change over time?

These questions can serve as a guiding framework to assess the extent to which open education can be perceived as a social movement as proposed earlier by researchers in the field.

Open Education from the Perspective of SMT

Conflict and Protest in Open Education

What are the underlying conflicts which open education is focusing on? One of the common themes of research and practice in open education is the joint *goal to increase access options to (higher) education with digital technologies*. In terms of conflicts, this notion can be connected to discussions around equality and fair allocation of chances to participate in education. Historically, a specific set of institutions such as open and distance teaching universities was established with the mission to allow flexible access to higher education and to offer options for the so-called "second chance" students, who did not have access to higher education in their initial education (Guri-Rosenblit, 1999). This *institutionalized widening of participation* in higher education has been later extended, via the open courseware movement and the publication of open educational resources, into opportunities to make use of resources from the formal educational system in a nonformal learning context (Sabadie et al., 2014). This central notion of increasing access has been later further extended via MOOCs but with more focus on access to learning opportunities than (reuse of) resources. Without focusing so much on the differences between these two types of activities, we can deduct that one of the central activities of open education is converting formerly inaccessible learning opportunities into public goods via the means of digital technologies.

Can we interpret this as a form of protest? According to Deimann and Sloep (2013), the origins of open education were rooted in dissatisfaction with and protest against the established educational system. This is also in line with earlier understanding of open education in which alternative pedagogical models in school education were subsumed under this concept. Van Mourik Broekman et al. (2014) mention several dimensions of protest underlying open education: protest against austerity, commercialization of higher education, unfair societal allocation of power and resources, and privatization of the public education sector. In this context, research attention has recently been directed towards social justice as a new paradigm for open education (Hodgkinson-Williams & Trotter, 2018; Lambert, 2018). Hodgkinson-Williams and Trotter (2018) approach the topic of social justice with regard to outcomes and processes of open education and a potential "economic maldistribution, cultural misrecognition and political misframing" (p. 207) and provide a wide range of contextual evidence on effects and needs from the context of OER. Lambert (2018) discusses social justice from the dimensions of redistributive, recognitive, and representational justice, and assigns exemplary activities to those categories for which a qualitative content analysis is conducted of 18 so-called "foundational texts."

It is an open question whether the sharing of resources, provision of access to open courses, or the analysis of social injustice in academic communities can be interpreted as an activity of protest against, for example, unfair distribution of chances to enter (higher) education and whether this activity is a sufficient sign of a social movement. In addition, if these actions take place only inside of academic communities, they mainly fall into the category of conventional actions in the taxonomy of protest developed by Caiani et al. (2012). In this taxonomy, five different levels of protest are differentiated ranging from conventional actions to violent actions. Conventional actions are the lowest level of protest and are represented by lobbying activities, for example. On a higher level are demonstrative actions which are represented by dedicated events and protest activities. Expressive actions address directly sympathizers outside of the social movement. Last but not least, two levels of aggressive actions form the highest level of protest involving illegal demonstrations and violence.

Social movements are, according to Della Porta and Diani (2020), different from other kinds of collective communities. The authors differentiate the so-called "epistemic communities" from social movements and point to the difference in key actors of these kinds of communities: "Epistemic communities involve actors usually endowed with decision-making power and certified knowledge" (p. 28). In this context, we would need to ask ourselves whether and how we include actors with no decision-making power and less certified knowledge into the discourse on open education.

Cultural Representation

As discussed in the introduction, the cultural representation of the open education community centers around the provision of learning opportunities, either through the publication of resources or access to open courses. Mostly, either institutions or actors from public bodies are involved in publication of resources and development of open courses. The assumed "innovation direction" is here from institutions to an unspecified body of individuals as users of these resources (Rabin et al., 2020b). Much less focus has been on cultural representations which are not coming from institutions or which take other forms. The vast number of learning communities and self-help portals has been, for example, mostly ignored in the discourse on open education although they provide excellent contexts for a different type of educational scenario compared to the classical "course metaphor" (Borkman, 1999). These communities also practice some form of open education which has been widely ignored in the scholarly community. Extending the focus on this type of cultural representations would lead to a more inclusive approach for open education.

While it is a very valid discussion that learning resources financed via public money should be publicly available, the resource-centric perspective on the production of learning material neglects a large part of what education is about and also ignores the conditions under which learners are able to make use of this specific type of educational offer (Knox, 2013). Della Porta and Diani (2020) discuss the production of public goods as a central activity of social movements but warn at the same time that these kinds of solutions do not "imply redistribution of power nor alterations in social structure, but focus instead on service delivery, self-help, personal and community empowerment" (p. 23). In this context, it is an open question whether the sharing of OER or the provision of access to open courses is sufficient to influence power structures or whether we do not put too much responsibility on the individual learner.

Values and Collective Action

A third aspect of social movements relates to shared values and collective action. An unquestioned value of open education can be formulated as improving the provision of access to (higher) education for learners who do not have access to learning opportunities for whatever reasons (Kalz, 2014) or phrased differently as the reduction of structural constraints on education. Furthermore, openness has been used as a connector to combine activities in areas like research (open access), scientific practices (open science), or management (open policy) (Weller, 2014). Edwards (2015) provides some examples of potential values underlying openness and open education. He mentions, for example, the need to create more flexible educational careers to ensure employment as one of the motivations and values underlying open education or the accumulation of more cultural capital as a more consumption-oriented foundation of open education.

In terms of addressing and improving access issues to higher education, the focus on resources and course development can be very unspecific compared to dedicated programs for minority groups, for example. In this sense, the investment of resources into unspecific sharing activities might be less effective than a dedicated development effort which puts less emphasis on advocacy or training for licensing than on quality of resources and impact. Interestingly, these economic investment efforts for OER are only calculated, for example, in terms of cost-saving effects on the student side (Hilton III et al., 2014), but other economic and effectiveness dimensions are neglected. In this sense, a broader economic assessment of the investment in the development of open education would be needed which could provide a better picture with respect to effectiveness of interventions. By setting openness and licensing as a "holy grail" of open education, other potential interventions are ignored, potentially resulting in less equality.

Lane (2016, pp. 32–33) differentiates four layers for collective action in open education which all relate to emancipation:

1. "emancipation of people *through* education" whereby education can be a means through which individuals can understand and work against structural constraints in society.
2. "emancipation of learners and teachers *within* education," referring to overcoming restrictions which the current educational system applies (systematically) to learners and teachers.

3. "emancipation *of* education" which relates to the emancipation of education as a discipline, policy area, and practice from structural constraints.
4. "emancipation *from* organized education," enabling individuals to become self-regulated learners who can take away some structural constraints in the sense that learning will be possible without dependency on educational institutions.

All these dimensions are subject to collective action in open education and the discourse does often not differentiate between these dimensions and their implications.

Influence of Social, Political, and Cultural Context

As a final dimension, one of the core questions for social movement analysis is the influence of the social, political, and cultural context on a social movement. The strong focus on property rights and alternative licensing options of OER can itself be regarded as a cultural reflex to set something against restrictive use of digital resources. Overall, the increasing commercialization and market-driven innovation of higher education infrastructures is another influencing factor which could motivate others to become an "open education supporter." The recent decision of the Massachusetts Institute of Technology (MIT) to sell one of the few remaining and largest MOOC platforms to a commercial company (MIT, 2021) is just another brick in the wall of a long history of institutional digital innovation projects which have later lost their open (source) direction and have been taken over by commercial companies. Williamson and Hogan (2021) provide a coherent collection of examples of the intensified commercialization of higher education during the Covid-19 pandemic.

Especially questions related to knowledge infrastructures and resource streams between the public sector and the open education space have not been sufficiently studied. Many assumptions about the replacement of parts of the higher education space with open education have not been met (Rabin et al., 2020b). While open education projects might start initially with the idea of an open knowledge infrastructure (Edwards, 2015; Kalz et al., 2020), these basic assumptions of the digital backbone for open education projects are often not sustained. In this context, we can see that open education can function as a double-edged sword: While striving for more openness in education and less (financial) barriers may result in an improvement on a short-term basis, the uninstitutionalized effort could lead in a longer term to unwanted outcomes such as privatization or the takeover of public infrastructure by commercial companies.

Discussion

Open education as a multifaceted concept with many dimensions and topics is entangled in scholarly activities, advocacy activities, political discourse (especially around the UNESCO declaration on OER), and finally training and knowledge sharing activities. This complexity of activities and broadness, combined with an inconclusiveness regarding the course of actions, target groups, problems to be addressed, and social benefits, contributes to a problematic identification of a real "center" of open education as a social movement.

While open education might be focusing on the surface *social conflicts*, the highly academic nature of discourse undermines the potential to involve other actors in the discourse. What is worthy of notice is the unclear picture of the stakeholders for which the open education scholarly community is working. Who are the specific marginalized and disadvantaged communities which are targeted with open courses, OER, and design approaches for social justice? A logical next step for the open education community would be similar to what the medical research community has realized over the course of the last 10 years. More and more researchers from this community do not talk about stakeholders but *with stakeholders*. Furthermore, many medical conferences engage patients in the academic discourse (Chu et al., 2016) and journals include patients on the editorial board (PatientsIncluded, 2016). For this purpose, a clearer picture of the stakeholders of open education would need to be developed and those stakeholders would need to be explicitly included in the discourse to move open education towards a social movement. This would imply that the disadvantaged learners and learners without access to educational opportunities would be enabled to contribute to the discourse on open education.

Currently, most activities do not contribute sufficiently to *protest* and do not seriously involve other parties in the discourse outside of academia.

The production of public goods as *cultural representation* is one of the central activities of open education with OER and open courses at the center mainly contributing to a reproduction of social norms within the higher education system. *Values* are shared on a high level (access and openness principles) while implications and tensions stemming from these principles are not sufficiently addressed and discussed. By stressing the importance of open and independent learning and publicly available resources, the community might unintentionally contribute to a neoliberal stance on lifelong learning (Barros, 2012) and educational technology (Jones, 2019) in which educational institutions are playing a minor role in the life of individual learners and an autonomous and self-directed learner is taken for granted. Furthermore, Della Porta and Diani (2020) remind us that "producing public goods, or expressing support for some moral values or principles does not automatically correspond to social movement action; the latter requires the identification of targets for collective efforts, specifically articulated in social or political terms" (p. 21). In this light, we should ask ourselves critically whether the licensing of resources or the development and publication of an open course can already be regarded as a social or political activity or whether it is just a side activity and product of another professional context.

The social, political, and cultural context has a high level of influence, but events do not lead necessarily to a "community response" in the way it would be expected from a social movement. In a similar manner, van Mourik Broekman et al. (2014) raise doubts that the uncritical adoption of protest started outside of the higher education context for the discourse inside academia might take away the original intention of this form of protest. Reflecting on the efforts around the UNESCO declaration on OER and also looking at policy projects on OER in some European countries, one can also ask whether the goals and values are not mistakenly exchanged with the means. It seems that open licensing is the goal and not the means to reach more equality and fairness in (higher) education. Huge investments into the development of OER portals by the European Commission, for example, in the policy support program, have lacked sustainability and no real effectiveness studies of these investments have been conducted. Similar investments have been and will be undertaken in other countries following the UNESCO declaration. In times of scarcity of funding, investment into OER development programs should have as a basis an expected educational effectiveness instead of a value-based belief in openness.

Furthermore, studies have shown that there are more fundamental problems like time and resources which hinder teachers from adopting OER and sharing digital resources (Kreijns et al., 2013), which suggests that awareness and advocacy activities might not be sufficient to realize a more open educational system. It can be assumed that rigorous research on conditions and factors influencing access to education is more sustainable and impactful compared to advocacy and training activities (for example, of faculty members for developing OER).

Conclusions

In this chapter, the arguments for the existence of an "open education movement" are used as a starting point, and SMT is adopted to analyze the field along the dimensions of conflict and protest, cultural representation, values and collective action, and the influence of the social, political, and cultural context. While some activities of open education are identified as practices of a social movement, the field as a whole resembles an epistemic community more than a social movement.

In general, it is also questionable whether the scholarly community of open education should put more effort into developing open education as a social movement. The Covid-19 pandemic has increased inequalities of educational systems worldwide, and a more systematic answer of the scholarly community and policymakers would be needed to make educational systems more accessible and to improve chances for disadvantaged learners.

Currently, activities are shifting from prescriptive and purely value-based advocacy (e.g., "OER are good, commercial licenses are bad") to evidence-based assessments of effects of open education on socially disadvantaged individuals (e.g., "MOOCs did not democratize education"). Investing more effort into rigorous research, developing a clearer and more inclusive approach to the central assumption of the research field, and steering the field towards an epistemic community would be beneficial for researchers and policy-makers in higher education.

Epistemic communities are depicted by the following traits according to Haas (1992):

- Share a set of beliefs and values as a basis for actions of community members.
- Share a set of causal beliefs derived from an analysis of current practices leading to a set of linkages between policy actions and potential outcomes.
- Share an understanding of validity and criteria for evaluating knowledge in the domain of expertise.
- Have a common policy framework leading to an improvement of human welfare.

Working on an explicit theoretical and conceptual framework in the sense of an epistemic community could increase the impact and coherence of work in the field of open education. Especially the discussion on causal beliefs could improve the rigor and quality of research in the field which would go beyond, for example, classical "license comparison studies" (Wiley, 2021, p. 412).

References

Altbach, P. G. (2014). MOOCs as neocolonialism: Who controls knowledge? *International Higher Education, 75*, 5–7. https://doi.org/10.6017/ihe.2014.75.5426.

Baraniuk, R. G. (2008). Challenges and opportunities for the open education movement: A Connexions case study. In T. Iiyoshi & M. S. Vijay Kumar (Eds.), *Opening up education: The collective advancement of education through open technology, open content, and open knowledge* (pp. 229–246). Cambridge: Massachusetts:MIT Press.

Barros, R. (2012). From lifelong education to lifelong learning. Discussion of some effects of today's neoliberal policies. *European journal for Research on the Education and Learning of Adults, 3*(2), 119–134. https://doi.org/10.3384/Frela.2000-7426.rela0071.

Bayne, S., Knox, J., & Ross, J. (2015). Special issue: Critical approaches to open education. *Learning, Media and Technology, 40*(3), 247–405. https://doi.org/10.1080/17439884.2015.1065272.

Borkman, T. (1999). *Understanding self-help/mutual aid: Experiential learning in the commons*. New Brunswick, NJ: Rutgers University Press.

Caiani, M., Della Porta, D., & Wagemann, C. (2012). *Mobilizing on the extreme right: Germany, Italy, and the United States*. Oxford: Oxford University Press.

Chu, L. F., Utengen, A., Kadry, B., Kucharski, S. E., Campos, H., Crockett, J., . . . Clauson, K. A. (2016). "Nothing about us without us"—Patient partnership in medical conferences. *BMJ, 354*. Retrieved from https://doi.org/10.1136/bmj.i3883.

Conole, G., & Brown, M. (2018). Reflecting on the impact of the open education movement. *Journal of Learning for Development, 5*(3), 187–203. Retrieved from https://jl4d.org/index.php/ejl4d/article/view/31.

Deimann, M., & Sloep, P. (2013). How does open education work? In A. Meiszner & L. Squires (Eds.), *Openness and education* (Advances in Digital Education and Lifelong Learning) (Vol. 1, pp. 1–23). Bingley, UK: Emerald Group Publishing Limited.

Della Porta, D., & Diani, M. (2015). Introduction: The field of social movement studies. In D. Della Porta & M. Diani (Eds.), *The Oxford handbook of social movements* (pp. 1–28). Oxford: Oxford University Pess.

Della Porta, D., & Diani, M. (2020). *Social movements: An introduction* (3rd ed.). New York \Oxford: Wiley\Wiley Blackwell.

Edwards, R. (2015). Knowledge infrastructures and the inscrutability of openness in education. *Learning, Media and Technology, 40*(3), 251–264. https://doi.org/10.1080/17439884.2015.1006131.

Farrow, R. (2017). Open education and critical pedagogy. *Learning, Media and Technology, 42*(2), 130–146. https://doi.org/10.1080/17439884.2016.1113991.

Guri-Rosenblit, S. (1999). The agendas of distance teaching universities: Moving from the margins to the center stage of higher education. *Higher Education, 37*(3), 281–293. https://doi.org/10.1023/A:1003644305026.

Haas, P. M. (1992). Introduction: Epistemic communities and international policy coordination. *International Organization, 46*(1), 1–35. https://doi.org/10.1017/S0020818300001442.

Hansen, J. D., & Reich, J. (2015). Democratizing education? Examining access and usage patterns in massive open online courses. *Science, 350*(6265), 1245–1248. https://doi.org/10.1126/science.aab3782.

Henderikx, M. A., Kreijns, K., & Kalz, M. (2017). Refining success and dropout in massive open online courses based on the intention–behavior gap. *Distance Education, 38*(3), 353–368. https://doi.org/10.1080/01587919.2017.1369006.

Hilton, J. L., III, Robinson, T. J., Wiley, D., & Ackerman, J. D. (2014). Cost-savings achieved in two semesters through the adoption of open educational resources. *International Review of Research in Open and Distributed Learning, 15*(2), 67–84. https://doi.org/10.19173/irrodl.v15i2.1700.

Hodgkinson-Williams, C. A., & Trotter, H. (2018). A social justice framework for understanding open educational resources and practices in the global south. *Journal of Learning for Development, 5*(3), 204–224. Retrieved from https://jl4d.org/index.php/ejl4d/article/view/312.

Jansen, R. S., van Leeuwen, A., Janssen, J., Conijn, R., & Kester, L. (2020). Supporting learners' self-regulated learning in massive open online courses. *Computers & Education, 146*, 103771. https://doi.org/10.1016/j.compedu.2019.103771.

Joksimović, S., Poquet, O., Kovanović, V., Dowell, N., Mills, C., Gašević, D., . . . Brooks, C. (2018). How do we model learning at scale? A systematic review of research on MOOCs. *Review of Educational Research, 88*(1), 43–86. https://doi.org/10.3102/0034654317740335.

Jones, C. (2019). Capital, neoliberalism and educational technology. *Postdigital Science and Education, 1*(2), 288–292. https://doi.org/10.1007/s42438-019-00042-1.

Kalz, M. (2014). Lifelong learning and its support with new technologies. In N. J. Smelser & P. B. Baltes (Eds.), International encyclopedia of the social and behavioral sciences (pp.93–99). Oxford: Pergamon. https://doi.org/10.1016/B978-0-08-097086-8.92006-3

Kalz, M., & Specht, M. (2013). *If MOOCs are the answer-did we ask the right questions. Implications for the design of large-scale open online courses*. Maastricht School of Management in its series Working Papers, 25. Retrieved from https://EconPapers.repec.org/RePEc:msm:wpaper:2013/25

Kalz, M., Schophuizen, M., & Türkeli, S. (2020). The disaggregated, networked and open future of education for sustainable development. In UNESCO (Ed.), *Humanistic futures of learning* (pp. 113–116). Perspectives from UNESCO chairs and UNITWIN networks. UNESCO.

Kasch, J., Van Rosmalen, P., & Kalz, M. (2021). Educational scalability in MOOCs: Analysing instructional designs to find best practices. *Computers & Education, 161*, 104054. https://doi.org/10.1016/j.compedu.2020.104054.

Knox, J. (2013). Five critiques of the open educational resources movement. *Teaching in Higher Education, 18*(8), 821–832. https://doi.org/10.1080/13562517.2013.774354.

Kreijns, K., Van Acker, F., Vermeulen, M., & Van Buuren, H. (2013). What stimulates teachers to integrate ICT in their pedagogical practices? The use of digital learning materials in education. *Computers in Human Behavior, 29*(1), 217–225. https://doi.org/10.1016/j.chb.2012.08.008.

Lambert, S. R. (2018). Changing our (dis) course: A distinctive social justice aligned definition of open education. *Journal of Learning for Development, 5*(3), 225–244. Retrieved from https://jl4d.org/index.php/ejl4d/article/view/290.

Lane, A. (2016). Emancipation through open education: Rhetoric or reality. In P. Blessinger & T. J. Bliss (Eds.), *Open education: International perspectives in higher education* (pp. 31–50). Open Book Publishing. Retrieved from https://books.openedition.org/obp/3540.

MIT. (2021). *FAQs on agreement to sell edX to 2U, Inc. and fund nonprofit to reimagine digital learning*. Retrieved from https://news.mit.edu/2021/mit-harvard-transfer-edx-2u-faq-0629

Park, H., & Shea, P. (2020). A review of ten-year research through co-citation analysis: Online learning, distance learning, and blended learning. *Online Learning, 24*(2), 225–244.

Patientsincluded. (2016). *Patients included journal charter*. Retrieved from https://patientsincluded.org/journals/

Rabin, E., Henderikx, M., Kalman, Y., & Kalz, M. (2020a). What are the barriers to learners' satisfaction in MOOCs and what predicts them? The role of age, intention, self-regulation, self-efficacy and motivation. *Australasian Journal of Educational Technology, 36*(3), 119–131. https://doi.org/10.14742/ajet.5919.

Rabin, E., Kalman, Y. M., & Kalz, M. (2020b). The cathedral's ivory tower and the open education bazaar–catalyzing innovation in the higher education sector. *Open Learning: The Journal of Open, Distance and e-Learning, 35*(1), 82–99. https://doi.org/10.1080/02680513.2019.1662285.

Rensing, C., Bergsträßer, S., Hildebrandt, T., Meyer, M., Zimmermann, B., Faatz, A., & Steinmetz, R. (2005). *Re-use, re-authoring, and re-purposing of learning resources*. Technical Report KOM-TR-2005-02, Darmstadt University of Technology. Retrieved from https://www.kom.tu-darmstadt.de/fileadmin/Externer_Bereich/Publications/Technical-Reports/technical-report-kom-2005-02.pdf

Sabadie, J. M. A., Muñoz, J. C., Punie, Y., Redecker, C., & Vuorikari, R. (2014). OER: A European policy perspective. *Journal of Interactive Media Education, 2014*(1), Art. 5. https://doi.org/10.5334/2014-05.

Schophuizen, M., Kreijns, K., Stoyanov, S., Rosas, S., & Kalz, M. (2020). Does project focus influence challenges and opportunities of open online education? A sub-group analysis of group-concept mapping data. *Journal of Computing in Higher Education*, 1–26. https://doi.org/10.1007/s12528-020-09264-w.

Shear, L., Means, B., & Lundh, P. (2015). *Research on open: OER research hub review and futures for research on OER*. Menlo Park, CA: SRI International.

UNESCO. (2019). *Recommendation on Open Educational Resources* (OER). Retrieved from https://unesdoc.unesco.org/ark:/48223/pf0000373755/PDF/373755eng.pdf.multi.page=3

van Mourik Broekman, P., Hall, G., Byfield, T., Hides, S., & Worthington, S. (2014). Open education: A study in disruption. *Rowman & Littlefield International*. Retrieved from http://www.rowmaninternational.com/books/open-education

van Stekelenburg, J., & Klandermans, P. G. (2009). Social movement theory: Past, present and prospect. In I. van Kessel & S. Ellis (Eds.), *Movers and shakers: Social movements in Africa* (African Dynamics; No. 8) (pp. 17–44). Brill.

Weller, M. (2014). *The battle for open*. Ubiquity Press.

Weller, M. (2020). Open and free access to education for all. In D. Burgos (Ed.), *Radical solutions and open science* (pp. 1–15). Singapore: Springer.

Weller, M., Jordan, K., DeVries, I., & Rolfe, V. (2018). Mapping the open education landscape: Citation network analysis of historical open and distance education research. *Open Praxis, 10*(2), 109–126. https://doi.org/10.5944/openpraxis.10.2.822.

Wiley, D. A. (2021). Open educational resources: Undertheorized research and untapped potential. *Educational Technology Research and Development, 69*(1), 411–414. https://doi.org/10.1007/s11423-020-09907-w.

Wiley, D. (n.d.). *Defining the "open" in open content and open educational resources*. Retrieved from http://opencontent.org/definition/

Williamson, B., & Hogan, A. (2021). *Pandemic privatisation in higher education: Edtech & UNIVERSITY REFORM*. Brussels: Education International.

Zawacki-Richter, O., Conrad, D., Bozkurt, A., Aydin, C., Bedenlier, S., Jung, I., . . . Kerres, M. (2020). Elements of open education: An invitation to future research. *International Review of Research in Open and Distributed Learning, 21*(3), 319–334. https://doi.org/10.19173/irrodl.v21i3.4659.

History and Development of Instructional Design and Technology

5

Michael H. Molenda

Contents

Abstract

The origins and evolution of instructional technology and instructional design are treated in this chapter as separate concepts, although having intertwined histories. As with other technologies, their origins can be traced to the scientific discoveries on which they are based. Early in the twentieth century, new discoveries in optics and electricity stimulated educators to the adoption of technological innovations such as projected still pictures, motion pictures, and audio recording. Individuals and, later, groups of affiliated professionals promoted enriching learning by adding visual and, later, audiovisual resources where verbal presentations previously dominated. As radio broadcasting grew in the 1930s and then television in the 1950s, these mass media were perceived as ways to reach audiences, in and out of school, with educative audiovisual programs. In the 1960s, the wave of interest in teaching machines incorporating behaviorist psychological technology

M. H. Molenda (✉)
Education, Indiana University, Bloomington, IN, USA
e-mail: molenda@indiana.edu

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_4

engendered a shift in identity from audiovisual technologies to all technologies, including psychological ones. As computers became ubiquitous in the 1990s, they became the dominant delivery system, due to their interactive capabilities. With the global spread of the World Wide Web after 1995, networked computers took on communication functions as well as storage and processing functions, giving new momentum to distance education. Meanwhile, research during and after World War II prompted a technology of planning – systems analysis. In the 1960s, educators adapted the systems approach to instructional planning, starting the development of instructional systems design (ISD). Since the 1980s, ISD has been the reigning paradigm for instructional design, while instructional design has become the central activity of instructional technology professionals.

Keywords

Instructional technology · Instructional design · Visual instruction · Audiovisual instruction · Radio · Television · Programmed instruction · Systems approach

Introduction

This brief history strives to tell the story of the evolution of instructional design and technology in the field of education. The terms used in the title, *instructional technology* and *instructional design*, are two separate constructs having separate – but intertwined – histories. Here, *instructional technology*, being the overarching construct, will be treated first, with *instructional design* being treated as a later development.

The Origins and Evolution of Instructional Technology

By definition, the role of technology is to put new scientific discoveries into practical application. Thus, one of the themes running through the history of the field is that new technologies tend to crop up in the wake of new scientific advancements. For example, the invention of the steam-driven rotary press around the turn of the nineteenth century, coupled with the invention of lithography, enabled the mass production of large-format color prints. As they were expensive to produce, a school or university might possess only a few copies of a given artwork or biological illustration; curating and promoting the use of such pictures became part of the job of visual education specialists. Later, the invention of photography added to the stock of images available for use by educators. By the turn of the twentieth century, the invention of the incandescent light bulb made projection of photographic images practical in educational institutions. Edison's invention of the film camera and projector added movies to the inventory of visual education specialists.

By the 1920s, in the USA the National Education Association had created a professional home for visual education specialists, the Department of Visual

Instruction (DVI). After World War II, when magnetic tape audio recording equipment became widely used, the name was broadened to Department of Audio-Visual Instruction (DAVI). As the focus of the field shifted from supporting the use of audiovisual hardware and software to creating and implementing instructional systems, the organization adopted a new name, Association for Educational Communications and Technology (AECT), in 1970 and has continued under that name to the present time.

In response to the continuous parade of innovations in media and advances in learning theory, the leading professional associations have periodically established committees to reflect on the current definition of the field. The first (Ely, 1963) signaled a shift from a product identity to a process identity, although the central axis remained "audiovisual." By 1977 (AECT Task Force on Definition and Terminology, 1977), the overall self-concept had shifted to "instructional technology" (although the Task Force delineated a distinction between *educational technology* and *instructional technology* and chose the former as the overarching construct). A more recent definition embraces the *educational technology* label and ignores the educational/instructional distinction (Januszewski & Molenda, 2008).

Unfortunately, these carefully crafted definitions have had limited impact on discourse among practitioners. This can be accounted for – in part – by the fact that each new wave of technological innovation attracts advocates for that particular technology. "Educational radio" broadcasters came from the ranks of radio, not education. "Educational television" producers came from the ranks of television. Programmed instruction enthusiasts typically identified with experimental psychology. Computer-assisted instruction (CAI) devotees generally came from the field of computer science/technology. Distance education practitioners were rooted in the traditions of university extension services. As Martin Weller summarizes the situation, "Edtech is also an area to which people come from other disciplines, so there is no shared set of concepts or history" (Weller, 2018, p. 34). The smaller core group of educators who identify as instructional technology professionals generally has had little power or control over developments as massive waves of technological fads and fashions have washed over institutions of education and training. This is the story as observed by those witnesses.

Hard and Soft Technologies

As civilization advanced, it demanded more and more specialized skills, eventually including reading and writing. To pass along those skills to the next generation required more expertise than could be found in the home or cottage industry, hence the establishment of schools and apprenticeships. Education and training became more organized over the centuries as educators developed new techniques and tools to make their efforts more efficient and effective. Some of these methods could be considered technological in the sense proposed by John Kenneth Galbraith (1967, p. 12), that is, applying scientific or other organized knowledge to the attainment of practical ends. Such developments may take the form of *hard* technologies, including materials and physical inventions, or *soft* technologies, including special work processes such as instructional design. Throughout the eighteenth and nineteenth centuries, media innovations gradually enhanced the schooling experience. Maps, globes, and scientific apparatus were standard equipment in the better European and American schools and colleges in the eighteenth century, but it was not until early in the nineteenth century that a new general-purpose display format – the blackboard – came into widespread use (Anderson, 1962).

Visualizing the Curriculum: The Paradigm of a Concreteness Continuum

Slide projection evolved from the seventeenth-century hand-painted slides illuminated by oil lamps. This "magic lantern" provided entertainment for theatrical audiences throughout the nineteenth century (Petroski, 2006). Edison's invention of incandescent lighting by electricity in the 1890s made slide projection affordable, and by the end of the nineteenth century, lantern slides were in common use in education. Edison's later perfection of the motion picture camera and projector led to the production of nontheatrical short films, beginning around 1910. British and French short-subject films showed amazing sights such as microscopic creatures, insects in flight, and underwater seascapes. Films of news events and travel adventures played to rapt theater audiences.

Silent films began to be used in schools as early as 1910 (Saettler, 1990, pp. 98–99). By the 1920s, educators could find theatrical films edited for special purposes, industrial films, government films, and a smaller number of films produced specifically for the classroom. Despite the marginal value of many of the available films, interest and usage continued to grow, and by the end of the 1920s, many education agencies had units devoted to film or visual education, and thick catalogs documented the thousands of films available to educators.

The field's initial identity was that of *visual instruction*, a movement within education to surmount the limitations of "verbalism," that is, reliance on the spoken and written word – lectures and books (Hoban, Hoban, Jr., & Zisman, 1937). The visual instruction movement posited that what really counted was meaningfulness, not just rote memory. Meaningful learning came from rich and varied experiences, as direct and concrete as possible. Where firsthand experience was not feasible, visual images could provide a measure of realism. One could say that the underlying paradigm was that of *concreteness*: provide as concrete a learning experience as possible. Edgar Dale, through his influential textbook (1946), expanded the notion of audiovisual instruction by proposing in his Cone of Experience that learning experiences – including direct personal experiences, field trips, and dramatizations, as well as audio and visual media – could be arrayed in a continuum from concrete to abstract, and each type has a role to play.

From Visual to Audiovisual Instruction: The Paradigm of Communication Improvement

As early as 1910, various types of phonograph recordings, used mostly for music, were available to the public. Although magnetic tape displaced the phonograph for recording purposes in the 1950s, vinyl records remain in use into the twenty-first century. Records, and later cassette tapes, made it possible to add a soundtrack to filmstrips and slide sets. Thus, the identity of the field became *audiovisual instruction*. By the 1930s, schools maintained equipment pools that contained (in order of frequency) lantern slide projectors, radio receivers, 16 mm silent film projectors, 35 mm silent film projectors, filmstrip projectors, opaque projectors, micro-slide projectors, 16 mm sound film projectors, and 35 mm sound film projectors (Saettler, 1990, p. 234).

Educational Radio

As broadcast radio stations began to reach mass audiences in the 1920s, governments stepped in to regulate the process. In most countries (other than the USA), broadcasting facilities were directly managed by the government. However, with the founding of the British Broadcasting Corporation (BBC) in 1927, several major countries, including Canada and Japan, followed its model of a quasi-autonomous public corporation. Providing cultural and educational programming was assumed to be a primary responsibility of these organizations; such programs were often among the first to be broadcast. The first school programs began in England in 1926. By the mid-1930s, there were school broadcasting services in virtually every European country as well as in Australia, Japan, South Africa, and India.

In the early 1920s, many American colleges and universities obtained licenses to operate radio stations. A large proportion of these succumbed to competition with commercial stations, but some put down roots. The operations that prospered were the ones in which radio played an integral part in the university's mission – bringing educational opportunities to audiences beyond the campus (Wood & Wylie, 1977). Later federal legislation reserved a portion of the FM radio band for noncommercial stations, giving school systems, universities, and public non-profit groups the chance to reach mass audiences.

From the beginning, educational broadcasts covered the whole range of subjects, including foreign languages, health, social studies, home economics, science, music, and many others, including art. By the mid-1930s, several American radio stations operated by local and state school boards had developed sophisticated educational programming, often incorporating innovative pedagogical techniques. In the UK, BBC programmers worked closely with advisory boards of teachers in every subject area to find niches into which audio material might add value (Bailey, 1957). In 1936, in England and Wales some 4600 schools were registered users (Parker, 1939). However, in the Americas and many European countries, programming tended to be, in the words of Levenson and Stasheff, "informally educative" (1952) rather than directly instructional. This pattern of consigning programming to a supplementary role was to be repeated with television, programmed instruction, and computer-assisted instruction.

Instructional Film

World War II brought films to the forefront of military training. The British and American armed forces made extensive use of 16 mm films for training and motivational purposes. Between 1941 and 1945, the Division of Visual Aids for Military Training produced over 400 sound films and over 400 silent filmstrips, enabling a military mobilization far broader and faster than the Axis strategists had expected (Saettler, 1990). During the war, as films were being produced and used in training, the US Army commissioned a series of psychological studies (Hovland, Lumsdaine, & Sheffield, 1949) that studied various filmic techniques and their instructional effectiveness. Because of the concentration of time, money, effort, and research expended on these productions, a genre of *instructional film* came into its own.

After the war, instructional film research continued under US Navy sponsorship at Pennsylvania State University (Hoban Jr. & Van Ormer, 1951). Some of the experiments dealt with utilization techniques but most explored presentation variables, such as camera angles, pacing, narration, music, and color (Saettler, 1990). Most of the basic research on visual and auditory perception has been done outside the field of instructional technology. However, a flood of applied research followed the enactment of the National Defense Education Act of 1958 in the USA. Generalizations gathered from the basic and applied research were compiled by Fleming and Levie (1978) in the form of message design principles, principles that have continued to be validated by research in multimedia learning (Mayer, 2014).

The Audiovisual Instruction Era

The period between World War II and the advent of personal computers in 1982 could be characterized as the audiovisual instruction era. Instructional films, 35 mm slide/filmstrip projectors, opaque projectors, radio receivers, and record players were owned by American schools at the rate of at least 1 per 100 teachers by the late 1940s. Television receivers reached this status in 1958 and overhead projectors in 1960 (Finn, Perrin, & Campion, 1962). Magnetic tape recording, invented in Germany in 1935, was introduced to the USA by servicemen who brought back recorders after the war. By 1956, reel-to-reel tape recorders had joined the ranks of media devices found in mass use in schools (Finn et al., 1962). Cassette audio recorders were introduced by Phillips in the Netherlands in 1962 and became the standard audio format in schools around the world by the early 1970s.

The rate of use of audiovisual media by K-12 teachers during this era was strongly affected by accessibility; instructors were likely to use materials that were stored in their own classrooms, somewhat less likely to use those housed in a center in their building, and even less likely to use items, such as 16 mm films, that had to be delivered from outside the building on a scheduled basis. Evidence from various sources indicates that the average teacher used about one film per month (Cuban, 1986, pp. 14–18). The reasons given by teachers for the low rate of use of film and similar media, in addition to accessibility, were lack of training with the technology, unreliability of projection equipment, limited school budgets (for rental of films and purchase of projectors), and difficulty of integrating the material into the curriculum. Not coincidentally, surveys in the 1990s and 2000s identified the identical barriers to teachers' use of computers (National Center for Education Statistics, 2000).

During the postwar period, communication theory became a dominant paradigm both in the physical and social sciences. Flowing from Shannon and Weaver's (1949) information theory, through Wiener's (1950) cybernetics and Berlo's (1960) process of communication model, thinkers in instructional technology began to view teaching-learning problems as communication problems. Improvement of communication depended on detecting where the weak points in the process were and ameliorating them – choosing a more visual medium, building more redundancy into the message, matching the receiver's language capability better, providing the sender with better feedback about the receiver's response, and the like. This perspective is reflected in the name adopted in 1970 by the Association for Educational *Communications* and Technology (AECT).

Television: Educational and Instructional

Television broadcasting began on a small scale before World War II but did not blossom until after the war. In countries such as Japan, the UK, and other European nations, it was already assumed that the purpose of broadcasting was to provide cultural enrichment as well as entertainment, so news, public affairs, science, and the arts were part of the program schedule right from the beginning. In the USA, the template established with radio – a program schedule heavily dominated by commercially sponsored entertainment – was carried over to television. To compensate for this gap, in 1952 the Federal Communications Commission (FCC) reserved 242 channels for noncommercial licenses. By 1958, 35 "educational television" (ETV) stations were on the air; by 2020, there were 330 stations in all 50 states that were members of the Public Broadcasting System (PBS), a partially government-supported agency formed in 1970. Although many of these stations are affiliated with colleges and universities, their programming is dominated by news, public affairs, science, history, and the arts – programs of general cultural "uplift," but not intended to fulfill an instructional function.

In the UK, the BBC began school television broadcasts in 1957; by the mid-1970s, over 80 percent of all schools were making regular use of BBC programs (Mohanty, 1984), a pattern that carried on into the twenty-first century. Guided by a school broadcasting council that included strong representation of teachers, programs were carefully designed to be integrated into the national curriculum. In other European countries, the general pattern has been for the state television corporation to devote a small percentage of its broadcast hours to programming aimed at in-school audiences and adult education. Like the UK, Canada also operates a national television network, the CBC, which began to provide school TV broadcasts in 1952. They continued to offer a limited schedule of in-school programs throughout the 1960s and 1970s, as the various provinces gradually undertook their own program production. Like the USA, Canada's K-12 education system is controlled by provincial authorities rather than the national government. By the mid-1960s, most of the provinces were producing instructional television (ITV) programs tailored to their specific curricular needs.

In the late 1950s and through the 1960s, there were directly instructional programs distributed on a regional basis in the USA, such as the Eastern Educational Network (EEN) and the Midwest Program of Airborne Television Instruction (MPATI), and a few on a national basis, such as *Continental Classroom*. For reasons too numerous to cover here, the concept of replacing many teachers with a single master teacher proved unsuccessful. Instead, schools and colleges, with subsidies from the Ford Foundation and the federal government, established their own local ITV operations, using closed-circuit transmission within one campus or microwave transmissions to link multiple campuses. After the popularization of videotape recording, which became video cassette recording in the 1970s, ITV programming was increasingly created and used as off-the-shelf packaged units rather than being received through broadcasting (Thornton & Brown, 1968).

As with educational films, ETV and ITV programs tended to emulate the familiar genres: lecture, demonstration, voice-over visualization, interview, panel discussion, dramatization, field trip, or documentary (Wood & Wylie, 1977, p. 259). American productions, particularly those beamed to college audiences, tended to be more verbal – the so-called talking heads – than European productions (Tanner & Woerdehoff, 1964). European programs, particularly those of the BBC, were notable for their emphasis on visualization. The BBC collection became a major international archive of exemplary programming that was drawn upon by producers from around the globe. A break from this expository presentation pattern began in the 1960s, influenced by the so-called cognitive revolution, which suggested that television should be participative rather than passive (McBride, 1966). This movement eventually led to the production of several series, especially in science and social studies, that portrayed problematic situations and invited learners to discuss them. The Jasper Woodbury Problem Solving Series, incorporated in videodiscs, represented the culmination of this movement (Cognition and Technology Group at Vanderbilt, 1992).

Behaviorism and Programmed Instruction: The Paradigm of a Technology of Teaching

The term *behaviorism* refers to several related theories in psychology. One of them, radical behaviorism, has had the greatest practical impact on instructional technology due to the application of its primary technique, operant conditioning, to teaching-learning problems (Burton, Moore, & Magliaro, 2004). B.F. Skinner's analysis of the problems of group-based traditional instruction (Skinner, 1954) led him to the invention of a mechanical device for applying operant conditioning to cognitive learning. Referred to by others as a "teaching machine," the device controlled the arrangement of stimuli, responses, and reinforcers according to reinforcement principles. Within a few years, inventive publishers devised ways to arrange these conditions in the form of a book rather than a machine, and programmed instruction lessons in book format were published in great profusion in the 1960s. However, the teaching machine did not disappear; it continued to be developed and profited from the increasing availability of computer processing, re-emerging in the 1980s as computer-assisted instruction.

Among programmed instruction advocates, attention gradually shifted to the process of designing self-instructional materials. B.F. Skinner came to refer to his development methods as a *technology of teaching* (1965, 1968). Thereafter, *technology* increasingly took on the dual meanings of "application of scientific thinking" – or soft technology – and the various communications media and devices or hard technology.

The first attempts to use computers to present and control programmed instruction began in the early 1960s with mainframe computers. The early experiments in CAI began just at the time that programmed instruction was at its peak, so many of the early CAI programs followed a drill-and-practice or tutorial format, similar to programmed instruction. For example, beginning in the mid-1960s, the CAI research and development program at Stanford University created successful drill-and-practice materials in mathematics and reading, later adding foreign languages (Saettler, 1990).

CAI programs more adaptable to individual differences were developed in the Time-shared Interactive Computer-controlled Information Television (TICCIT) project at Brigham Young University in the 1970s after the invention of the microprocessor led to the proliferation of "mini-computers." Although they produced successful programs in mathematics and English composition, both the Stanford and TICCIT programs failed to gain major adoption in their intended sectors, K-12 and community college education (Saettler, 1990).

The Programmed Logic for Automatic Teaching Operations (PLATO) project at the University of Illinois began in 1961, aiming to produce cost-efficient instruction using networked inexpensive terminals and a simplified programming language for instruction, TUTOR. Most of the early programs were basically drill-and-practice with some degree of branching, but a wide variety of subject matter was developed at the college level. Over time, terminals at outlying universities were connected to the central mainframe in a time-sharing system, growing to hundreds of sites and thousands of hours of material available across the college curriculum. The PLATO system pioneered many applications that later became standard Internet formats – a graphical Web browser, online forums and message boards, email, chat rooms, instant messaging, remote screen sharing, and multiplayer games – leading to the emergence of what was perhaps the world's first online community (Woolley, 1994). PLATO continued to grow and evolve right through the early 2000s, finding a niche in military and vocational education.

"Intelligent tutoring" systems continue to be developed, incorporating artificial intelligence to allow more adaptation based on users' backgrounds, past performance, and current mastery – for example, AutoTutor (Graesser, 2016) and TutorIT (Scandura, 2015) – although such programs remain expensive and limited in scope.

The role of computers in education began to change dramatically with the development of "microcomputers" in the 1960s and 1970s. Computers designed for personal use became increasingly commercially successful after the introduction of new models in 1977 by Apple and RadioShack and in 1981 by IBM, and as more people grew accustomed to using a personal computer, they became more and more popular in schools. Previously, students encountered mainframe or mini-computers in labs, where they served as tutors, typically controlling drill-and-practice exercises. Now both students and teachers could have access to user-friendly desktop computers in the classroom and at home to use as productivity tools – word processing programs for writing, spreadsheets for organizing quantitative data, and presentation software to create graphs and slide shows.

Throughout the 1980s, school adoption of computers increased at a steady rate. By 1990 several countries in Europe and North America had reached the plateau of having approximately one computer per classroom. However, as had been discovered earlier in the audiovisual era, access to the hardware does not equate to use (Plomp & Pelgrum, 1991; Pelgrum & Plomp, 1993). In these early years, student usage was primarily to learn *about* computers rather than to learn *with* computers. Building on the earlier Plomp and Pelgrum research, an international survey involving 22 countries (not including the USA or the UK) in 2006 found that virtually 100% of students in those countries had access to computers (Law, Pelgrum, & Plomp, 2008). However, teacher adoption varied greatly from place to place, from 20% to 80%, and increased access to computers did not correlate with students using them to master vital curricular skills. As seen in earlier audiovisual research, teachers' pedagogical orientation, as well as practical hurdles, determined how seriously they embraced the new technology to pursue curricular learning goals.

As profoundly as personal computers changed the information environment in the 1980s, the advent of the Internet in the 1990s changed it even more. The rapid increase in connections to the Internet in the early 1990s vastly expanded the potential for sharing information at a distance. As the World Wide Web became the most popular Internet protocol by around 1993, it became the de facto standard platform for sharing resources.

The Origins and Evolution of Instructional Design

The construct that is nowadays known as *instructional design* originally was referred to as *instructional systems design* (ISD). This construct represents a synthesis of developments that arose from different fields of study – especially industrial training protocols, military systems analysis, behavioral psychology, and pedagogical research. Each of these tributaries viewed ISD through a different lens, but their insights converged around a process that has similar features. Leslie Briggs's (1977) definition describes this synthesis:

> Instructional systems design—a systematic approach to the planning and development of a means to meet instructional needs and goals; all components of the system (objectives, instructional materials, tests, etc.) are considered in relation to each other in an orderly but flexible sequence of processes; the resulting delivery system is tried out and improved before widespread use is encouraged. (p. xxi)

Each of the tributaries is described below, followed by the story of how these influences flowed together to create the contemporary construct of *instructional design*.

Tributaries to Instructional Design

Industrial Training During Wartime, 1918–1945

When the USA entered World War I, the number of men who enlisted in the military created a critical skill shortage in the shipyards and other defense industries. The US Shipping Board engaged Charles R. Allen, a vocational educator, to devise a training system to fill the void (Griffiths, n.d.). Allen's four-step system, characterized as "Show, Tell, Do, Check," and his method for analyzing job tasks (Allen, 1919) were highly detailed and were used in a highly standardized fashion at hundreds of defense plants. A similar situation arose when the USA entered World War II in 1941. The Training Within Industry (TWI) Service built on Allen's work to create a standard training methodology that was implemented in over 16,000 defense plants in the USA, UK, and Canada (Griffiths, n.d.). After the war, the program was disbanded, but TWI was exported to Japan and Europe to help rebuild their industrial capability. Ironically, the methodology returned to North America when Toyota and other manufacturers established plants in the USA, bringing back TWI as part of the *kaizen* (continuous improvement) system (Dinero, 2005), and was still being applied into the 2020s.

TWI was not a direct contributor to the concept of instructional design, but the TWI system gives industrial training a standardized template for the design and delivery of training, establishing a widespread corporate mentality attuned to a standardized approach to training design, such as the systems approach.

Military Research and Development, 1941 Through the Early 1950s

The systems approach traces its origins to military research during World War II. An analytical technique that grew out of submarine hunting was called *operations research*, in which computers were used to make the calculations required. After the war, this approach to analyzing, creating, and managing man-machine operations, now referred to as *systems analysis*, was applied to the development of training materials and programs.

During the postwar period, each of the US military services had developed its own model for training development, all of which were based on the systems approach, a soft science version of systems analysis (McCombs, 1986). In the 1950s, the military services issued regulations specifying that newly developed weapons must be treated as "man-machine *systems*," with operator training integrated into the total package provided by contractors (Dick, 1987). As the notion of *systems approach to instruction* evolved, it came to mean an approach that is both systemic and systematic: viewing a teaching-learning situation holistically and paying attention to the interplay of forces among the parts while devising solutions to problems in a step-by-step manner.

Programmed Instruction and the Development Process, the Late 1950s

Programmed instruction (PI), discussed above as a psychological technique that evolved into a technology, specified a process for developing PI software. Since reinforcement theory called for practicing mostly correct responses, each frame of the program had to be tested for efficacy. In fact, developmental testing was a mandatory specification for materials destined for the military training market. This demanded a commitment to evaluation and revision – "developmental testing" – far beyond what had been typical in the past. So the PI development process that evolved was characterized by careful specification of objectives, active responses, immediate feedback, and repeated rounds of testing and revision. Gradually, PI developers began to realize that it was the painstaking development *process* – more than the PI *format* itself – that made PI successful, epitomized by Markle and Tiemann (1967) in the phrase "programming is a process."

From Military Research to Pedagogical Principles, the 1960s

By the mid-1960s, prominent educational psychologists Robert Gagné (1965) and Robert Glaser (1962) were aggregating findings from research on learning in the military and industrial realms, as well as in schools. They were advocating instructional improvement from the standpoint of emerging psychological principles but also placing these principles under a "systems" umbrella. These highly influential works did not attempt to lay out specific detailed procedures or models for ISD, but they did provide the pedagogical rationale for an approach such as ISD.

Societal Pressures Forge a Synthesis

By the 1960s, socioeconomic conditions in the USA became more receptive to technological solutions to problems in education and training. First, the "baby boom" of the immediate postwar period meant a rapidly growing population of school-age children, threatening to overwhelm conventional educational facilities, encouraging a search for technological tools to make teaching less labor-intensive. Second, the Cold War meant an adversarial posture between the Western European and American allies and the Soviet Union, which had demonstrated its technological superiority with the launching of Sputnik in 1957. The American response included the National Defense Education Act of 1958, which prioritized education in science and technology. Third, the 1960s was an era of social upheaval in North America and Europe, leading to new government programs to ameliorate poverty, including the Great Society social programs of President Lyndon Johnson.

The Job Corps, created in 1964, provided general and vocational education, technical training, and work experience at residential centers for young people from poverty backgrounds. Overnight a huge market was created for self-instructional materials for the tens of thousands of Job Corps learners. Thus the "learning industry" was launched. Companies such as GE, Westinghouse, Litton Industries, and Morton Thiokol established large units to create individualized materials and to manage learning systems. Several future contributors to the ISD movement, including Robert Morgan, Robert Branson, and Donald Tosti, among others, gained firsthand experience working in the learning industry on Job Corps projects (D. Tosti, personal e-mail communication, July 24, 2008).

Federal R&D funds from the Elementary and Secondary Education Act and the Higher Education Act of 1965 supported a large number of academic projects aimed at developing and testing systems approach models. Barson's Instructional Systems Development project, conducted at Michigan State University and three other universities, produced an influential model and a set of heuristic guidelines for developers (Barson, 1967). During this same period, Leonard Silvern at the University of Southern California began offering the first course in applying the systems approach to instruction, "Designing Instructional Systems," which was based on his military and aerospace experience. He also produced a detailed procedural model that influenced later model builders (Silvern, 1965).

In the early 1970s, Florida State University was selected by the US Department of Defense to develop procedures to substantially improve Army training. The ISD procedures developed for the Army evolved into a model that was adopted by the Army, Navy, Air Force, and Marines, called the Interservice Procedures for Instructional Systems Development (IPISD) (Branson et al., 1975; Branson, 1978). The IPISD model eventually had enormous influence in military and industrial training because its use was mandated not only in all the US armed services but also among defense contractors. The many and varied ISD models that followed differed in details but typically adhered to a common conceptual framework: analyze, design, develop, implement, and evaluate. This conceptual framework came to be called by its acronym, ADDIE (Molenda, 2003).

Critiques and the ISD Concept Today

In the 1970s and 1980s, advocates for the systems approach attempted to promote its use in K-12 and higher education. These efforts struggled to gain traction, for reasons related to the social and economic dynamics of these institutions. However, ISD was welcomed in corporate and military training, where it became the reigning paradigm as a way to standardize design practices and make training more efficient and effective. By the early 1980s, more than 40 different ISD models sharing congruent "ADDIE" features were being used (Andrews & Goodson, 1981). By the end of the 1980s, skill in instructional design was viewed as the core competency of the instructional technology professional. By contrast, the development and production of audiovisual materials – the previous mainstay of the profession – became a niche specialization, one that was often outsourced.

In the 1990s, advocates of constructivism raised questions about many instructional practices, including those associated with ISD. Constructivism may be viewed as a challenge to ISD either at the level of selecting instructional methods or at the broad philosophical level (Dick, 1997). At the instructional methods level, constructivism is a label for a learner-centered pedagogy based on widely accepted principles from cognitive psychology. The ISD process does not mandate any specific instructional methods. In fact, one of the classic works in ISD (Reigeluth, 1999) provides a compendium of instructional strategies and tactics available for use at the “design” stage of ISD, the majority coming from the cognitive perspective. Indeed, the psychological underpinnings of ISD have evolved over time, expanding upon its original behaviorist bias. After two decades of debate over the one “correct” theory to inspire instructional design, there seems to be a new consensus, represented by Willis (1998), that an eclectic posture is warranted. As he points out, “strategies developed within one paradigm are used by those who support another” (p. 15), indicating that practitioners continue to adapt on a pragmatic basis.

A more recent alternative paradigm is the Successive Approximation Model (SAM) (Allen & Sites, 2012), which specifies an iterative process, beginning with a rough prototype modified through cycles of evaluation and revision. However, the notion of iterative progression toward a more finished product is central to ISD, as is evident in the earliest ISD textbooks and also the more recent. For example, in Handshaw’s model, “prototype” appears at the center of the model (Handshaw, 2014). Another popular contemporary ISD textbook advocates a model in which evaluation and revision encompass every step in the process (Morrison, Ross, Morrison, & Kalman, 2019).

One of the most publicized critiques from the corporate domain (Gordon & Zemke, 2000) laid out a broad array of criticisms of an anecdotal nature. After a vigorous debate about the supposed deficiencies presented in the original article, Zemke and Rossett (2002) concluded that the flaws attributed to ISD lay more in how the process was executed rather than flaws in ISD as a conceptual framework.

Other critics feel that ISD, even if implemented adequately, still has deficiencies that limit its comprehensiveness. They suggest that design traditions in other disciplines – such as art, architecture, and software engineering – offer alternatives worthy of consideration (Molenda & Boling, 2008, pp. 119–122; Gibbons, 2014). Others are concerned about the extent to which clients or users are involved in the design process. Carr-Chellman and Savoy (2004) discuss a range of design approaches from user-based, to user-centered, to truly user-controlled or emancipatory design.

In the twenty-first century, ISD continued to enjoy widespread support, not only from practitioners but also from thought leaders. Prominent consultants, such as Darryl L. Sink & Associates (Sink, n.d.) and Handshaw Inc. (Handshaw, 2014); leading textbook authors, such as Gary Morrison and co-authors (2019) and Walter Dick and co-authors (Carey, Carey, & Dick, 2022); and the major performance standards organization, the International Board of Standards for Training, Performance and Instruction (IBSTPI) (Koszalka, Russ-Eft, & Reiser, 2013), all continue to champion the systems approach as the standard for instructional design.

Conclusion

The field and profession of instructional technology has been evolving for over a century, beginning with the visual instruction movement, which promoted the use of slides and silent films for schools, colleges, and adult education. Technological innovations created new opportunities to expand the scope and refine the techniques of audiovisual instruction. US government investment in science and technology in the 1950s and 1960s built up the technological capacity of schools and colleges in the USA and drove research and development on a wide range of technological innovations, including psychological technologies. The process of instructional systems design grew out of military research melded with academic research on the instructional process. In the half century since its inception, ISD became and remains the dominant paradigm in the field of instructional design, and instructional design – intertwined with distance education – has become the central focus of the instructional technology profession.

The phenomenon that became known as *distance education* began outside the realm of instructional technology. Offering university credit for nonresidential study first gained serious traction in the mid-nineteenth century when an "external programme" was chartered at the University of London. This model was emulated at the University of Chicago and, later, Columbia University and the University of Wisconsin in the USA late in the nineteenth century as *correspondence study* (Molenda & Subramony, 2021, p. 12). When radios became widely available in homes, "schools of the air" emerged, often as part of the outreach efforts of universities. The correspondence-study model went through a paradigm shift in the 1970s, led by Britain's Open University, which employed broadcast radio and television supplemented by print and audio materials to present new material to learners. Students interacted with tutors, either at local learning centers or via telephone, to work through the material and complete assignments, with credit granted based on performance on coursework and examinations (Molenda & Subramony, 2021, p. 13). The label of *distance education* began to predominate, and its high-technology delivery system brought it into overlap with the world of instructional technology. This overlap only grew larger as distance education programs moved more and more toward online delivery.

As the delivery systems for technology-based instruction shifted from inside the classroom, to transmission through broadcast media, to incorporation in networked computers, to sharing via World Wide Web, instructional technology evolved from a field based largely in North America and Western Europe to one that is thoroughly global in practice and in perspective.

References

AECT Task Force on Definition and Terminology. (1977). *The definition of educational technology*. Washington, DC: Association for Educational Communications and Technology (AECT).

Allen, C. R. (1919). *The instructor the man and the job: A handbook for instructors of industrial and vocational subjects*. Philadelphia, PA: J.B. Lippincott &.
Allen, M. W., & Sites, R. (2012). *Leaving ADDIE for SAM: An agile model for developing the best learning experiences*. Alexandria, VA: ASTD Press.
Anderson, C. (1962). *Technology in American education 1650–1900* (U.S. Department of Health, Education, and Welfare, Office of Education, bulletin 1962, no. 19). Washington, DC: U.S. Government Printing Office.
Andrews, D. H., & Goodson, L. A. (1981). A comparative analysis of models of instructional design. *Journal of Instructional Development, 3*(4), 2–15.
Bailey, K. V. (1957). *The listening schools: Educational broadcasting by sound and television*. London, England: British Broadcasting Corporation.
Barson, J. (1967). *Instructional systems development. A demonstration and evaluation project: Final report. U.S. Office of Education, Title II-B project OE 3-16-025*. East Lansing, MI: Michigan State University.
Berlo, D. (1960). *The process of communication: An introduction to theory and practice*. New York, NY: Holt, Rinehart, & Winston.
Branson, R. K. (1978). The interservice procedures for instructional systems development. *Educational Technology, 18*(3), 11–14.
Branson, R. K., Rayner, G. T., Cox, J. L., Furman, J. P., King, F. J., & Hannum, W. H. (1975). *Interservice procedures for instructional systems development (5 volumes)*. Fort Benning, GA: U.S. Army Combat Arms Training Board.
Briggs, L. J. (Ed.). (1977). *Instructional design: Principles and applications*. Englewood Cliffs, NJ: Educational Technology Publications.
Burton, J. K., Moore, D. M., & Magliaro, S. G. (2004). Behaviorism and instructional technology. In D. H. Jonassen (Ed.), *Handbook of research on educational communications and technology* (2nd ed., pp. 3–36). Mahwah, NJ: Lawrence Erlbaum Associates.
Carey, J. O., Carey, L., & Dick, W. (2022). *The systematic design of instruction*. New York, NY: Pearson Education.
Carr-Chellman, A., & Savoy, M. (2004). User-design research. In D. H. Jonassen (Ed.), *Handbook of research on educational communications and technology* (2nd ed., pp. 710–716). Mahwah, NJ: Lawrence Erlbaum Associates.
Cognition and Technology Group at Vanderbilt. (1992). The Jasper series as an example of anchored instruction: Theory, program description, and assessment data. *Educational Psychologist, 27*(3), 291–315. https://doi.org/10.1207/s15326985ep2703_3.
Cuban, L. (1986). *Teachers and machines: The classroom use of technology since 1920*. New York, NY: Teachers College Press.
Dale, E. (1946). *Audio-visual methods in teaching*. New York, NY: The Dryden Press.
Dick, W. (1987). A history of instructional design and its impact on educational psychology. In J. A. Glover & R. R. Ronning (Eds.), *Historical foundations of educational psychology* (pp. 203–230). New York, NY: Plenum Press.
Dick, W. (1997). Better instructional design theory: Process improvement or reengineering? *Educational Technology, 37*(5), 47–50.
Dinero, D. (2005). *The foundation of lean*. Boca Raton, FL: CRC Press, Taylor & Francis Group.
Ely, D. P. (Ed.). (1963, January–February, Supplement 6). The changing role of the audiovisual process: A definition and glossary of related terms. *AV Communication Review, 11*(1).
Finn, J. D., Perrin, D. D., & Campion, L. E. (1962). *Studies in the growth of instructional technology, I: Audio-visual instrumentation for instruction in the public schools, 1930–1960, a basis for take-off*. Washington, DC: National Education Association.
Fleming, M., & Levie, W. H. (1978). *Instructional message design: Principles from the behavioral sciences*. Englewood Cliffs, NJ: Educational Technology Publications.
Gagné, R. M. (1965). *The conditions of learning*. New York, NY: Holt, Rinehart and Winston.
Galbraith, J. K. (1967). *The new industrial state*. Boston, MA: Houghton-Mifflin.

Gibbons, A. J. (2014). *An architectural approach to instructional design*. New York, NY: Routledge.

Glaser, R. (1962). Psychology and instructional technology. In R. Glaser (Ed.), *Training research and education*. Pittsburgh, PA: University of Pittsburgh Press.

Gordon, J., & Zemke, R. (2000). The attack on ISD. *Training, 37*, 43–53.

Graesser, A. C. (2016). Conversations with AutoTutor help students learn. *International Journal of Artificial Intelligence in Education, 26*, 124–132. https://doi.org/10.1007/s40593-015-0086-4.

Griffiths, J. (n.d.). *A brief history of TWI.* Retrieved May 24, 2021, from Workforce Strategies International: https://www.workforcestrat.com/a-brief-history-of-twi-2/

Handshaw, D. (2014). *Training that delivers results: Instructional design that aligns with business goals*. Washington, DC: AMACOM, American Management Association, and ASTD.

Hoban, C. F., Hoban, C. F., Jr., & Zisman, S. B. (1937). *Visualizing the curriculum*. New York, NY: The Cordon Co.

Hoban, C. F., Jr., & Van Ormer, E. B. (1951). *Instructional film research, 1918–1950*. Port Washington, NY: Special Devices Center.

Hovland, C. I., Lumsdaine, A. A., & Sheffield, F. (1949). *Experiments on mass communication (Vols. 3 of Studies in social psychology in World War II, 1949–1952)*. Princeton, NJ: Princeton University Press.

Januszewski, A., & Molenda, M. (Eds.). (2008). *Educational technology: A definition with commentary.* New York, NY: Lawrence Erlbaum Associates.

Koszalka, T. A., Russ-Eft, D. F., & Reiser, R. (2013). *Instructional designer competencies: The standards* (4th ed.). Charlotte, NC: Information Age Publishing.

Law, N., Pelgrum, W. J., & Plomp, T. (Eds.). (2008). *Pedagogy and ICT use: In schools around the world: Findings from the IEA SITES 2006 study.* Dordrecht, The Netherlands: Springer.

Levenson, W. B., & Stasheff, E. (1952). *Teaching through radio and television* (Revised ed.). New York, NY: Rinehart & Co.

Markle, S. M., & Tiemann, P. W. (1967). *Programming is a process. Sound filmstrip*. Chicago, IL: University of Illinois at Chicago.

Mayer, R. E. (Ed.). (2014). *The Cambridge handbook of multimedia learning* (2nd ed.). New York, NY: Cambridge University Press.

McBride, W. (Ed.). (1966). *Inquiry: Implications for televised instruction*. Washington, DC: National Education Association.

McCombs, B. L. (1986). The instructional systems development (ISD) model: A review of those factors critical to its successful implementation. *Educational Communications and Technology Journal, 34*(2), 67–81.

Mohanty, J. (1984). *Educational broadcasting: Radio and television in education*. New Delhi, India: Sterling Publishers.

Molenda, M. (2003). In search of the elusive ADDIE model. *Performance Improvement, 42*(5), 34–36.

Molenda, M., & Boling, E. (2008). Creating. In A. Januszewski & M. Molenda (Eds.), *Educational technology: A definition with commentary* (pp. 81–140). New York, NY: Lawrence Erlbaum Associates.

Molenda, M. H., & Subramony, D. P. (2021). *The elements of instruction: A framework for the age of emerging technologies*. New York, NY: Routledge, Taylor & Francis Group.

Morrison, G. R., Ross, S. J., Morrison, J. R., & Kalman, H. K. (2019). *Designing effective instruction* (8th ed.). Hoboken, NJ: John Wiley & Sons.

National Center for Education Statistics. (2000). *Teachers' tools for the 21st century: A report on Teachers' use of technology.* Washington, DC: U.S. Department of Education.

Parker, L. W. (1939). British school broadcasting. *The English Journal, 28*(4), 296–0302.

Pelgrum, W. J., & Plomp, T. (1993). The worldwide use of computers: A description of main trends. *Computers & Education, 20*(4), 323–332.

Petroski, H. (2006). *Success through failure: The paradox of design*. Princeton, NJ: Princeton University Press.
Plomp, T., & Pelgrum, W. J. (1991). Introduction of computers in education: State of the art in eight countries. *Computers & Education, 17*(3), 249–258.
Reigeluth, C. M. (1999). *Instructional-design theories and models, Volume II: A new paradigm of instructional theory*. Mahwah, NJ: Lawrence Erlbaum Associates.
Saettler, P. (1990). *The evolution of American educational technology*. Englewood, CO: Libraries Unlimited.
Scandura, J. M. (2015). AuthorIT & TutorIT: An intelligent tutor authoring and delivery system you can use. *Technology, Instruction, Cognition and Learning, 10*, 173–202.
Shannon, C. E., & Weaver, W. (1949). *The mathematical theory of communication*. Urbana, IL: University of Illinois Press.
Silvern, L. (1965). *Basic analysis*. Los Angeles, CA: Education and Training Consultants.
Sink, D. L. (n.d.). *The instructional developer workshop*. Retrieved June 21, 2021, from Darryl L. Sink & Associates: https://dsink.com/the-instructional-developer-workshop-3-days
Skinner, B. F. (1954). The science of learning and the art of teaching. *Harvard Educational Review, 24*, 86–97.
Skinner, B. F. (1965). The technology of teaching. *Proceedings of the Royal Society, Series B, 162*, 427–443.
Skinner, B. F. (1968). *The technology of teaching*. New York, NY: Appleton-Century-Crofts.
Tanner, D., & Woerdehoff, F. J. (1964). Profiles of instructional methodology for selected television courses. *The School Review, 72*(2), 201–208.
Thornton, J., & Brown, J. W. (Eds.). (1968). *New media and college teaching*. Washington, DC: Department of Audiovisual Instruction and American Association for Higher Education, Departments of the National Education Association.
Weiner, N. (1950). *The human use of human beings: Cybernetics and society*. Boston, MA: Houghton-Mifflin.
Weller, M. (2018, July/August). Twenty years of Edtech. *EDUCAUSE Review, 53*(4), 34–48. Retrieved June 23, 2020, from https://er.educause.edu/articles/2018/7/twenty-years-of-edtech
Willis, J. (1998). Alternative instructional design paradigms: What's worth discussing and what isn't. *Educational Technology, 38*(3), 5–16.
Wood, D. N., & Wylie, D. G. (1977). *Educational telecommunications*. Belmont, CA: Wadsworth Publishing.
Woolley, D. R. (1994). *PLATO: The emergence of online community*. Retrieved February 12, 2020, from http://just.thinkofit.com/plato-the-emergence-of-online-community/
Zemke, R., & Rossett, A. (2002). A hard look at ISD. *Training, 39*, 27–34.

The Rise and Development of Digital Education

6

Martin Weller

Contents

Abstract

Over the past 25 years, digital education has risen to prominence. It has a direct relationship with open education, which can be considered an umbrella term. In this chapter the rise of digital education is explored through five specific educational technologies. These technologies – the web, Learning Management System (LMS), blogs, social media, and Massive Open Online Courses (MOOCs) – all raise issues of control and ease of use. They also have a direct impact on different aspects of open education, which in turn helps inform their development. This chapter sets out the multiple interpretations of open education and their overlap with digital education. By then exploring five educational technologies, common themes are extracted which highlight this intersection of digital and open education.

Keywords

Digital education · Online education · Massive Open Online Courses (MOOCs) · Learning Management System (LMS) · Virtual Learning Environment (VLE)

M. Weller (✉)
The Institute of Educational Technology, The UK Open University, Milton Keynes, UK
e-mail: martin.weller@open.ac.uk

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_5

Introduction

Open education is a broad term that has itself undergone evolution and transformation. Weller, Jordan, DeVries, and Rolfe (2018) used a citation analysis method to investigate different clusters of publications which were associated with open education. This revealed eight distinct categories, namely:

- Distance education
- Open education in schools
- E-learning
- Open Education Resources (OER)
- Massive Open Online Courses (MOOCs)
- Open Practices
- Social Media
- Open Access Publishing

There was scant overlap between these clusters of publications, so authors of MOOCs articles, for instance, rarely referenced work on distance education. What this analysis reveals is that open education is not a single entity and practitioners can occupy one aspect with little or no intersection with other forms. For the purpose of this chapter, it also highlights the significance of digital education to different forms of open education. With the exception of earlier articles on distance education and open education in schools, most of these categories have arisen specifically as a function of digital technology. This can be seen with the early shift to publications focusing on "e-learning" in the late 1990s, to MOOCs and OER which are driven by the ability to share resources easily and globally.

In this chapter this trajectory of digital education will be explored through an analysis of several key educational technological developments. The term educational technology is, like "open," a broad and contested one. In this chapter it encompasses technological developments applied in education, so includes not only specific technologies such as Twitter, but also broader applications of technology, such as learning analytics. Each of the selected technologies has an impact on some aspect of open education, but it is the cumulative effect that is most significant. The intention of such an approach is partly to provide a useful historical perspective, particularly for those new to the field, and also to provide an analysis of how open education is influenced by technology. A more detailed historical analysis from a purely educational technology perspective, rather than an open education one is provided in *25 Years of Ed Tech* (Weller, 2020). Open education, at least for some of the categories provided above, is often seen as synonymous with digital education, and so there is considerable overlap between these two accounts. Zawacki-Richter et al. (2020) note the "octopus-like" nature of the term "open" with many tentacles connected to one central concept. These tentacles reach into many different areas, such as MOOCs, OER, open scholarship and open data, each of which itself intersects with aspects of digital education.

Digital education is often, rightly, portrayed as a rapidly changing field, with new technologies, issues and developments arising every year. This sense of rapid change is sometimes used as a motivation or threat to educators to embrace the latest form of technology, otherwise it will be too late to catch up. For example, Rigg (2014) asked "can universities survive the digital age?" suggesting that universities are too slow to change and are irrelevant to young people embedded in their fast-moving, digital age. This type of article is not uncommon, for instance Janssen (2021) decries "dear professors, why are you so hesitant to learn something new? . . . Don't you love challenging yourself to think in new and different ways? I'm baffled by some of the aversion to 21st-century demands and opportunities." These types of articles both underestimate the degree to which educators do engage with new technology and also overestimate the digital natives-type narrative that all students want their education to be the equivalent of Instagram. Fullick (2014) highlighted that this imperative to adopt all technological change immediately and without question has a distinctly Darwinian undertone: "Resistance to change is presented as resistance to what is natural and inevitable" (para. 3).

Engagement with digital education requires practitioners to maintain a delicate balance therefore between succumbing to hype and rhetoric and rejecting all new claims and approaches. One way to navigate this tension is to acquire a certain protection afforded by an historical perspective. However, the digital education field is rather poor at recording its own history and reflecting critically on its development, as if there is no time to look in the rear-view mirror in a field that is solely interested in the future. It is easy to find books about the future of digital education, but relatively difficult to find ones about its past. This historical amnesia is in part the result of a year-zero mentality in the field, for instance, during the MOOC rush of 2012, there were many "new" discoveries about online learning reported which were already tired concepts in the online education field.

By adopting an historical perspective in this chapter then the intention is to counter some of this year zero mentality, and demonstrate the importance of digital education to different aspects of open education. A short note on definitions first though: digital education is a loose term, and at its most literal interpretation could encompass a lecturer using a PowerPoint presentation or writing a book using Word. Such interpretations would not address the more interesting aspects of changing practice in education. Digital education should therefore be interpreted as a convenient shorthand for the intersection of digital, networked and open practices in education. For example, preparing slides for a lecture in PowerPoint to be presented in a face to face lecture and stored on the lecturer's hard-drive is not really an aspect of digital education, but creating an online webinar which is openly accessible and sharing the content under a Creative Commons license afterward provides an example of the new possibilities (and associated issues) that are under consideration.

Digital Developments

This section will examine the rise of digital education through the lens of different technologies. In this chapter, five significant educational technologies have been selected. The choice of these is subjective, based on the author's perception of their impact and relevance. Obviously other technologies could be proposed and might provide a different perspective.

The Web

The web is probably the most significant of all the technologies relating to digital education, as it laid the foundations for all that followed. While the story of the invention of the web is reasonably well known, it is worth revisiting with the knowledge of how it developed, and to identify the foundations in that development that have come to shape so much of digital education.

In 1989, Sir Tim Berners-Lee was working as a software engineer at the large particle physics laboratory, CERN (Conseil Européen pour la Recherche Nucléaire, or European Council for Nuclear Research). With scientists from around the world working on different projects and generating large amounts of data and findings, Berners-Lee (n.d.) identified that they had difficulty in sharing information, saying that "in those days, there was different information on different computers, but you had to log on to different computers to get at it. Also, sometimes you had to learn a different program on each computer" (para. 1).

By 1990 Berners-Lee had developed four technologies that made the web functional and that still underpin it:

- HTML: Hypertext Markup Language, an easy to use language to produce web documents.
- URI: Uniform Resource Identifier (also known as URL for Uniform Resource Locator), a means of giving any page on the web a unique address so it can be linked to and located.
- HTTP: Hypertext Transfer Protocol, a data transfer method that allows web resources to be retrieved across the internet.
- Web browser: a piece of software that utilizes the previous three technologies to allow a user to navigate the web.

The fundamental design principles were as significant as the specific technologies in the development of the web. Berners-Lee (1989) identified that for any such system to succeed it needed to be open, and not a proprietary system owned by any one corporation. The technical attributes of the web can also be seen as giving rise to its social attributes, and why it is such a fundamental driver for openness in education. It was designed as a communication system, around principles of robustness, decentralization and openness.

From these technological features a system evolved which had no central authority, meaning that it was difficult for established agencies to control what was published on the web. What anyone could publish and debate was not governed or censored.

By 1995, the web browser was becoming reasonably commonplace, with Netscape dominating. At this stage, the web still required a degree of technical expertise and was awkward to use, but it was on the way to becoming easy enough, and sufficiently interesting, to be moving beyond purely specialist interest. People regularly made proclamations that no-one would shop online, or that it was the equivalent of Citizen Band radio. Even at the time, these seemed misguided: we could not predict smart phones and ubiquitous Wi-Fi but being able to dial up and connect to information sources anywhere was always going to be revolutionary – and particularly so for education. What the web browser provided was a common tool so that specific software was no longer required for every online function. Prior to this file transfer was performed through File Transfer Protocol (FTP), email through specific clients, bulletin board systems through software such as FidoNet, and so on. The browser provided the potential to unify all these, and more, in one tool.

Even in the simple design afforded by hand-crafted HTML pages, the nascent possibilities of the web for education were evident. Firstly, it made communication, and as a result, networking, much easier. Even though social media didn't exist yet, it was still possible to find the work of a scholar at another university and send them an email. Secondly, the uploading of publications to your own website marked the beginning of consideration about the dissemination of knowledge and the relationship with publishers which would lead to much of the open access developments. Thirdly, academics began to share teaching resources in this way, which as with publications, would plant the seeds of the open education movement. Most significantly, educators began to explore how it could be used in teaching, and the e-learning boom of the late 1990s took off.

Therefore, in this early development of what became known as Web 1.0 we can see the important aspects of what the web gave education – the freedom to publish, communicate, teach and share. For distance education, which had previously relied on expensive broadcast or shipping physical copies of books, videos, and CDs, this was a significant change. It not only altered how single function distance education institutions such as the Open University operated, but also lowered the cost of entry into the distance education market, so now all other universities could effectively become distance, or hybrid, education providers.

In summary, the web laid the foundation for nearly all the technologies that follow in this chapter and is the one we are still feeling the impact of most keenly. Much of digital education is essentially a variant on the question: what does the web mean for us? In teaching, the development of Learning Management System (LMS), OER, and MOOC, as well as related pedagogic approaches, are all examples of this. In research, the use of blogs, analytics, and Web 2.0 tools have all been significant. For academics and universities responding to the cultural shifts caused by social media, video, and the dark side of the web an understanding of these tools has become strategically important. The removal of the publication filter that the web provided was often touted as the most significant socio-technological change since the invention of the printing press (e.g., Giles, 1996) and even now that view does not seem like hyperbole.

LMS

Arguably the most successful education technology and the one that has had the biggest impact (for good and bad) is the LMS or Virtual Learning Environment

(VLE). The LMS provided an enterprise solution for e-learning for universities. It stands as the central e-learning technology, despite frequent proclamations of its demise. Prior to the LMS, e-learning provision was realized through a variety of tools, for instance, a bulletin board for communications, a content management system, and home-created web pages. The quality of these solutions was variable, often relying on the enthusiasm of one particular devotee. The combination of tools would also vary across any one university, with the medical school adopting a different set of tools to engineering, which varied again from humanities, and so on. A number of tools such as Virtual-U and FirstClass began to emerge in the 1990s which combined some of these functions.

As e-learning became more central to university provision, both for blended learning and fully online, this variety and reliability became more of an issue. The LMS offered a neat collection of the most popular tools, any one of which might not be as good as the best of the breed-specific tools but good enough, as the web browser had done earlier for internet functions. It allowed for a single, enterprise solution with associated training, technical support, and helpdesk to be implemented across an institution. The advantage of this was that e-learning could progress more quickly across an entire institution if it was driven by strategy. However, over time this has come to seem something of a Faustian pact, with institutions finding themselves locked into contracts with vendors.

LMS uptake grew significantly over the first half of the 2000s, and by 2005 nearly all higher education institutions had deployed an LMS, but only 37% had a single one, with others operating multiple systems, with the intention to move to a single system (OECD, 2005, p. 124).

It has often been noted that when a new technology arrives, it tends to be used in old ways before its unique characteristics are recognized. This approach applied to much of the early implementation of the LMS. In order to smooth the transition to the online environment, developers started by implementing a familiar model, the virtual classroom. Conole, de Laat, Dillon, and Darby (2008) found that the LMS was often used as a place to dump notes and to replicate lectures rather than engage in more experimental pedagogies. In this approach, content that can be analogous to lectures is laid out in a linear sequence with discussion forums analogous to tutorials linked to this. This approach should have been an initial step to greater experimentation with online learning, but many institutions became "stuck" at this stage, and the LMS is a primary cause of this. As was seen in the COVID-19 pandemic, this model was still in operation with most universities adopting online lectures via technologies such as Zoom.

One of the issues with enterprise systems such as the LMS is that they require significant investment in terms of finance, expertise, time, and resources. They thus gain a momentum of their own. The reservation many educators have with the LMS is not necessarily the actual technology but rather the institutional "sediment" that builds up around it. For the LMS, this sediment can be seen in the structures that accrue around the system. Institutions invest significant amounts of money on technology and employ people who become experts in using that technology. Accompanying this, they develop administrative structures and processes that are couched in terms of the specific technology. There are roadmaps, guidelines, training programs, and reporting structures, which all help to embed the chosen tool. This creates a form of tool-focused solutionism – if an educator wants to achieve something in their course, and they ask their information technology (IT) services department or educational support team for help, the answer will often be couched in terms of the question, “What is the LMS way of implementing this?”

There have been premature proclamations of the death of the LMS (e.g., Clay, 2009; Weller, 2007) but it is still going strong. Much like the lecture in higher education, reports of its demise, it seems, are always overstated. The Irish Learning Technology Association published a special issue in 2018 which highlighted the ongoing impact of the LMS, by analyzing responses to the VLEIreland survey, a cross-institutional survey of students in Irish higher education over a number of years. McAvinia and Risquez (2018) concluded that far from fading, the VLE has evolved:

> The newer VLEs and upgrades of the “traditional” brands offer features such as integrated social media tools and e-portfolios, and have lost the visual cues tying them to the classroom, such as book and blackboard imagery. The regeneration of the VLE is remarkable. (p. ii)

Indeed, the robustness of the LMS is one of its main attractions. As institutions begin to offer more provision through their LMS they are also acquiring more reliable data, which enables them to understand learning patterns and behaviors better (e.g., Holmes, Nguyen, Zhang, Mavrikis, & Rienties, 2019). The LMS is at the centre of much of the work in digital education, and it can often be an unglamorous role ensuring that a system works effectively for thousands of students. Like universities themselves, part of the appeal of the LMS is its steadfast nature: experimenting with people’s education is not something to be done lightly. But there is a balance to be struck between allowing freedom, innovation, and experimentation and maintaining the core functions. It may be a question of time; education moves slowly, and now that there is a level of stability with the LMS, more experimentation can happen around the fringes.

In summary, the LMS provided a useful means of rapidly developing and unifying e-learning delivery which led to increased uptake of digital education. Much of open education relies on the type of stable platforms provided by the LMS, for example providing OER in formats which can be easily deployed within standard LMS. However, this has sometimes come at the price of a lack of innovation in digital education, and by extension open education.

Blogs

Blogging developed alongside more education-specific developments, and it was then co-opted into ed. tech. In so doing, it foreshadowed much of the Web 2.0 developments, with which it is often bundled. Blogging was a very obvious extension of the web. Once people realized that anyone could publish on the web, they inevitably started to publish diaries, journals, and regularly updated resources. Blogging emerged from a simple version of online journals when syndication became easy to implement. The advent of feeds, and particularly the universal standard RSS (Really Simple Syndication), provided a means for readers to subscribe to anyone's blog and receive regular updates. This was as revolutionary as the liberation that web publishing initially provided. If the web made everyone a publisher, then RSS made everyone a distributor.

People swiftly moved beyond journals and in education the ability to create content freely, and have it immediately distributed to a specific audience offered potential teaching opportunities. The use of blogs in education began in the early 2000s and a fledgling community of educational bloggers emerged. This potential to expand the academic community through the informal use of blogs that were external to formal university systems was powerful and would be repeated later with social media. From the perspective of today, with ubiquitous social media, it is difficult to appreciate how liberating the advent of blogging was in higher education.

Blogging provided a new form of academic identity, and one that increasingly became as significant as the traditional identity that is formed through publications, teaching, and research grants. It came with its own cultural norms of informality, acknowledgment, experimentation, and support. This was known to produce tension. For instance, Costa (2013) has argued that "Higher Education Institutions are more likely to encourage conventional forms of publication than innovative approaches to research communication" (p. 171). The online academic has had to negotiate two worlds simultaneously, which can have different modes of operation and value systems, as Costa (2016) put it, they end up being double gamers. There is some effort to reconcile these modes with increasing recognition of the value of network identity in achieving scholarly goals, although most remuneration is still linked to traditional outputs, such as published articles and successful research grant income. This is in contrast with the online world that determines prestige through identities and attention (Stewart, 2015).

Blogs can be seen as the start of what would become a networked academic identity, which would become more prevalent with the Web 2.0 and social media boom. Veletsianos and Kimmons (2012) used the term Networked Participatory Scholarship (NPS) to encompass scholars' use of social networks to "pursue, share, reflect upon, critique, improve, validate, and further their scholarship" (p. 766). This has become a rich area for research as academics wrestle with some of the issues it raises. On the positive side, Stewart (2016) noted that establishing such an identity increases visibility for pre-tenure academics, and this can offer some protection in a climate of precarious academic labor: "Among the junior scholars and graduate students in the study, opportunities including media appearances, plenary addresses, and even academic positions were credited to long-term NPS investment and residency, and to resultant online visibility" (p. 76).

However, on the negative side, the online world is one which Stewart (2016) notes can be characterized by "rampant misogyny, racism, and harassment" (p. 62). For all their potential to democratize the online space, such tools frequently reflect and reinforce existing prestige, with higher-ranked universities having more popular Twitter accounts (Jordan, 2017a), and professors generally developing larger networks than other positions in higher education (Jordan, 2017b).

Increasingly, as data capitalism and the nefarious uses of our data have come to light, there has been a movement to "own your own domain," with a blog at the center. That is, to host your own tools on a web domain that is under your control, rather than simply using a third-party service. Watters (2016) has emphasized that this control and ownership of data is an educational imperative:

> When one controls—albeit temporarily—a domain name and a bit of server space, I contend, we act in resistance to an Internet culture and an Internet technology and an Internet business model in which we control little to nothing. We own little to nothing. (para. 04)

Blogs are not just a tool for educators, but increasingly for students also. It is interesting to speculate what the current digital education environment would look like if, in the early days, institutions had adopted blogging platforms as their LMS rather than the commercial products. This is not as far-fetched as it might seem – blogging tools such as WordPress can be constructed to deliver course content and have embedded discussions, and they are easily extendable with plug-ins for specific functions, resembling the sort of service-oriented architecture that was deemed desirable. Templated versions can be implemented for all students, so they have their own space to develop their identity, create assignments, and develop something akin to an e-portfolio (more on this later). In 2008, Jim Groom (2008) and others were promoting the idea of blogs as educational platforms:

> This model puts the power in the hands of the authors, which in turn provides the possibility for a far greater level of educational openness. These are platforms that provide many, if not all, of the features of more traditional LMSs, but exponentially move beyond them given the fact that they benefit from huge open source communities that are constantly enhancing the applications. (Groom, 2008, para. 01)

What this comparison between the LMS and blogs reveals is more than a difference over software preferences; it reveals differing visions about the nature of digital education, with blogs more aligned to many of the characteristics of openness. For many of the advocates of blogs, the vision of ed-tech is one that embraces the open aspects of the original web. To return to Watters' (2016) post on owning your own domain, she claims,

> The *rest* of ed-tech—the LMS, adaptive learning software, predictive analytics, surveillance tech through and through—is built on an ideology of data extraction, outsourcing, and neoliberalism. But the Web—and here I mean the Web as an ideal, to be sure, and less the Web in reality—has a stake in *public* scholarship and *public* infrastructure. (para. 26)

Groom and Lamb (2014) also bemoan this loss of the original vision of the web in how educational technology came to be deployed, and see the LMS as a key component in this:

> [h]igher education overall, perhaps concerned about the untamed territories of the open web and facing unquestionably profound challenges in extending its promise beyond the early adopters, cast its lot with a "system" that promised to "manage" this wild potential and peril. (p. 29)

It is not necessarily a binary divide. For instance, there are commercial applications of blogs and of the open-source LMS, so it is more of a continuum. It represents something of a philosophical divide about how people view e-learning, and at its center are degrees of control.

In summary, blogs can be seen as highlighting some of the tension that the previous two educational technologies have brought to the fore. The web provides almost uncontrolled freedom, which comes with issues and implications, while the LMS offers control which can be stifling. Blogs operate somewhere in the middle ground, which is perhaps why they are often a preferred tool for open practitioners such as Groom and Lamb.

Social Media

If the LMS represents the dominant educational technology, then social media tools such as Twitter and WeChat represent the kind of third-party technology that has been adopted in education. Social media represents the culmination of the paradox that the web unleashed for education, and society in general, in that it is both a toxic, damaging environment that spreads disinformation, but also a useful tool for connecting, sharing and engaging.

Initially Twitter and other social media saw a democratizing effect: formal academic status was not significant since users were judged on the value of their contributions to the network. In educational terms, social media has done much to change the nature of the relationship between academics, students, and the institution. It remains a means of creating a valuable and rewarding network for scholars that brings real benefits. How, then, are we to resolve this quandary of benefit and damage? For some, the benefits are no longer significant enough and they have quit social media.

Educators, then, are faced with having to negotiate complex paradoxes for both themselves and often on behalf of their students. There are several potential uses for social media in teaching and learning, which can be framed as a set of hypotheses. These are not guaranteed findings, but rather potential impacts for which there are some tentative reasons to propose them.

- *Social media increases student recruitment*. The use of Twitter, Instagram, Facebook, and other social media by universities, students, and staff provides potential students with a good insight into student life and can act as an effective marketing tool (Constantinides & Zinck Stagno, 2011).
- *Social media increases student engagement*. The use of social media helps blur boundaries between study and other aspects of life and provides an element that

can be fitted in-between other activities in a way that more concentrated study activities cannot, and as such can improve student engagement (Roopchund, Ramesh, & Jaunky, 2019).

- *Social media increases student retention*. Students who make social connections tend to stay with their studies (Astleitner, 2000). Conventionally, this is realized through societies and social functions. Social media provides a further means to enhance these bonds, and particularly for distance or part-time students.
- *Higher education has a duty to develop expertise in fake news and misinformation*. Mike Caulfield (2017), who has done much of the work in exploring the impact of misinformation, has developed an online book and a wide range of activities to help develop these skills. They are likely to become increasingly significant as the quality of fake videos and sophisticated targeting improve.

Social media such as Facebook, Twitter, WeChat, and KakaoTalk have often achieved an infrastructure-like status for much of the online experience. For instance, for a significant number of users, Facebook is viewed as the entirety of the Internet. Reporting on surveys in Indonesia and Nigeria, Farrell (2015) stated that "large numbers of first-time adopters come online via Facebook's proprietary network, rather than via the open web" (para. 08). While these corporations have inveigled their way to infrastructure status, we should remember that providers of physical infrastructure systems such as water, roads, and power have responsibilities and accountability placed upon them. This is relevant to online education, because it highlights the responsibility in mandating the use of such systems and thus increasing their infrastructure-like status and stresses the importance of developing a critical approach to technology in all subject areas.

What social media ultimately provides online education with is a set of tools and possibilities, but these are not without risks and issues. The clearer distinction between professional and personal is deliberately blurred on social media. This can be beneficial, but it also leads to "context collapse." Marwick and Boyd (2011) highlighted this issue:

> We present ourselves differently based on who we are talking to and where the conversation takes place—social contexts like a job interview, trivia night at a bar, or dinner with a partner differ in their norms and expectations . . . . The need for variable self-presentation is complicated by increasingly mainstream social media technologies that collapse multiple contexts and bring together commonly distinct audiences. (p. 01)

In other words, we communicate in social media with one audience in mind, but several different audiences might access that content. This context collapse provides both an opportunity, for example in reaching new audiences for research dissemination, and a risk, for example trolls searching for terms to harass people. This is a reflection of what social media does for education as a whole – the context between the university and the rest of society is collapsed. That may be beneficial generally, but when it means conspiracy theorists arrive in a geology discussion to insist the world is flat, it raises problems that we are still incapable of solving.

In summary, social media provides a means of disseminating knowledge and a medium through which much of open practice can flourish. However, it also represents the more extreme aspects of the freedoms that the web originally provided and as such its usage in digital education is complex.

MOOCs

The MOOC phenomenon is an interesting case study in the rise of digital education, particularly how it relates to open education. Such was their growth and hype during 2012 that *The New York Times* declared it to be "the year of the MOOC" (Pappano, 2012). MOOCs can be viewed as the combination of several preceding technologies: some of the open approach of OER, the application of video, and the revolutionary hype of Web 2.0. Early experiments by educators such as George Siemens and Stephen Downes with course design had examined connected pedagogies. These had attracted attention within the online education community, but MOOCs were still widely unknown outside of the field. However, once Stanford professor Sebastian Thrun's course on artificial intelligence attracted over 100,000 learners and almost as many headlines (Raith, 2011), they gained media interest and significant venture capital. Now that the initial flurry of activity has died down, what can we say about MOOCs?

First of all, their impact has been far less dramatic than was often projected at the start. Sebastian Thrun famously declared that there will only be 10 global providers of higher education by 2022 (Leckart, 2012), and that was not the case. Morgan (2016) argued that "MOOCs prove that universities can and should embrace online learning," and Godin (2016) proclaimed MOOCs to be the "first generation of online learning." As well as overclaiming for the impact of MOOCs, what many of these pieces have in common is a conflation of online learning with MOOCs. For instance, it didn't take the development of MOOCs to show universities that they should embrace online learning, as Morgan contended.

A consequence of this conflation is that, if MOOCs and the online courses are synonymous, then MOOCs become seen as the *only* way of realizing online learning. For example, Lewin (2013) published his article entitled "After Setbacks, Online Courses Are Rethought" in *The New York Times* on the problems of Thrun's company, Udacity, and its approach to MOOCs. In this narrative, MOOC failures become the failure of all online learning, and the future of MOOCs becomes the future of all online learning.

Several problems began to emerge with MOOCs after the initial enthusiasm, leading to the reining back on some of the ambitions. The key ones were:

- Low Completion Rate – With around only 10% of registered students finishing the course, completion rates have been problematic for MOOCs (Jordan, 2014).

- Learner Demographics – Most successful MOOC learners were already well educated (Christensen et al., 2013), and this finding undermined claims of the MOOC democratizing learning.
- Sustainability – As MOOCs became industrialized and required high-quality media outputs, their costs varied considerably, particularly when staff time, marketing, and support were factored in (Hollands & Tirthali, 2014). Finding sustainable business models that justified this expenditure has proven problematic.

These issues saw a change in tone around MOOCs, with MOOC provider Coursera (2013) announcing that it was going to "explore MOOC based learning on campus." This proposed system resembled conventional blended learning, or e-learning, but on a new platform. Similarly, Georgia Tech announced it was offering a masters-level MOOC, which was not free (costing US$7,000), once again conflating online learning with MOOCs, and Thrun's company Udacity "pivoted" to focus on corporate training.

Aside from all the hyperbole, what practical applications of MOOCs have emerged? The most obvious one is that millions of people signed up for them and found them an enjoyable and useful learning experience. For example, Farrow, Ward, Klekociuk, and Vickers (2017) reported on over 11,000 participants in a MOOC on understanding dementia. As educators, the rise of such courses and increased knowledge has to be seen as a positive outcome. There are also examples of their use in formal education to expand the curriculum; for example, the Delft University of Technology offers a "Virtual Exchange Programme," whereby its campus-based students can take MOOC with other accredited providers and receive credit at Delft (Pickard, 2018). Other providers offer routes by which learners' gain credit for studying in MOOCs and transfer these into a university to count toward a degree. While such models will not appeal to everyone, they do allow increased flexibility in the higher education offering. The more recent interest in "micro-credentials," i.e., shorter courses that carry university credit can also be seen as a consequence of the MOOC approach.

MOOCs also raised the profile of online education, and open practice in particular. Even if MOOCs themselves are only open in terms of enrolment and not in terms of licensing, their presence has a knock-on effect. For example, for many university libraries, curating their open access resources is not a priority because fee-paying students have access to those resources anyway. So, there is no real driver for educators to focus on open access above other resources. But when universities started creating MOOC, this placed pressure on people to use open access resources, because the open learners probably wouldn't have privileged library access. While we may bemoan that MOOCs themselves are not really open in the sense of openly licensed, they do form part of a larger system, which helps drive openness.

In summary, MOOCs might seem to represent one of the successful alignments of digital and open education. However, many proponents of open education would not consider them truly open, and their commercial drivers have often pushed them toward increasingly conventional models of education.

Conclusions

In this chapter, five significant technologies for digital education have been considered, namely, the web, LMS, blogs, social media and MOOCs. Many other educational technologies could have been addressed also, for example wikis, computer games, mobile technology, learning analytics, and virtual reality. These have all raised the profile and range of possibilities for digital education. In this concluding section analysis can turn to what they represent collectively for open education in particular. The five technologies highlighted here have a number of features in common. First, they lowered the participation barrier, making it easier for educators and students to engage in digital education. The web, social media and blogs all made publishing and sharing a democratized activity. This meant that not only could educators experiment, but that learners were operating in a context where online activity was increasingly the norm. Digital education therefore is not struggling as an unfamiliar concept. Second, they all have elements of control as a central proposition. For the web and social media there is a lessening of control, while the LMS is a means to explicitly regain that control from the "wild web." MOOCs are an interesting microcosm of this tension, as the early experimental MOOCs (sometimes referred to as cMOOCs) were much more open in terms of pedagogy, community and technology. The later commercial MOOCs (also known as xMOOCs) are delivered in a much more uniform, linear, controlled manner. Lastly, the combination of these two features – ease of use and control – lead to reflections on openness.

At the start of this chapter eight areas of open education were proposed. The five educational technologies presented here map much of this trajectory. The web was crucial in the transformation of much of distance learning into e-learning, which led to the LMS. Blogs and social media have informed open practice, which was a driving factor for OER and MOOCs. It is a mistake to see open education as synonymous with only one of these eight sub-topics, just as it is also not synonymous with digital education. However digital education and open education are intricately entwined. Digital technologies give rise to development in education which seeks to explore aspects of the openness these technologies afford. The practices developed in open education themselves then go on to influence the development of further technologies. It is through this lens of iterative influence that we can best consider future developments in open education.

References

Astleitner, H. (2000). A review of motivational and emotional strategies to reduce dropout in web-based distance education. In D. Leutner & R. Brünken (Eds.), *Neue medien in unterricht, aus- und weiterbildung [New media in education, training and further education]* (pp. 17–24). Munich, Germany: Waxmann.

Berners-Lee, T. J. (1989). Information management: A proposal. (CERN Report No.CERN-DD-89-001-OC). Retrieved from https://www.w3.org/History/1989/proposal.html

Berners-Lee, T. J. (n.d.). What made you think of the WWW? Answers for young people. Retrieved from https://www.w3.org/People/Berners-Lee/Kids.html#What

Caulfield, M. (2017). *Web literacy for student fact checkers . . . and other people who care about facts*. Retrieved from https://webliteracy.pressbooks.com/

Christensen, G., Steinmetz, A., Alcorn, B., Bennett, A., Woods, D., & Emanuel, E. (2013). The MOOC phenomenon: Who takes massive open online courses and why? *Ewing Marion Kauffman Foundation Research Paper* https://doi.org/10.2139/ssrn.2350964

Clay, J. (2009, September 9). The VLE is dead–The movie [Video file]. Retrieved from http://elearningstuff.net/2009/09/09/the-vle-is-dead-the-movie/

Conole, G., de Laat, M., Dillon, T., & Darby, J. (2008). "Disruptive technologies," "pedagogical innovation": What's new? Findings from an in-depth study of students' use and perception of technology. *Computers and Education, 50*, 511–524. https://doi.org/10.1016/j.compedu.2007.09.009.

Constantinides, E., & Zinck Stagno, M. C. (2011). Potential of the social media as instruments of higher education marketing: A segmentation study. *Journal of Marketing for Higher Education, 21*(1), 7–24. https://doi.org/10.1080/08841241.2011.573593.

Costa, C. (2013). *The participatory web in the context of academic research: Landscapes of change and conflicts* (Doctoral dissertation). University of Salford.

Costa, C. (2016). Double gamers: Academics between fields. *British Journal of Sociology of Education, 37*(7), 993–1013. https://doi.org/10.1080/01425692.2014.982861.

Coursera. (2013, May 30).10 US state university systems and public institutions join Coursera to explore MOOC-based learning and collaboration on campus [Coursera blog]. Retrieved from https://blog.coursera.org/10-us-state-university-systems-and-public/

Farrell, N. (2015). Developing countries think Facebook is the internet. *Fudzilla*. Retrieved from https://www.fudzilla.com/news/36984-developing-countries-think-facebook-is-the-internet

Farrow, M., Ward, D. D., Klekociuk, S. Z., & Vickers, J. C. (2017). Building capacity for dementia risk reduction: The preventing dementia MOOC. *Alzheimer's & Dementia: The Journal of the Alzheimer's Association, 13*(7), P871–P872. https://doi.org/10.1016/j.jalz.2017.06.1244.

Fullick, M. (2014, November 6). The times, they are (always) a-changin'. *University Affairs*. Retrieved from https://www.universityaffairs.ca/opinion/speculative-diction/times-always-changin/

Giles, M. W. (1996). From Gutenberg to gigabytes: Scholarly communication in the age of cyberspace. *The Journal of Politics, 58*(3), 613–626.

Godin, S. (2016, March 1). Will this be on the test? The startup. Retrieved from https://medium.com/swlh/will-this-be-on-the-test-237ae9cc53b4#.zdksfx36e

Groom, J, (2008). Don't call it a blog! [Blog post]. *Bavatuedays*. Retrieved from https://bavatuesdays.com/dont-call-it-a-blog/

Groom, J., & Lamb, B. (2014). Reclaiming innovation. *Educause Review, 49*(3). Retrieved from https://www.educause.edu/visuals/shared/er/extras/2014/ReclaimingInnovation/default.html.

Hollands, F., & Tirthali, D. (2014). Resource requirements and costs of developing and delivering MOOCs. *The International Review of Research in Open and Distributed Learning, 15*(5). https://doi.org/10.19173/irrodl.v15i5.1901.

Holmes, W., Nguyen, Q., Zhang, J., Mavrikis, M., & Rienties, B. (2019). Learning analytics for learning design in online distance learning. *Distance Education, 40*(3), 309–329.

Janssen, C. (2021). Risk-averse academy needs to get on board with new tech. Times Higher, March 17th 2021. https://www.timeshighereducation.com/opinion/risk-averse-academy-needs-get-board-new-tech

Jordan, K. (2014). Initial trends in enrolment and completion of massive open online courses. *The International Review of Research in Open and Distributed Learning, 15*(1). https://doi.org/10.19173/irrodl.v15i1.1651.

Jordan, K. (2017a). Examining the UK higher education sector through the network of institutional accounts on Twitter. *First Monday, 22*(5). Retrieved from http://firstmonday.org/ojs/index.php/fm/article/view/7133/6145.

Jordan, K. (2017b). *Understanding the structure and role of academics' ego-networks on social networking sites* (Doctoral dissertation). The Open University. Retrieved from http://oro.open.ac.uk/48259/

Leckart, S. (2012, March 20). The Stanford education experiment could change higher learning forever. *Wired*. Retrieved from https://www.wired.com/2012/03/ff_aiclass/

Lewin, D. (2013, November 12). After setbacks, online courses are re-thought. *New York Times*. Retrieved from https://www.nytimes.com/2013/12/11/us/after-setbacks-online-courses-are-rethought.html?_r=0

Marwick, A. E., & Boyd, D. (2011). I tweet honestly, I tweet passionately: Twitter users, context collapse, and the imagined audience. *New Media & Society, 13*(1), 114–133. https://doi.org/10.1177/1461444810365313.

McAvinia, C., & Risquez, A. (2018). Editorial: The #VLEIreland project. *Irish Journal of Technology Enhanced Learning, 3*(2). https://doi.org/10.22554/ijtel.v3i2.37.

Morgan, K. (2016, May 24). Moocs prove that universities can and should embrace online learning. *Times Higher Education*. Retrieved from https://www.timeshighereducation.com/blog/moocs-prove-universities-can-and-should-embrace-online-learning

OECD. (2005). *E-learning in tertiary education: Where do we stand?* Paris, France: OECD. Retrieved from https://www.oecd-ilibrary.org/docserver/9789264009219-en.pdf?expires=1566763030&id=id&accname=guest&checksum=4BD037CA011C923760309EA764420987.

Pappano, L. (2012, November 14). The year of the MOOC. *New York Times*. Retrieved from https://www.nytimes.com/2012/11/04/education/edlife/massive-open-online-courses-are-multiplying-at-a-rapid-pace.html

Pickard, L. (2018). TU Delft students can earn credit for MOOCs from other universities [Blog post]. *Class Central*. Retrieved from https://www.class-central.com/report/delft-virtual-exchange-program/

Raith, A. (2011, August 23). Stanford for everyone: More than 120,000 enroll in free classes. *KQED News*. Retrieved from https://www.kqed.org/mindshift/14740/stanford-for-everyone-more-than-120000-enroll-in-free-classes

Rigg, P. (2014, October 31). Can universities survive the digital age? *University World News*. Retrieved from https://www.universityworldnews.com/post.php?story=20141030125107100

Roopchund, R., Ramesh, V., & Jaunky, V. (2019). Use of social media for improving student engagement at université des mascareignes (udm). In *Information systems design and intelligent applications* (pp. 11–20). Singapore, Singapore: Springer.

Stewart, B. (2015). Open to influence: What counts as academic influence in scholarly networked twitter participation. *Learning, Media and Technology, 40*(3), 287–309. https://doi.org/10.1080/17439884.2015.1015547.

Stewart, B. (2016). Collapsed publics: Orality, literacy, and vulnerability in academic Twitter. *Journal of Applied Social Theory, 1*(1). Retrieved from https://socialtheoryapplied.com/journal/jast/article/view/33/9.

Veletsianos, G., & Kimmons, R. (2012). Networked participatory scholarship: Emergent techno-cultural pressures toward open and digital scholarship in online networks. *Computers & Education, 58*(2), 766–774. Retrieved from https://www.veletsianos.com/wp-content/uploads/2011/11/NPS_final_published.pdf.

Watters, A. (2016). A domain of one's own in a post-ownership society. Retrieved from http://hackeducation.com/2016/08/23/domains

Weller, M. (2007). The VLE is dead [blog post]. *The Ed Techie.* Retrieved from http://blog.edtechie.net/web-2-0/the-vlelms-is-d/

Weller, M. (2020). *25 years of Ed tech*. Athabasca, Canada: Athabasca University Press.

Weller, M., Jordan, K., DeVries, I., & Rolfe, V. (2018). Mapping the open education landscape: Citation network analysis of historical open and distance education research. *Open Praxis, 10*(2), 109–126.

Zawacki-Richter, O., Conrad, D., Bozkurt, A., Aydin, C. H., Jung, I., Kondakci, Y., . . . Xiao, J. (2020). Elements of open education: An invitation to future research. *The International Review of Research in Open and Distance Learning, 21*(3), 319–334. http://www.irrodl.org/index.php/irrodl/article/view/4659.

Artificial Intelligence in Education and Ethics

7

Benedict du Boulay

Contents

Abstract

This chapter traces the ethical issues around applying artificial intelligence (AI) in education from the early days of artificial intelligence in education in the 1970s to the current state of this field, including the increasing sophistication of the system interfaces and the rise in data use and misuse. While in the early days most tools were largely learner-facing, now there are tools that are teacher-facing, supporting their management of the classroom, and administrator-facing, assisting in their management of cohorts of students. Learner-facing tools now take into account the affective and motivational aspects of learning as well as the cognitive. The rise of data collection and its associated analytic tools has enabled the development of

B. du Boulay (✉)
University of Sussex, Brighton, UK
e-mail: B.du-Boulay@sussex.ac.uk

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_6

dashboards for the dynamic management and reflective understanding of learners, teachers, and administrators. Ethical issues hardly figured in the early days of the field but now they loom large. This is because of the legitimate fears that learners' and teachers' autonomy will be compromised, that learner data will be collected and potentially misappropriated for other purposes, and that AI will introduce extra biases into educational decisions and increase existing inequity and also because of the scary reputation that AI has in general.

Keywords

Artificial intelligence in education · Ethics · Analytics · Dashboards · Learner-facing · Teacher-facing · Administrator-facing

Introduction

Artificial intelligence (AI) was initially applied in education about 50 years ago and only a decade or so after the founding of AI as a research field itself, at a Dartmouth College Workshop, in Hanover, New Hampshire, USA, in 1956 (see, for example, Moor, 2006).

In 1970, Carbonell's paper "AI in CAI: An Artificial-Intelligence Approach to Computer-Assisted Instruction" described a tutor and authoring system named SCHOLAR for geography, based on semantic networks (Carbonell, 1970). This "information structure-oriented (ISO)" tutor separated out its teaching strategy from its knowledge of South American geography in such a way that, in principle, the geography of some other part of the world could be slotted in and the teaching strategy applied to that, or a different teaching strategy applied to the geography of South America. Moreover, because of the explicit representation of its geographic knowledge via semantic networks, the system could reason about its knowledge to draw conclusions that were not explicitly coded in and also answer questions about what it knew. Thus, its "mixed-initiative" teaching strategy could encompass both the system questioning the student, making use of the context and the relevance of its questions, and the student questioning the system, both in very limited English. The system kept track of which bits of the geographical domain had been understood by the student by tagging the relevant parts of the semantic network, thus creating an evolving model of the student's knowledge. This adaptation to the individual learner was one of the factors that distinguished this system from the computer-assisted instructional (CAI) systems that preceded it. The system also exemplified what came to be the standard conceptual architecture of learner-facing artificial intelligence in education (AIEd) systems.

The Early Days of AI in Education

An early collection of AIEd papers demonstrated what could already be achieved about a decade later (Sleeman & Brown, 1979). This collection included articles, among others, on systems for computer-based coaching in a gaming scenario (Burton & Brown, 1979), adding tutorial rules to an expert system to enable it to explain and teach the expert system's rules (Clancey, 1979), a knowledge representation to capture the evolving understanding of a learner (Goldstein, 1979), a tutor for elementary programming (Miller, 1979), and a tutoring system for quadratic equations that conducted experiments to evaluate its own teaching performance and then update its own teaching tactics as a result (O'Shea, 1979).

These early papers essentially mapped the conceptual architecture of what are now often called "learner-facing tools," namely, an explicit model of what is to be taught, an explicit model of how it should be taught, an evolving model of the learner's understanding and skill, and an interface through which the interaction of the learner and the system communicate. Hartley (1973) provided an early definition of this architecture as follows, where (3) and (4) together are the explicit model of teaching, and the interface was not mentioned given its limited scope at that time:

1. A representation of the task
2. A representation of the student and his performance
3. A vocabulary of (teaching) operations
4. A pay-off matrix or set of means-ends guidance rules (Hartley, 1973, p. 424)

The standalone nature of these early systems, their unsophisticated interfaces, and their lack of interest in collecting large amounts of learner data meant that many of the contemporary ethical issues around the use of AIEd were not in evidence.

From the start, the general field of AI has had intertwined scientific and engineering aspects (Buchanan, 1988). The scientific aspect of AI *in education* has concerned itself with questions around the nature of human learning and teaching, often with the goal of understanding and then duplicating human expert teaching performance. This aspect has focused largely on learner-facing tools but more recently has expanded into teacher-facing tools. The science has been pursued as a kind of computational psychology for its own sake or as a way to improve educational practice and opportunity in the world. The engineering aspect of applying AIEd has exploited a wide range of computational technologies such as Carbonell's semantic networks, mentioned above, and more recently machine learning techniques of various kinds. This aspect of the work has pursued even wider goals that also include the development of educational administrator-facing tools.

This chapter is divided into six sections. Section "Contemporary AI in Education" gives a brief overview of the current state of the applications of AIEd, including subsections on learner-facing tools, teacher-facing tools, and administrator-facing tools. Section "Ethical Issues" examines the ethical issues that arise from applying AIED, including the ethical issues around educational technology in general, ethical design, and the ethical use and analysis of data. Section "Open Questions and Directions for Future Research" looks at open questions. Section "Implications for Open, Distance, and Digital Education (ODDE)" examines the implications for open, distance, and digital education (ODDE). Section "Conclusion" offers some brief conclusions.

Contemporary AI in Education

These days the field of AIEd has split into three broad overlapping enterprises. The first continues to develop educational tools that focus on *learners* by undertaking various pedagogical roles such as tutoring a set of skills (Koedinger & Aleven, 2016) or assisting concept acquisition (Biswas, Segedy, & Bunchongchit, 2016) or supporting metacognitive awareness and regulation (Azevedo & Aleven, 2013), among others. The second enterprise is the development of assistive tools for teachers (see section "AI and Teacher-Facing Tools"), and the third enterprise develops tools designed to help educational administrators (see section "AI and Administrator-Facing Tools"). A useful summary of the applications of AIEd for a reader working within ODDE can be found in Kose and Koc (2015).

AI and Learner-Facing Tools

As an example of a tool that focuses on learners, Betty's Brain is a system designed to help students develop their understanding of the concepts of ecology (Biswas et al., 2016). In this system, the interface is one of the key parts of the system. The student uses the interface to draw a conceptual map consisting of nodes and arrows depicting some of the processes involved in a river ecosystem, such as the absorption of oxygen and the generation of carbon dioxide. The system also provides reading materials from which the student is expected to create the conceptual map. At any time, the student can ask the system to check and test her conceptual map for accuracy and completeness, and the system will offer comments to help her build a better conceptual map. The system is presented in terms of a story where the student is building a conceptual map for an artificial student, Betty, hence Betty's Brain. The checking and testing is presented as if being set and marked by an artificial teacher, Mr. Davis. Mr. Davis also provides metacognitive hints to the student if she seems to not be paying proper attention to her own learning, such as not making good use of the available reading material.

One of the developments of AIEd since the early days has been the focus on learners as human beings with *feelings* and *aspirations* as well as knowledge and skills. This broader focus on the nature of learners and learning has been provoked by our increased understanding of learner motivation (Schunk, Pintrich, & Meece, 2008), mindset (Dweck, 2002), and academic feelings/emotions (Pekrun, 2014), to name but three aspects of human learning. While such an evolution helps to humanize the interaction between systems and learners, it opens up further scope for ethical issues around privacy and around the kinds of data that are collected and stored. This enlarged focus has involved the development of techniques to try to assess the transient emotional and motivational states of learners in order to boost positive frames of mind, such as engaged concentration, and counter negative states of mind, such as frustration or boredom.

An example of the application of the above is found in a tutor for school mathematics. Arroyo et al. (2014) drew on the work of Dweck (2002) and others to augment an existing tutoring system for mathematics by clustering students' learning behaviors into a small number of profiles in terms of their use of hints, the time they were taking in solving problems, and the number of errors they were making. Each of these profiles was determined by both cognitive and affective/motivational dimensions. For each profile, there were cognitive and affective/motivational actions and feedback by the tutor, such as to set a harder problem (cognitive), praise effort or to de-emphasize the importance of immediate success (affective/motivational).

The suite of language learning tools, Enskill, provides another example of a contemporary interface for learner-facing systems (Johnson, 2019). This is a suite of tools for learning a language, the contextualized use of the correct language register, and for learning how to speak effectively, e.g., making a forceful case for some course of action. The tools use game-based technology to set up an on-screen scenario containing one or more characters with whom the learner speaks and who can reply in speech. The analysis and feedback of the learner's language can be at different levels depending on the context, e.g., pronunciation, grammar, and appropriateness. Moreover, the tools log all interactions with learners, and these link into a mechanism to improve the systems' performance when mistakes or glitches occur ("data-driven development (D3) of learning environments").

A particular outcome of learner analytic aspect of AI in education has been the growth of "dashboards" (Schwendimann et al., 2017). These can be aimed at students to help them reflect on progress, either in the moment or after a lesson or session, or even reflect on the efficacy of the reflection tools themselves (Jivet, Wong, Scheffel, Specht, & Drachsler, 2021). Dashboards aimed at students have grown out of an earlier learner-facing technology named "Open Learner Models" (see, for example, Bull & Kay, 2016).

Are Learner-Facing Tools Effective and Being Used?

There have been at least seven meta-studies and meta-analyses of the effectiveness of learner-facing tools as compared to either a teacher working with a whole class of students or a skilled teacher working with a single student (for a summary, see du Boulay, 2016). The overall message from 182 comparative studies is that learner-facing tools perform better in terms of learning gains compared to a human teacher working with a whole class (effect size = 0.47) but slightly worse than a skilled human tutor working with a single student (effect size = −0.19). In addition to the seven meta-studies, there was a 2-year, large, multistate evaluation of the Cognitive Tutor for Algebra in matched pairs of schools in the USA (Pane, Griffin, McCaffrey, & Karam, 2014). Each pair consisted of a school that continued to teach algebra in their own fashion and another in which the school also made use of the Cognitive Tutor for Algebra (though without necessarily using it as per the advice of the tutoring system's designers). In the second year of the study, when the teachers had got used to deploying the tutoring system effectively, there was a small comparative learning gain in favor of the schools using the tutoring system (effect size = 0.21).

Despite the positive results for learner-facing tools above, the penetration of artificial intelligence tools of all kinds into schools and colleges has been slow, but with some notable exceptions, such as the Cognitive Tutors in the USA, mentioned above, and now trading under the name Carnegie Learning (Koedinger & Aleven, 2016). More positively, Baker, Smith, and Anissa (2019) say:

> Despite minimal attention, AIEd tools are already being used in schools and colleges in the UK and around the world – today.
>
> We find learner-facing tools, such as adaptive learning platforms that 'personalise' content based on a child's strengths and weaknesses. We find teacher-facing tools, such as those which automate marking and administration (one government-backed pilot in China sees children in around 60,000 schools having their homework marked by a computer). We find system-facing tools, such as those which analyse data from across multiple schools and colleges to predict which are likely to perform less well in inspections. (p. 5)

According to a systematic review of research on artificial intelligence applications in higher education, the penetration into universities is still patchy with few papers referring either to the ethical dimensions or to learning theory (Zawacki-Richter, Marín, Bond, & Gouverneur, 2019):

> The descriptive results show that most of the disciplines involved in AIEd papers come from Computer Science and STEM, and that quantitative methods were the most frequently used in empirical studies. The synthesis of results presents four areas of AIEd applications in academic support services, and institutional and administrative services: 1. profiling and prediction, 2. assessment and evaluation, 3. adaptive systems and personalisation, and 4. intelligent tutoring systems. The conclusions reflect on the almost lack of critical reflection of challenges and risks of AIEd, the weak connection to theoretical pedagogical perspectives, and the need for further exploration of ethical and educational approaches in the application of AIEd in higher education. (Zawacki-Richter et al., 2019)

In their editorial to a special issue on AI in university education, that included the paper mentioned above, the editors noted that "there is little evidence at the moment of a major breakthrough in the application of 'modern' AI specifically to teaching and learning, in higher education, with the exception of perhaps learning analytics" (Bates, Cobo, Mariño, & Wheeler, 2020).

AI and Teacher-Facing Tools

Recently, there has been the development of educational tools that focus on teachers to help them either *orchestrate* the use of classroom technology or reflect on that organization. They also (i) help teachers allocate their precious time effectively to those students who need it most and (ii) analyze students' work to determine which are the common issues within a class. We can see this as an evolution of the learner model to encompass both the individuals within a group and the group itself.

For example, the Lumilo system gave the teacher glasses that provided an augmented reality view of her class of students, each working alone with an AIEd system (Holstein, McLaren, & Aleven, 2018). There were two kinds of augmentation in this view. The first involved an augmented reality symbol, apparently hovering above each student's head, that indicated their current learning state. These symbols included those for designating the following learner states: idle, (too) rapid attempts, hint abuse or gaming the system, high local error after hints, or unproductive persistence. These symbols were designed to give the teacher information on which to base her decision about which student she should go and help in person. The second augmentation involved an analysis of how the students were doing as a whole to provide a synopsis of problems common to the class. This synopsis was designed to give the teacher information on what might be the focus of her whole class interventions.

AI and Administrator-Facing Tools

The third broad area for AIEd has been the rise of analytics applied to data generated in educational contexts at the class or cohort level and aimed at administrator-facing tools. These kinds of analysis explore, for example, the relation of learner engagement to overall success in massive online open courses (MOOCs) (see, for example, Rienties et al., 2016), different patterns of engagement (see, for example, Rizvi, Rienties, Rogaten, & Kizilcec, 2020), and identification of individual and whole class difficulties with course material and the means to rapidly identify and fix any problems and failings in the interactions of a systems with its learners (see, for example, Johnson, 2019).

For example, Peach, Yaliraki, Lefevre, and Barahona (2019) analyzed learners' temporal behavior in online courses at Imperial College Business School and the UK Open University. This data included task completion, timing, and regularity of interactions with the learning system. They mapped individuals' task completion times against the average for all learners and used clustering techniques to create groups that included early birds, on time, low engagers, sporadic outliers, and crammers. They found that poor performers (based on outcome measures) typically evidenced cramming behavior (no surprise there) but good performers were found in all of the time-related groupings, including low engagers and crammers.

In their wide-ranging systematic review, Zawacki-Richter et al. (2019) found a number of papers related to the application of AI in admissions decisions. For example, Acikkar and Akay (2009) used machine learning techniques to generate a predictive model of whether students would be admitted to university to study physical education and sports based on their "performance in the physical ability test as well as [their] scores in the National Selection and Placement Examination and graduation grade point average (GPA) at high school" (p. 7228). These analyses were undertaken retrospectively and were very accurate (e.g., >90%). The ethical dimension of such predictions comes into sharp focus if such predications are made prospectively when students apply, either as advice to admission tutors or more worryingly as actual decisions with no human in the loop.

Ethical Issues

There have been fears about artificial intelligence from long before the advent of the field (see, for example, *The Golem* (Meyrink, 1915) – a retelling of an ancient tale about animating a living being from a clay statue). However, there were few ethical issues uppermost in the minds of the early creators of student-facing tools using AI. For them, the issues were largely technological and pedagogical, e.g., how to build such systems at all and to determine whether they were effective in educational contexts. These days ethical issues have become much more pressing because of the greater penetration of educational technology (including AI-based technology) into education and training at all levels, the much greater collection of data in educational contexts, and the entry of companies engaged in surveillance capitalism into the educational ecosystem (Williamson, 2018).

Ethical Issues Around Education in General

In most countries, human teachers already operate within an ethical framework. In Scotland, for example, this covers a number of areas, including *doing one's best* for one's students, e.g., by keeping up to date with changes in the curriculum, and *treating students equitably*. It also includes respecting students' confidentiality (see, for example, General Teaching Council Scotland, 2012).

The rise of educational technology of all kinds, whether involving AI or not, and its creation of logs of interactions, has produced a huge amount of student data at all levels in education from primary (elementary) schools to universities. Teachers' ethical guidelines, such as those above, need to encompass these extra sources of data. There are many unanswered questions about who owns this data, who has access to it, how long it will be kept, and so on. The European Framework on General Data Protection Regulation (GDPR) provides guidance on managing all kinds of personal data (Li, Yu, & He, 2019). However, there are still issues for students around understanding what data about them counts as "personal" (Marković, Debeljak, & Kadoić, 2019), as well as around their degree of ownership and rights over educational log data.

Ethical Issues of AI in Education

Involving AI into educational technology must also be required to *do its best and treat students equitably*. For learner-facing tools, one should expect that designers of the educational technology will ensure that the technology will do the best that is possible in the circumstances, whether it is teaching, tutoring, mentoring, or counseling students. One should also expect that the technology treats students in an equitable fashion and does not favor one student over another either inadvertently or deliberately.

Learner-Facing Tools

How might it ever be the case that technology treats students inequitably, we may ask? Many learner-facing systems select what they think is the next most useful learning task, e.g., the next problem to solve, for a particular student with a particular educational history. A faulty design-level categorization of learners into groups, e.g., by gender, perceived prior attainment, motivation, or self-regulated learning capability, might lead to a student being presented with inappropriate or much tougher tasks than they can cope with or indeed much easier tasks than they can learn from. Of course, this kind of bias can also happen with human teachers where their low expectations of some students can become self-fulfilling prophecies. But just because human teachers can, on occasion, be biased does not mean we should turn a blind eye to the potential biases in AI-based educational technology.

Teacher-Facing Tools

Similar considerations apply to teacher-facing tools. The Lumilo orchestration system we described above flagged up students who were doing OK or who were experiencing different kinds of difficulty. This aimed to enable the teacher to make choices about who to help. Clearly, this is an ethically charged decision. Should the teacher prioritize those who are in most difficulty or spread her effort more evenly across the whole class? That is a human dilemma. But the orchestration system had better get its diagnostics correct about who it thinks is doing OK and who it thinks needs help. Even without the use of AI, systems for helping the teacher manage a classroom can have unexpected negative effects on the students. In a study of ClassDojo, used by teachers to record student behaviors, Lu, Marcu, Ackerman, and Dillahunt (2021) noted that:

> In particular, the use of ClassDojo runs the risk of measuring, codifying, and simplifying the nuanced psycho-social factors that drive children's behavior and performance, thereby serving as a "Band-Aid" for deeper issues. We discuss how this process could perpetuate existing inequality and bias in education. (Lu et al., 2021)

Administrator-Facing Tools

For a discussion of the wide uses of AI in universities, see Zeide (2019). Administrator-facing tools are sometimes used to make predictions about which students seem to be doing broadly OK and which are showing evidence of failing the course or dropping out. These kinds of judgment are often based on learning analytics using AI methodologies. The issue here is the consequences of false negatives and false positives emerging from an inadequate data analysis. For example, missing signs that a student is really struggling may mean that no human is alerted to provide help. Labeling a student as struggling who is doing OK may also have repercussion down the line, rather like an incorrect entry in a credit rating. For an interesting example of the artifacts that can occur in analyzing cohort data, see Alexandron, Yoo, Ruipérez-Valiente, Lee, and Pritchard (2019). They showed that sometimes students using a MOOC set up two accounts so that they could game the system. One account (in a fake name) would be used to get lots of help from the system to find the right answers, while the other account (in the student's real name) would be used to answer all the questions quickly and correctly.

Using predictions to drive admissions of students to schools or colleges (Acikkar & Akay, 2009) or to predict grades when exams could not be taken because of COVID are fraught with ethical issues. The recent creation and then abandonment of an algorithm to predict UK student grades for entry to university is a salutary reminder about both potential AI biases and the potential human teacher biases the algorithm was intended to mitigate (see, for example, Hao, 2020).

Dealing with Ethical Issues in the Design, Implementation, and Deployment of AIEd Systems

Many different systems are now designed that include AI elements, from smartphone apps to big bank data systems. There has been increasing concern about the ethical questions that arise in the design, implementation, and deployment of such systems, with the EU proposing legislation to manage the situation (European Commission, 2020). Many different frameworks have been proposed to manage the development of such systems. A useful summary of such frameworks can be found in Floridi and Cowls (2019). They developed a framework from bioethics, under the general headings of beneficence, non-maleficence, autonomy, and justice, to also include "explicability." Most systems should work under the control of (or at least in tandem with) humans, so it is important that the system employing AI is able to offer an explanation or justification for exactly why it is suggesting a decision, a course of action, an outcome, or whatever, in order that the human can weigh up the degree to which he or she should agree with the machine. Particularly in education, autonomy and explicability must play a central role.

The issue of collecting, analyzing, and managing learner data has become more pressing for many reasons, including (i) greater general awareness of data privacy issues, (ii) the sheer quantity of learner data being collected, (iii) the increased use of AI and other methodologies for finding patterns in that data and drawing inferences from them, and (iv) the use of learner (and thus user) data for commercial purposes which have nothing to do with education (Williamson, 2018).

For example, Williamson (2018) warns about "Big Tech" companies moving into the field of education, typically with learner-facing tools, so that they can harvest the learner data for commercial purposes:

> Startup schools are analysed as prototype educational institutions that originate in the culture, discourse and ideals of Silicon Valley venture capital and startup culture, and that are intended to relocate its practices to the whole social, technical, political and economic infrastructure of schooling. These new schools are being designed as scalable technical platforms; funded by commercial "venture philanthropy" sources; and staffed and managed by executives and engineers from some of Silicon Valley's most successful startups and web companies. Together, they constitute a powerful shared "algorithmic imaginary" that seeks to "disrupt" public schooling through the technocratic expertise of Silicon Valley venture philanthropists. (Williamson, 2018, p. 218)

Researchers within AI in education are starting to be aware of these ethical issues, even though Zawacki-Richter et al. (2019) found only two papers in their systematic review of the applications of AI in universities that dealt with ethical issues. So, for example, we see both the emergence of general design frameworks, such as that of Floridi and Cowls (2019) above, for including AI in software products, and those aimed specifically at the development of AI applications in education (see, for example, Drachsler & Greller, 2016) and, most notably, the creation of an Institute of Ethical AI in Education which has set out guidelines particularly for teachers in their use of applications of AI (Seldon, Lakhani, & Luckin, 2021).

Open Questions and Directions for Future Research

From an ethical point of view, the big issue is how we can ensure that learners acquire more control over the data that is generated when they interact with educational technology and are protected from the misuse of their data by others. This section identifies some open questions and directions of research in the science and engineering of applications of AIEd for each of the categories of system mentioned above, namely, learner-facing, teacher-facing, and administrator-facing.

Given the increasing interest in gathering and using affective data about learners to improve the adaptivity of learner-facing tools, two *scientific* questions are (i) what might be the most useful affective categories on which to develop an affective pedagogy and (ii) what kinds of pedagogic rules should be used to maximize the chance of fruitful learning, given the sequence of the learner's cognitive and affective states so far. For example, should hope, dismay, and pride also play a role as well as confusion, frustration, and engaged concentration, and how should they be "managed"?

For systems aimed at teachers, an *engineering* question is: How best to manage and support the division of labor between the human teacher(s) and the system, given the manifest complexity and dynamic nature of most classrooms full of learners? For example, how should a tool used for dynamic management differ from one used for reflective practice?

For systems aimed at understanding cohorts, an *engineering* question is: How best can learning management systems be developed to measure and potentially answer *academic* questions about learning rather than *administrative* ones? For example, did students on this course show strong evidence of improvements in their self-regulated learning capability?

Implications for Open, Distance, and Digital Education (ODDE)

There are three main implications for ODDE. The first is that one of the oldest technologies for distance learning, the textbook, has been enhanced by the application of AI, either through adapting the content or the route through that content to the reader (see, for example, Thaker, Huang, Brusilovsky, & He, 2018). The second implication is that online, distance, and digital systems have increasingly incorporated elements of AI in order to make such systems smarter and more responsive to the needs of learners and teachers (see, for example, Kose, 2015; UNESCO, 2021). The third implication is that the developers and deployers of ODDE systems are already taking an ethical stance on how the systems are designed and built, how they are used in practice, and how their data is collected, stored, and analyzed (Prinsloo & Slade, 2016). For example, with particular respect to ODDE, Sharma, Kawachi, and Bozkurt (2019) state:

> First, there should be some control mechanisms that should be put into place to ensure transparency in collection, use and dissemination of the AI data. Second, we need to develop ethical codes and standards proactively so that we truly benefit from AI in education without harming anything; not only humans but any entity. Third, we should ensure learners' privacy and protect them for any potential harm. Next, we must raise awareness about the AI so that individuals can protect themselves and take a critical position when needed. (p. 2)

Conclusion

In order to give a longitudinal view of AIEd and ethics, this chapter has sketched the early days of learner-facing system development in the 1970s as well as provided some examples of much more recent systems. While the early systems were mostly learner-facing, contemporary applications of AI now also include teacher-facing and administrator-facing tools and are used both locally and via online, distance, and digital technologies.

The interface is one area where there have been big changes. One of the earliest systems had an interface that involved the learner typing in answers (and indeed questions) in stilted English, whereas contemporary learner-facing tools can show lifelike pedagogical agents with whom learners have a spoken dialogue in everyday English. Moreover, tools for other kinds of user make use of complex interactive dashboards.

In the early days, learner-facing tools were largely designed to work as tutors with a single learner. These days some tools are still designed to work with a single learner, though they can now adapt to the learner's affective and motivational state as well as to what the learner knows and understands. Other tools can work with more than a single learner (see, for example, Walker, Rummel, & Koedinger, 2009), and others again work with teachers rather than learners to assist them in the complex task of managing a class full of students and allocating their limited time in the most effective way.

The creation of log data from educational systems and the use of data mining and other analytic techniques have given rise to the thriving field of learner analytics. This in turn has enabled the creation of dashboards for learners, teachers, and administrators to interrogate data at varying levels of granularity.

Ethics has played a strong role in education for many years, most obviously via the codes of professional practice that teachers are expected to act within. In the early days of AI, ethical issues around education tool design and deployment were not uppermost in the minds of designers: simply making the systems work effectively was the main goal. Nowadays, ethics is very much in people's minds whether they be system designers, teachers, parents, administrators, or indeed learners, but there is still a long way to go to make educational technology a place of trust and safety.

AI has a mixed reputation. On the one hand, it is so ubiquitous that we hardly notice it, e.g., interacting with a chatbot on a website or having one's camera optimize a photograph. On the other hand, there are scary stories about AI taking over the world, or just as scary reports about biased decisions that might affect one's well-being (e.g., refusal of a mortgage or a job) or one's life (e.g., a diagnostic system generating a false-positive or false-negative report about a tumor). Within education, there are issues about the ways that analytics may produce biased results or that companies using AI enter education not with learner's best interest at heart but as a way to hoover up their data for commercial purposes. To counter these issues, various codes of ethics have been developed that cover all aspects of the design and deployment of AI-based educational technology at both international and more local levels.

Acknowledgments I thank Mutlu Cukurova, Carmel Kent and Anissa Moeini and the reviewers for helpful suggestions on a draft of this chapter.

References

Acikkar, M., & Akay, M. F. (2009). Support vector machines for predicting the admission decision of a candidate to the School of Physical Education and Sports at Cukurova University. *Expert Systems with Applications, 36*, 7228–7233. https://doi.org/10.1016/j.eswa.2008.09.007

Alexandron, G., Yoo, L. Y., Ruipérez-Valiente, J. A., Lee, S., & Pritchard, D. E. (2019). Are MOOC learning analytics results trustworthy? With fake learners, they might not be! *International Journal of Artificial Intelligence in Education, 29*, 484–506. https://doi.org/10.1007/s40593-019-00192-0

Arroyo, I., Woolf, B. P., Burleson, W., Muldner, K., Rai, D., & Tai, M. (2014). A multimedia adaptive tutoring system for mathematics that addresses cognition, metacognition and affect. *International Journal of Artificial Intelligence in Education, 24*, 387–426.

Azevedo, R., & Aleven, V. (Eds.). (2013). *International handbook of metacognition and learning technologies*. New York: Springer.

Baker, T., Smith, L., & Anissa, N. (2019). Educ-AI-tion rebooted? Exploring the future of artificial intelligence in schools and colleges. Retrieved from https://media.nesta.org.uk/documents/Future_of_AI_and_education_v5_WEB.pdf

Bates, T., Cobo, C., Mariño, O., & Wheeler, S. (2020). Can artificial intelligence transform higher education? *International Journal of Educational Technology in Higher Education, 17*(1), 42. https://doi.org/10.1186/s41239-020-00218-x

Biswas, G., Segedy, J. R., & Bunchongchit, K. (2016). From design to implementation to practice a learning by teaching system: Betty's Brain. *International Journal of Artificial Intelligence in Education, 26*, 350–364. https://doi.org/10.1007/s40593-015-0057-9

Buchanan, B. G. (1988). Artificial intelligence as an experimental science. In J. H. Fetzer (Ed.), *Aspects of artificial intelligence* (pp. 209–250). Dordrecht: Kluwer Academic Publishers.

Bull, S., & Kay, J. (2016). SMILI☺: A framework for interfaces to learning data in open learner models, learning analytics and related fields. *International Journal of Artificial Intelligence in Education, 26*, 293–331. https://doi.org/10.1007/s40593-015-0090-8

Burton, R. R., & Brown, J. S. (1979). An investigation of computer coaching for informal learning activities. *International Journal of Man-Machine Studies, 11*, 5–24. https://doi.org/10.1016/S0020-7373(79)80003-6

Carbonell, J. R. (1970). AI in CAI: An artificial-intelligence approach to computer-assisted instruction. *IEEE Transactions on Man-Machine Systems, 11*, 190–202. https://doi.org/10.1109/TMMS.1970.299942

Clancey, W. J. (1979). Tutoring rules for guiding a case method dialogue. *International Journal of Man-Machine Studies, 11*, 25–50. https://doi.org/10.1016/S0020-7373(79)80004-8

Drachsler, H., & Greller, W. (2016). Privacy and analytics: It's a DELICATE issue a checklist for trusted learning analytics. In S. Dawson, H. Drachsler, & C. P. Rosé (Eds.), *Enhancing impact: Convergence of communities for grounding, implementation, and validation* (pp. 89–98). Edinburgh: ACM. https://doi.org/10.1145/2883851.2883893

du Boulay, B. (2016). Artificial intelligence as an effective classroom assistant. *IEEE Intelligent Systems, 31*(6), 76–81. https://doi.org/10.1109/MIS.2016.93

Dweck, C. S. (2002). Beliefs that make smart people dumb. In R. J. Sternberg (Ed.), *Why smart people can be so stupid* (pp. 24–41). New Haven: Yale University Press.

European Commission. (2020). White Paper on Artificial Intelligence: A European approach to excellence and trust (COM(2020) 65 final). Retrieved from https://ec.europa.eu/info/publications/white-paper-artificial-intelligence-european-approach-excellence-and-trust_en

Floridi, L., & Cowls, J. (2019). A unified framework of five principles for AI in society. *Harvard Data Science Review, 1*(1), 1–13. https://doi.org/10.1162/99608f92.8cd550d1

General Teaching Council Scotland. (2012). Code of Professionalism and Conduct. Retrieved from https://www.gtcs.org.uk/regulation/copac.aspx

Goldstein, I. P. (1979). The genetic graph: A representation for the evolution of procedural knowledge. *International Journal of Man-Machine Studies, 11*, 51–78. https://doi.org/10.1016/S0020-7373(79)80005-X

Hao, K. (2020). The UK exam debacle reminds us that algorithms can't fix broken systems. *The MIT Technology Review*. Retrieved from https://www.technologyreview.com/2020/08/20/1007502/uk-exam-algorithm-cant-fix-broken-system/

Hartley, J. R. (1973). The design and evaluation of an adaptive teaching system. *International Journal of Man-Machine Studies, 5*, 421–436. https://doi.org/10.1016/S0020-7373(73)80029-X

Holstein, K., McLaren, B. M., & Aleven, V. (2018). Student learning benefits of a mixed-reality teacher awareness tool in ai-enhanced classrooms. In C. P. Rosé, R. Martínez-Maldonado, H. U. Hoppe, R. Luckin, M. Mavrikis, K. Porayska-Pomsta, B. McLaren, & B. du Boulay (Eds.), *Artificial intelligence in education: 19th international conference, AIED 2018, London, UK, June 27–30, 2018 proceedings, part I* (pp. 154–168). Cham: Springer.

Jivet, I., Wong, J., Scheffel, M., Specht, M., & Drachsler, H. (2021). Quantum of choice: How learners' feedback monitoring decisions, goals and self-regulated learning skills are related. In M. Scheffel, N. Dowell, S. Joksimovic, & G. Siemens (Eds.), *The impact we make: The contributions of learning analytics to learning* (pp. 416–427). Edinburgh: ACM. https://doi.org/10.1145/3448139.3448179

Johnson, W. L. (2019). Data-driven development and evaluation of Enskill English. *International Journal of Artificial Intelligence in Education, 29*, 425–457. https://doi.org/10.1007/s40593-019-00182-2

Koedinger, K. R., & Aleven, V. (2016). An interview reflection on "Intelligent Tutoring Goes to School in the Big City". *International Journal of Artificial Intelligence in Education, 16*, 13–24. https://doi.org/10.1007/s40593-015-0082-8

Kose, U. (2015). On the intersection of artificial intelligence and distance education. In U. Kose & D. Koc (Eds.), *Artificial intelligence applications in distance education* (pp. 1–11). Hershey: IGI Global.

Kose, U., & Koc, D. (2015). *Artificial intelligence applications in distance education*. Hershey: IGI Global.
Li, H., Yu, L., & He, W. (2019). The impact of GDPR on global technology development. *Journal of Global Information Technology Management, 22*, 1–6. https://doi.org/10.1080/1097198x.2019.1569186
Lu, A. J., Marcu, G., Ackerman, M. S., & Dillahunt, T. R. (2021). *Coding bias in the use of behavior management technologies: Uncovering socio-technical consequences of data-driven surveillance in classrooms*. Paper presented at the DIS'21: Conference on Designing Interactive Systems, Virtual Event, USA. Retrieved from https://static1.squarespace.com/static/5ebb1d874617b44f913c6d4b/t/609afa7f6ca7b40f39e55106/1620769435258/lu_dis21.pdf
Marković, M. G., Debeljak, S., & Kadoić, N. (2019). Preparing students for the era of the General Data Protection Regulation (GDPR). *TEM Journal: Technology, Education, Management, Informatics, 8*, 150–156. https://doi.org/10.18421/TEM81-21
Meyrink, G. (1915). *Dr Golem*. Leipzig: Kurt Wolff.
Miller, M. L. (1979). A structured planning and debugging environment for elementary programming. *International Journal of Man-Machine Studies, 11*, 79–95. https://doi.org/10.1016/S0020-7373(79)80006-1
Moor, J. (2006). The Dartmouth College Artificial Intelligence conference: The next fifty years. *AI Magazine, 27*(4), 87–91. https://doi.org/10.1609/aimag.v27i4.1911
O'Shea, T. (1979). A self-improving quadratic tutor. *International Journal of Man-Machine Studies, 11*, 97–124. https://doi.org/10.1016/S0020-7373(79)80007-3
Pane, J. F., Griffin, B. A., McCaffrey, D. F., & Karam, R. (2014). Effectiveness of Cognitive Tutor Algebra I at scale. *Educational Evaluation and Policy Analysis, 36*, 127–144. https://doi.org/10.3102/0162373713507480
Peach, R. L., Yaliraki, S. N., Lefevre, D., & Barahona, M. (2019). Data-driven unsupervised clustering of online learner behaviour. *npj Science of Learning, 4*, 14. https://doi.org/10.1038/s41539-019-0054-0
Pekrun, R. (2014). Emotions and learning. Retrieved from http://www.ibe.unesco.org/en/document/emotions-and-learning-educational-practices-24
Prinsloo, P., & Slade, S. (2016). Big data, higher education and learning analytics: Beyond justice, towards an ethics of care. In K. D. Ben (Ed.), *Big data and learning analytics in higher education: Current theory and practice* (pp. 109–124). Cham: Springer.
Rienties, B., Boroowa, A., Cross, S., Farrington-Flint, L., Herodotou, C., Prescott, L., . . . Woodthorpe, J. (2016). Reviewing three case-studies of learning analytics interventions at the Open University UK. In S. Dawson, H. Drachsler, & C. P. Rosé (Eds.), *Enhancing impact: Convergence of communities for grounding, implementation, and validation* (pp. 534–535). Edinburgh: ACM. https://doi.org/10.1145/2883851.2883886.
Rizvi, S., Rienties, B., Rogaten, J., & Kizilcec, R. F. (2020). Investigating variation in learning processes in a FutureLearn MOOC. *Journal of Computing in Higher Education, 32*, 162–181. https://doi.org/10.1007/s12528-019-09231-0
Schunk, D. H., Pintrich, P. R., & Meece, J. L. (2008). *Motivation in education: Theory, research and applications* (3rd ed.). Upper Saddle River: Pearson/Merrill Prentice Hall.
Schwendimann, B. A., Rodriguez-Triana, M. J., Vozniuk, A., Prieto, L. P., Boroujeni, M. S., Holzer, A., . . . Dillenbourg, P. (2017). Perceiving learning at a glance: A systematic literature review of learning dashboard research. *IEEE Transactions on Learning Technologies*, *10*, 30–41. https://doi.org/10.1109/tlt.2016.2599522.
Seldon, A., Lakhani, P., & Luckin, R. (2021). The ethical framework for AI in education. Retrieved from https://www.buckingham.ac.uk/wp-content/uploads/2021/03/The-Institute-for-Ethical-AI-in-Education-The-Ethical-Framework-for-AI-in-Education.pdf
Sharma, R. C., Kawachi, P., & Bozkurt, A. (2019). The landscape of artificial intelligence in open, online and distance education: Promises and concerns. *Asian Journal of Distance Education*, *14*, 1–2. Retrieved from http://www.asianjde.com/ojs/index.php/AsianJDE/article/view/432

Sleeman, D. H., & Brown, J. S. (1979). Editorial: Intelligent tutoring systems. *International Journal of Man-Machine Studies, 11*, 1–3. https://doi.org/10.1016/S0020-7373(79)80002-4

Thaker, K., Huang, Y., Brusilovsky, P., & He, D. (2018). *Dynamic knowledge modeling with heterogeneous activities for adaptive textbooks*. Paper presented at the 11th International conference Educational Data Mining (EDM 2018), Buffalo.

UNESCO. (2021). The Open University of China awarded UNESCO Prize for its use of AI to empower rural learners. Retrieved from https://en.unesco.org/news/open-university-china-awarded-unesco-prize-its-use-ai-empower-rural-learners

Walker, E., Rummel, N., & Koedinger, K. R. (2009). Integrating collaboration and intelligent tutoring data in the evaluation of a reciprocal peer tutoring environment. *Research and Practice in Technology Enhanced Learning, 4*, 221–251. https://doi.org/10.1142/S179320680900074X

Williamson, B. (2018). Silicon startup schools: Technocracy, algorithmic imaginaries and venture philanthropy in corporate education reform. *Critical Studies in Education, 59*, 218–236. https://doi.org/10.1080/17508487.2016.1186710

Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education – Where are the educators? *International Journal of Educational Technology in Higher Education, 16*(1). https://doi.org/10.1186/s41239-019-0171-0

Zeide, E. (2019). Artificial intelligence in higher education: Applications, promise and perils, and ethical questions. *Educause Review*, 31–39. Retrieved from https://er.educause.edu/-/media/files/articles/2019/8/er193104.pdf

Classic Theories of Distance Education

8

Context and Interpretations

Terry Evans and Viktor Jakupec

Contents

Abstract

This chapter explores the influence of three of distance education's classic theorists—Otto Peters, Börje Holmberg, and Michael Moore—on its subsequent conceptualization and practice. The classic theorists' understanding of theory and theorizing is discussed critically in the context of the articulation of each's particular theory. This is then contextualized in terms of the history of the

T. Evans (✉)
Deakin University, Geelong, VIC, Australia
e-mail: terry.evans@deakin.edu.au

V. Jakupec
Deakin University, Warrnambool, Australia
e-mail: Viktor.Jakupec@deakin.edu.au

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_7

development of distance education and its institutions, from Pitman's correspondence courses on shorthand, through correspondence schooling and higher education external studies, to the rise of the United Kingdom Open University in the 1960s. The latter's subsequent powerful influence on the theory and practice of open and distance education internationally is described as stimulating a fertile context for the classic theorists' endeavors. Finally, consideration is given to more recent scholars' interpretations and adaptations of the classic theories of distance education. This leads to a concluding reflection on the authors' engagement with distance education theorizing and the prospects for the future of distance education's theorizing and practice.

Keywords

Classic theorists of distance education · Guided didactic conversation theory · Industrialized form of education theory · Transactional distance theory · The OUUK and the rise of open and distance education · Interpretations of the classic theories of distance education

Introduction

Three theorists—Otto Peters, Börje Holmberg, and Michael Moore—have fundamentally influenced the way that "distance education" came to be named, articulated, and practiced from the late 1970s. Their theorizing and leadership helped shape the rise of open and distance education globally through agencies, such as the International Council for Open and Distance Education (as it was (re)named in 1982), the Commonwealth of Learning (formed in 1988), and, more generally, through UNESCO. Their theoretical works are described below and then juxtaposed critically to elucidate the different nature of their theorizing of the field.

Consideration is given to the educational practices and institutions —correspondence education, external studies, the establishment of the UK Open University (OUUK), etc.—that preceded or overlapped with the three theorists' early work which provided the context for the emergence and naming of the new field of "distance education." Furthermore, their work is discussed in relation to the consequences for (open and) distance education policy, practice, and scholarship as reflected in the writings of their more recent contemporaries. The chapter proceeds to a discussion of other scholars' interpretations and theorizing from these foundational theories of distance education to contribute to retheorizing distance education as its practices and potential unfold in the twenty-first century.

The chapter closes with the authors' reflections on their engagement with distance education theorizing, research, and practice which drew on the work of the classic theorists and others. This leads to a consideration of the future direction of distance education's theorizing and practice.

Classic Theorists of Distance Education

In order to understand distance education, it is advantageous to examine its origins through a lens of its classical theories in a chronological order. Such an examination affords an understanding of the subsequent theoretical developments and the emergence of "new" theories, which build on, and advance, the preceding classical theories. We ascribe classic theories of distance education as those of Otto Peters (1973, 2003, 2007), Börje Holmberg (1983, 2003, 2005), and Michael Moore (1973, 1993, 1997) (a contributor to this volume). Their work was not only visionary for their times but also of fundamental importance to define distance education as a subdiscipline of education (Delling, 1971). In so doing, they set the concept of "distance education" apart from the theory and practice of correspondence studies, which emerged in the nineteenth century (Fritsch, 2001).

The rationale for defining the theoretical foundations developed by Peters, Holmberg, and Moore, respectively, as *classical distance education theories* is that each of these theories (i) has its specific epistemological grounding, (ii) is an independent epistemological construct, (iii) operationally defines distance education, (iv) has particular explanatory representations, and (v) has its own distinct identifiable descriptive constituents.

Based on the above rationale and in chronological order, Peters (1973) was arguably the first scholar who advanced a theory of distance education, namely, *distance education as an industrialized form of education*. The second major theoretical discourse on distance education was advanced by Holmberg with his *guided didactic conversation* theory (Holmberg, 1983). Subsequently, Moore (1993) developed the *transactional distance theory* which, alongside Peters and Holmberg's work, can be categorized as a "classical" distance education theory.

Peters, Holmberg, and Moore with their respective theories based on different epistemological frameworks provided the foundations for distance education theories that followed. In so doing, they advanced significantly the scholarship of distance education. Thus, for scholars and practitioners of distance education, their theories are important for understanding the concept of "distance education" as it has mutated into its current forms.

Prior to dissecting classical distance education theories, it is useful to explain how each of the theorists defines "theory." Peters, Holmberg, and Moore held their own particular understandings of what constitutes a theory; these contributed to each's theoretical stances. Bernath & Vidal (2007, n.p.) cited Peters as defining "theory" as an "understanding of reality" and as ". . .an explanation, a systematic account of relationships among phenomena." They noted that Peters referred to Garrison (2000, p. 3) stating that theory ". . .is a coherent and systematic ordering of ideas, concepts and models, with a purpose of constructing meaning to explain, to interpret, to shape practice."

Pyari (2011, p. 95) described Holmberg as defining theory as being a ". . .systematic ordering of ideas about the phenomenon of a field of inquiry, and an over-arching logical structure of reasoned suppositions which can generate testable hypotheses" (Bernath & Vidal, 2007). Holmberg did not offer a generic definition of theory but rather referred mainly to teaching-learning theories in a descriptive manner (Pyari, 2011, p. 95). He, thus, provided an understanding of distance education as guided didactic conversation (viz., communicative action) (Holmberg, 1985). It is possible to deduce what Holmberg perceived as "theory" from his comment that his theory arises from:

> . . .the application of a methodological approach - empathy-creating conversational style – [which] leads to increased motivation to learn and better results than conventional presentation of learning matter. (Holmberg cited in Bernath & Vidal, 2007, n.p.)

Holmberg refers to Johann Gustav Droysen and Wilhelm Dilthey (Bollnow, 1967; Bernath & Vidal, 2007), thus trying to place his theory within the realm of hermeneutics and the concept of *Verstehen* (understanding). To explain, Holmberg's concept of *Verstehen* is couched in the process of selecting and interpreting texts which are to be narrated. This is partially in line with Gadamer's double hermeneutics (cf. Ginev, 1998; Gadamer, 1975). However, Holmberg interprets double hermeneutics in a different key. He proposes that there are two hermeneutics, rather than double hermeneutics in play. One is the author's presentation of "facts" and the other is the interpretation of the "facts" by the reader. The presentation of "facts" may well be perceived as an empirical notion couched in *Erklären* (explaining), and the interpretation may be seen as couched in the process of *Verstehen*. Put simply, this means the author constructs a "factual" world, which the reader interprets by constructing the meaning from the author's "factual" narrative (Juler, 1992).

Moore takes a similar view to that of Holmberg. Bernath & Vidal (2007, n.p.) explain that Moore argues that ". . . theory is the statement of what is known as the prelude for research that is discovering what is not known." They argue that Moore sees theory as a map which encapsulates what is known and identifies what is unknown. Thereby, Moore perceives theory as an epistemic framework, including both empirical and hermeneutic inquiry modes, consisting of explanation (*Erklären*) and understanding (*Verstehen*) of given phenomena.

Having briefly identified the three classical theorists' understandings of theory, it is now possible to turn to the epistemological constructs of their classical distance education theories specifically.

Epistemological Constructs of Classical Distance Education Theories

In order to comprehend and analyze a theory, it is necessary to establish its epistemological basis. That is, only when it is revealed what counts as knowledge and how it is constructed is it possible to understand a theory. A brief elucidation may be in place.

Bernath & Vidal (2007) report Holmberg as stating that:

> [s]cholarly theories imply a systematic ordering of ideas about the phenomena of our field of inquiry and are usually of two kinds. One is concerned with *understanding*, the other with *explanation* and prediction. (n.p.) (Authors' emphases)

Thus, one should be able to ascribe to each theory an inquiry mode (Habermas, 1972), which in turn identifies the epistemological grounding.

Otto Peters' Distance Education as an Industrialized Form of Education Theory

Peters' (1971, 1973) industrialized form of education theory is premised on principles of industrialization in the 1960s and thus reflects the proposition that distance education is an industrialized form of teaching and learning. His theory is based on explaining (*Erklären*) distance education through his observations of its practice. In constructing his theory, Peters focused on technical aspects of distance education or what Habermas (1972) would term as an *empirical-analytical inquiry mode* with its *technical interests*. This allows Peters to firmly root his theory in technology and economics. From this epistemological vantage point, Peters contrasts distance education with face-to-face education and delineates the former as a standardized educational mass system. This system, according to Peters, is delineated by constituents, such as rationalization, division of work among cooperating individuals, mechanization of material production and dissemination, and planning and mass production akin to Fordism (Farnes, 1993; Campion, 1999). In effect, Peters' theory generates the same constituents as the operationalization of the theory. Thus, the theoretical and operational constituents of Peters' industrialized form of education may lead to the conclusion that it is akin to industrialized production processes (Peters, 1993a, 1993b).

Börje Holmberg's Guided Didactic Conversation Theory

In contrast, Holmberg's theoretical foundation is couched in the concept of understanding (*Verstehen*) and interpretation of the communication phenomena leading to *guided didactic conversation* theory. Holmberg et al. (1982) claim that his theory is both empirical and interpretative; however, a review of Holmberg's work shows that there is a limited substantive empirical basis underpinning his theory. To clarify, Holmberg focuses on distance education from an interpretive vantage point, providing an understanding concerning communicative and social interaction. This may be aligned with Habermasian interpretive (historic-hermeneutic) epistemology based on *practical interests* (Habermas, 1972).

Holmberg provided three theoretical stances: (i) the *guided didactic conversation theory,* (ii) *the empathy approach theory*, and (iii) *a one-to-one relationship between tutor and learner* theory. Holmberg tried to build his *empathy approach theory* on Popperian *critical rationalism* and empirical testing and on Bloom's taxonomy.

However, as far as the former goes, there is no evidence to show that his *empathy approach theory* has been tested and that it is falsifiable. Rather, Holmberg only hypothesized that an empathetic conversational style is motivational and promotes learning (Hülsmann, 2008).

Holmberg's *one-to-one relationship between tutor and learner* theory (Holmberg, 2003) hypothesized that distance education facilitates a *one-to-one association* between an individual learner and the learning facilitator. Holmberg (2005) saw this association in a distance educational environment as unique, perhaps akin to Oxbridge tutorials. This presupposes that each learner has a separate and independent communication conduit to their learning facilitator. Arguably, this may occur, but this theory fails to address the extent to which, in distance education, a *one-to-one association* exists between learners themselves.

Holmberg's main contribution to distance education is his *guided didactic conversation theory.* Arguably, this theory encompassed some elements of the two preceding theoretical notions. In *guided didactic conversation theory*, Holmberg (1983) transferred the responsibility for teaching (learning facilitation) to course designers. He argued that due to the space-time dichotomy in distance education, the communication process imposes the requirement to reorganize the teaching-learning process. He proposed that distance education cannot mirror the face-to-face teaching-learning environment. Thus, distance education needed to incorporate (i) the extrication of content presentation from the teaching-learning interaction and (ii) the receptive space-time interaction, whereby the main teaching responsibility is transferred from communicative action to content presentation (Holmberg, 1983, 2003, 2005). Although others previously had theorized instructional design as tutorials in print, Holmberg took this further by arguing that one can incorporate a Socratic dialogue as a communicative (inter)action into the content. In so doing, it is theoretically possible to shift the locus of teaching-learning process to course development. Holmberg's theory captured the aforementioned concept of Socratic dialogue cum communicative (inter)action into the realm of distance education.

Michael Moore's Transactional Distance Theory

Moore's *transactional distance theory* (Moore, 1992, 1993, 1997, 2013) is based on a proposition which allows for a nexus between the concepts of *understanding* and of *explaining* distance education. This theory represents the distinctive characteristics of the relationship between the learner and the learning facilitator within distance learning activities (cf. Moore, 1993). Thus, Moore's theoretical stance allows for the existence of idiosyncratic distance education practices which interpret and support social interaction allowing for learners' emancipation through Moore's (1972) notion of autonomy.

In essence, Moore's theory is located within three substantive constructs: (i) structure, (ii) conversation or dialogue as constituents of communicative action, and (iii) learners' autonomy. Structurally, Moore delineates an educational or learning experience, as determined by a learning activity (Moore cited in Holmberg, 1986, p.110). Communicative action or dialogue in Moore's concept of transaction identifies the distinct relationship between the learner and the learning facilitator. This brings the learning experience to the fore and articulates the meaning of such an experience for the learner. Learners' autonomy refers to degree to which learners are able to shape their aims and objectives and assessment and evaluation parameters.

These epistemological stances enabled the emergence of different and stand-alone distance education theories. To summarize, while Peters focused on the technical aspects of distance education leading to his industrialization theory, Holmberg focused on communicative action, and Moore bridges the understanding and communication gap between the learner and the learning facilitator due to the geographic and psychological distance.

It is evident that Peters, Holmberg, and Moore constructed their distance education theories from different epistemological perspectives. However, gradually each theory has been subjected to Kuhnian (Kuhn, 1996) paradigmatic shifts which enabled other scholars to advance the theoretical foundations of distance education, leading to different "new" theories and discourses to emerge. With this in mind, it is possible to consider the operationalization of each classical distance education theory at an operational level.

All three classical theories of distance education are substantively delineated by their operational level. In other words, the three classical theories emerged, or have been constructed through, an inductive epistemological approach. Peters, Holmberg, and Moore progressed from observing and understanding specific operationalizations to theorize broad generalizations. These generalizations formed the basis for the advent of distance education theories and subsequent operationalizations of distance education.

Operationalization of the Classical Distance Education Theories

From an operationalization perspective, Peters was arguably the first to have an effect on the operations of distance education, partly because he addressed the industrialization of distance education that was already evident, and his theory helped shape and manage its future models (Peters, 2003). In this respect, Peters (2007) emphasized that distance education needed to be viewed from the socioeconomic framework of the times. As such, he was theorizing during the period when (as we discuss in the next section) mass distance education—especially in the form of the nascent OUUK—was emerging. Key features of industrial society were discernible in distance education, such as the application of technologies (see Peters' [2013] critics of digitalization), division of labor, mass production, economies of scale, standardization of production, and organizational process rationalization.

The two operational "macro-factors" arising from Peters' theory are *organization* and *economics*. The former is aligned with the division of labor, the application of technologies, and the process rationalization. The latter is underpinned by economies of scale, mass production, and the standardization of production.

In comparison with Peters' theory, Holmberg's *guided* didactic conversation theory was less obviously operationalized in distance education. It may be argued that Holmberg's theory has been influential by recognizing the proposition that distance education in its diverse forms and levels is characterized by addressing the time-space dimension. This leads to operationalization of support services and learning design and its effectiveness across time and space. Operationally, the *guided* didactic conversation theory advocates an organized teaching-learning program and process (Holmberg, 1983, 1985) which is now integral to distance education.

At its operational level, the theory of transactional distance addresses the communicative action gap between the learner and learning facilitator due to the geographic distance (Moore & Kearsley, 2005). Operationally, this gap may be bridged by applying appropriate instructional design features as well as facilitating interaction between teachers and students (Bernath & Vidal, 2007). This, according to Moore, includes policies, procedures, and facilities at the institutional level, such as learning resources, design, delivery, and interaction to constitute the learning habitat. These may be viewed as operational "macro-factors" of transactional distance education. The operationalization of Moore's theory is based on program structure (i.e., course content analysis), dialogue (i.e., interactions between learning facilitator and learners), and autonomy (i.e., learner's participation in decision-making concerning the time, place, and substance of their learning) (Moore, 1972, 1976).

In order to appreciate the significance of the classic theories and their operationalization, we now turn to understand the historical context in which Peters, Holmberg, and Moore formed their theoretical positions.

A Background to the Emergence of Open and Distance Education Theorizing

As is explained above, our classic theorists of distance education had their intellectual and experiential roots in the mid-twentieth century. Holmberg first published on distance education in 1960, Peters in 1967 (see Zawacki-Richter, 2019), and Moore in the early 1970s. These were interesting times historically as the world emerged from the clouds of World War II into the sunshine of the modernizing 1960s and 1970s—notwithstanding the Cold War chill! These 1960s and beyond developments—in what became known as "distance education" by the 1980s—evolved alongside developments in media and communications technology into the (largely) online distance education world we have today. The work of the classic theorists, directly (through their leadership positions in distance education) and indirectly (through others' use, interpretations, and development of their writings), helped shape this world. The classic theorists, however, also benefited from the significant earlier developments of what came to be known as "distance education" from the 1980s.

The term "distance education" embraced the practices incorporated by the earlier terms, "correspondence education," "correspondence schooling," "external studies," "university extension," etc. These earlier forms can be traced back to the nineteenth century when print (e.g., typewriting, typesetting) and communications (postal services) technology developed alongside the emerging needs for schooling and skills training. The "classic" early example is Pitman's shorthand training being offered using postcards with written instructions and tasks sent to and from students via the new "penny postal" service in the1840s in London and later throughout the UK. One hundred and sixty years later, Tait (2003) reflected on the Pitman's courses as being especially significant in terms of the two-way communications and the individual support this enabled for the students. Striving for interaction between teacher and learner, and between learners themselves, has become an intense focus in pre-distance education theory and practice, especially in the work of Charles Wedemeyer in the USA (Latchem, 2019, pp. 11–12).

The early twentieth-century correspondence schooling became an important means of providing education for children in rural and remote communities in nations, such as Australia, Canada, and the USA, with large land masses and geographically distributed settlements. In Australia, Adelaide Miethke deployed the shortwave radio network developed for the Royal Flying Doctor Service, to enable teachers to provide scheduled "classes" over the air from the 1950s until the rise of telecommunications and the Internet replaced radio. An important consideration here is that such post-World War II educational developments were substantially influenced by their governments' concerns for social and economic development for their populations. Doubtless, our classic theorists were influenced by the public adoption of such social and economic imperatives and the validation it gave to them to begin their theoretical journeys.

Arguably, one of the major twentieth-century developments in higher education was unfolded in the UK during the 1960s and influenced the work of the classic theorist. The Wilson Labour Government, elected in 1964 on a platform of social, economic, and educational reform (Hennessey, 2019), embarked on major reforms to primary schooling (Plowden Report, 1967) and the abolition of tripartite secondary education and the establishment of comprehensive education ("Circular 10/65", n.d.). For people in higher education, especially those around the world working in forms of correspondence education, external studies, etc. (see Smith [1984], for example, from Australasia and the South Pacific), it was the establishment of the OUUK that really made a profound difference. It fuelled not only reform to tertiary education in the UK; it energized distance education theory and practice internationally and, of course, launched the idea of an "open university": one that was open to all. Evans & Nation (1989) describe how Harold Wilson, after observing, in 1963, technical education by correspondence in Moscow, and also the work of *Encyclopedia Britannica* in its educational films became captivated with the idea of a "university of the air" for the UK. This eventually became the Open University with the British Broadcasting Corporation (BBC) providing broadcasts "over the air" (MacArthur, 1974, pp. 4–6; Perry, 1976, pp. 10–11). The Wilson Government established the OUUK as a major step toward modernizing post-War Britain through educating its citizens and, therefore, its workforce. It was to prove much more than that for the world and for theorizing distance education.

The OUUK was established in 1969 and enrolled its first students in 1971. Its first location was in the old BBC studios at Alexandra Palace in London; it later moved to new premises in Milton Keynes (then a "new town" growth area) 90 kilometers northwest of London. New BBC studios were included on the campus for the OU to develop the BBC radio and TV programs broadcast to its students (and anyone else with a TV). This was a major use of media and communications technology in distance education. This was possible in the UK because of the BBC's national radio and TV broadcast coverage. This was something that Australia and Canada, for example, could not achieve (especially with TV) through their national broadcasters due to their smaller populations distributed across their vast expanses and different time zones, although, as noted previously, shortwave radio was used (such as for the School of the Air) and some local radio stations, too (Arger, 1989).

The OUUK's integration of educational technologies was a core feature of its development. An Institute of Educational Technology (IET) was established to inform, research, and guide the OUUK's course development. Harris (1987), in a study of the OUUK in the 1980s, observed "a cheerful operationalisation pervades the work of 'educational technology'. . ." (p.2). There appears to be little influence of the classic theorists over this period in the OUUK. Harris's work makes it clear that there were many contradictions and tensions between the IET staff themselves and also with other academic and nonacademic staff. Indeed, Harris (1987, pp. 26–7) discusses the work of the Survey Research Department (SRD), which "in the early days at least was concerned with market research" and "reflected a strong concern for public relations" and lacked comparability with contemporary sociological or educational research or, one assumes, from the nascent classic theorists' work, although Peters' theory, in particular, related well to the SRD's "industrial" approach. Harris reports that the SRD's marketing and public relations focus met with "resistance from some junior members" of the SRD. (From 1985, this formed part of the new Student Research Centre [SRC) which remains today.) An example of these young resisters can be found in the work of the late Alistair Morgan. He was a passionate advocate for, and practitioner of, substantive qualitative research into distance students' learning (Morgan, 1993). He argued strongly that the SRC (and others in the OUUK) should move "beyond (the) mindless data collection" of rudimentary surveys (Morgan, 1990, p.10) and the "mindless empiricism" that underpinned it (p.13).

Like Harris, Morgan saw that there was a rich vein of social and educational science theories that could be applied to the OUUK's institutional research. A key point here, in terms of understanding the rise of the classic distance education theories, is that the OUUK was established to address the social and (higher) educational inequalities in the UK—not just to provide "regular" selective higher education at a distance; it was to be "open learning"—This theoretical concept reflected the political and pedagogical imperatives of the time (Jakupec & Nicoll, 1994).

The classic theorists of distance education were differently influenced by the OUUK's rise to prominence in open and distance education. Moore was a OUUK staff member between 1977 and 1986. He then returned to the USA where previously, in the early 1970s, he worked with, and was influenced by the work of, Charles Wedemeyer at the University of Wisconsin-Madison on correspondence education and independent learning (Diehl, 2013). More recently, Holmberg and Peters received honorary doctorates from the OUUK for their contributions to distance education. This suggests that there were some mutual influences between the theorists and the OUUK. We now turn to discussing how the classic distance education theories were subsequently interpreted by others.

Interpretations of Classical Distance Education Theories

The literature shows that there is no unified, general theory of distance education. Over 30 years ago, Keegan (1986) proposed that distance education theories fall into one of the following groups: (i) industrialization theories, (ii) independence and autonomy theories, and (iii) interaction and communication theories. However, nowadays, some distance education theories are based on established communication and educational theories (Pyari, 2011).

From Keegan's vantage point, the interpretation of distance education theories may well lead to the conclusion that it is a more industrialized form of education when compared to conventional face-to-face education. But this does not mean that other aspects of distance education, such as independence and autonomy, and interaction and communication are absent. Distance education, at an interpretative level and based on the classical theories, can be thus perceived as a systematically planned endeavor. The constituents of such an endeavor include didactic groundwork as it relates to teaching-learning activities and learners' choice including learners' independence and autonomy, supervision, guidance, and support. It is important that all these and other relevant constituents should be enacted within a framework of physical distance and often based on an asynchronous time frame. At interpretational level, this requires bridging the space-time gap using some form of technology, as well as forms of texts and media (Hawkridge, 2002).

It is possible to focus on the interpretation of distance education theories by using (i) Keegan's (1993) theory of teaching-learning integration, including two-way communication; (ii) Garrison's (1993) communication and learner control theory, emphasizing a nexus between technology and self-directed learning; and (iii) Verduin & Clark's (1991) theory of dialogue and support including structure and content and two-way digital mediation. The rational for focusing on these three theories and projecting them into the realm of interpretation is twofold: First, they include the above-stated endeavors to various degrees. Secondly, they are constituted from the existing classic distance education theories and have their analytical frameworks which lend themselves to be translated into interpretational structures based on two or more of the classic distance education theories.

Keegan's Integration Theory of Teaching-Learning

Keegan's (1993) integration theory relies to a large extent on aspects of two-way communication. However, it also has partially its roots in Peters' (1983) notion of distance as a barrier which can be overcome using technologies and decision-making processes. This means overcoming barriers to enhance the relationship between actors through technology is seen by Keegan (1993) as a reintegration of the teaching-learning activities. Keegan (1996) provides an analysis of the classical distance education theories and articulates a new extended theory of distance education based on the following constituents:

(i) The quasi-permanent separation of teacher and learner throughout the length of the learning process
(ii) The influence of an educational organization both in the planning and preparation of learning materials and in the provision of student support services
(iii) The use of technical media—print, audio, video, or computer—to unite teacher and learner and carry the content of the course
(iv) The provision of two-way communication so that the student may benefit from or even initiate dialogue
(v) The quasi-permanent absence of the learning group throughout the length of the learning process (p. 50)

Keegan (1993) believes that distance education requires activities similar to those of face-to-face educational transaction. He states:

> . . .a theoretical structure for distance education focusing on the reintegration of the teaching acts by which learning is linked to learning materials may go some way to compensating for the location of the students, causing the lack of eye-to-eye contact which is so important in education. (Keegan, 1993, p. 131)

His view is important because it advocates face-to-face educational transactions which are found in Holmberg and Moore's theories. There is a subtle difference, however, in that the latter two theorists assume learners have a greater ability to take responsibility for their learning than does Keegan. Nevertheless, major aspects of Holmberg and Moore's theories reside in Keegan's integration theory of teaching-learning.

Garrison's Communication and Learner Control Theory

The center of Garrison's (1993) communication and learner control theory is the nexus between technology and self-directed learning. Garrison (2000) suggests that the focus of distance education theory should be understanding the teaching-learning processes which occur at a distance through utilization of a range of methods and technologies. He argues that distance education theories should reflect collaborative teaching-learning, which are focused on adaptive teaching-learning transactions. Thereby, Garrison suggests changing from the classic distance education theories which focus on the organizational and structural aspects of distance education to one which focuses on transactional teaching and learning processes. The central concepts of Garrison's communication and control theory are educational transaction, learner control, and communication. These three concepts are underpinned by the facilitation of educational transactions and are influenced by communication theories.

Garrison's theory of communication and learner control also contains similar elements to those in Moore's transactional distance education theory. Garrison (1989, cited in Amundsen, 1993, p. 67) states that "...the educational transaction is based upon seeking understanding and knowledge through dialogue and debate..." and, therefore, necessitates two-way communication between teacher and learner. The proposition is that a two-way communication be administered in a way that control over the teaching-learning transaction is negotiated between the learning facilitator and the learner and should be supported by appropriate technology. The concept of learner and learning facilitator control is thus proposed partly instead of the concept of independence or autonomy embedded in Holmberg's *guided didactic conversation* theory and Moore's *transactional distance theory.*

Verduin and Clark's Theory of Dialogue: A Three-Dimensional Theory of Distance Education

Verduin & Clark's (1991) theory of dialogue is a three-dimensional distance education theory built on the classic distance education theories. It uses mainly Moore's *transactional distance theory* and Keegan's *integration theory of teaching-learning*. The three dimensions are as follows:

Dialogue/support dimension, which focuses on dialogue. In this sense, "dialogue" is applied as a full support for the benefit of the distance learner. In short, dialogue is the primary activity ensuring full support (Verduin & Clark, 1991).

Structure/specialized competence dimension as a definitional structure of the formality of the subject matter. Verduin and Clark argue that some subject matter or learning subjects may be basic and thus require only a minimal structure. Conversely, a subject matter may require a high structure. This applies especially to learning disciplines "...in which many years of study may be necessary before a learner is competent enough to set objectives and study methods or to take part in evaluation" (Verduin & Clark, 1991, p. 125).

General competence/self-directedness dimension. This dimension differentiates between suitable self-directedness or autonomy levels and assessment of the learner's general competence, to ascertain to which extent appropriate structure and dialogue have been afforded to the learner (Verduin & Clark, 1991).

Verduin & Clark (1991) suggest that these three dimensions may form a continuum allowing for diverse combinations. They perceive the combination as fitting most problem-based forms of distance education.

It is evident that the above interpretations of classical DE theories provided by Keegan, Garrison, and Verduin & Clark, respectively, not only have shed light on the above cited and discussed works of Peters, Holmberg, and Moore but also have extended it further. Their respective interpretations do not fit exactly into the three main categories stated above, namely, (i) industrialization theories, (ii) independence and autonomy theories, and (iii) interaction and communication theories. Keegan, Garrison, and Verduin and Clark were instrumental in crossing the boundaries of the classical distance education theories.

As one may expect, the rapidly evolving field of distance education from the 1980s prompted many more interpretations of the classical theories of distance education. For example, Rumble (1989) provided a wide-ranging analysis of the constructs of distance and openness, respectively. Perraton (1987) advanced a distance education theory focusing on teaching, administration, and assessment as three interrelated systems. Evans & Nation (1989) identified dialogue as the quintessence of practice, research, and theory in distance education. There are several others, too, some of which are reflected in this handbook but which are beyond the capacity of this chapter.

Concluding Reflections

The invitation from the editors to write a chapter on the classic theories of distance education prompted the authors to reflect on their first experiences in distance education. They both commenced at Deakin University's Institute of Distance Education in the mid-1980s with backgrounds in teaching and research in distance education. Their significant early work together was on the development and teaching of the Master of Distance Education (MDEd) program jointly offered by Deakin University and the University of South Australia (Calvert, Evans, & King, 1993). The MDEd provided students with a critical understanding of distance education's roots, theories, and practices. The final part of the program focused on learning about research methods and methodologies (Evans & Nunan, 1993) and then the students practicing a small piece distance education research using appropriate and ethical procedures (Evans & Jakupec, 1996). An important goal of the program was to strengthen research capacity in distance education by providing graduates with the background to pursue applied research and evaluation in their workplaces and, for some, doctoral research in (and through) distance education (Evans, 2008; Evans & Green, 2013).

To achieve these ends for the students, the teaching staff drew on the theoretical work of Holmberg, Moore, and Peters, plus the contributions of the (then) emerging scholars of open and distance education. Writing this chapter required returning to the authors' work at the time (e.g., Evans, 1989; Evans & Nation, 1989, 1992, 1996; Evans & Jakupec, 1996; Jakupec, 1996; Jakupec & Nicoll, 1994) to identify its foundations in the work of the classic theorists and those who interpreted it. Sadly, during this preparatory period, the authors learned that Börje Holmberg died at the age of 97 on April 10, 2021. Hence, distance education lost a leading figure in the theory and practice of distance education. He was awarded honorary doctorates by the OUUK and Deakin University for his significant contribution to the field. It has been timely to recognize this work in here.

There are two inescapable major conclusions that emerge from reflecting on the work of the classic theorists. One is that the social imperatives of—and for—distance education persist into the twenty-first century. From schooling to universities, distance education is deployed to provide learning opportunities for people at times and places to suit their needs and circumstances (e.g., Jakupec, 2011). Indeed, the COVID-19 pandemic prompted governments in developed and developing countries to close schools and require them to "teach online." Furthermore, universities continue to provide MBAs, MEds, M Nursing, etc., and even doctorates, for professionals to address the emerging national and global needs for an enlightened and informed workforce (Berge, 2013; Dunning & Evans, 2009; Evans, 2008; Evans & Green, 2013; Kuhne, 2013).

The second major conclusion is that distance education continues to reposition and repurpose itself by adopting and adapting new technologies to its purposes: from Pitman's postcards in the nineteenth-century to the twenty-first-century virtual reality (Evans & Pauling, 2021). Such repositioning and repurposing sustain distance education at the forefront of educational change to address social and economic imperatives. A pertinent example is Meier and Jakupec's (in press) work on the impact of COVID-19 on digitalization in higher education. As discussed above, such changes have not been without their critiques and challenges (Jakupec, 1996; Peters, 2013), and one may expect there will be more to come!

This chapter shows that critiques and challenges, especially those embedded within sound and substantive theorizing, are a fundamental component of the intellectual substance of distance education. The work of Otto Peters, Börje Holmberg, and Michael Moore provided the theoretical foundation upon which others have built over the recent decades. The cumulative effect is an expanding theoretical reservoir from which practitioners can draw, and to which they can contribute, to create future of distance education.

References

Amundsen, C. (1993). The evolution of theory in distance education. In D. Keegan (Ed.), *Theoretical principles of distance education* (pp. 61–79). London, England: Routledge.

Arger, G. (1989). Talking to New England. In T. D. Evans & D. E. Nation (Eds.), *Critical reflections on distance education* (pp. 73–94). Lewes, England: Falmer Press.

Berge, Z. (2013). Distance training and education in the corporate sector. In M. G. Moore (Ed.), *Handbook of distance education* (3rd ed., pp. 609–624). New York, NY: Routledge.

Bernath, U., & Vidal, M. (2007). "The theories and the theorists: Why theory is important for research": With Børje Holmberg – Michael Graham Moore Otto Peters. *Distances et savoirs, 5*(3), 427–457. Retrieved from https://www.cairn.info/revue-distances-et-savoirs-2007-3-page-427.htm

Bollnow, O. F. (1967). *Dilthey*, *Eine Einführung in seine Philosophie*. Stuttgart, Germany: Klett.

Calvert, J., Evans, T. D., & King, B. (1993). Inter-institutional collaboration in Australia: Constructing a Master of Distance Education course. In L. Moran & I. Mugridge (Eds.), *Collaboration in distance education: International case-studies* (pp. 37–63). Routledge: London, England.

Campion, M. (1999). Industrial models as applied to distance education: Retrospect and prospect (Xingfu Ding trans). *Distance Education in China (Zhongguo Yuancheng Jiaoyu), 9 /10*, 69–76.

Circular 10/65. (n.d.). Retrieved April 21st, 2021 from https://en.wikipedia.org/wiki/Circular_10/65

Delling, R. M. (1971). Grundzüge einer Wissenschaft vom Fernstudium. *Epistolodidaktika*, *1*, 14–28.

Diehl, W. C. (2013). Charles A Wedemeyer: Visionary pioneer of distance education. In M. G. Moore (Ed.), *Handbook of distance education* (3rd ed., pp. 38–48). New York, NY: Routledge.

Dunning, T., & Evans, T. D. (2009). Using doctorates in professional contexts. In C. Denholm & T. D. Evans (Eds.), *Beyond doctorates downunder: Maximizing the impact of your doctorate in Australia and New Zealand* (pp. 203–209). Melbourne, VIC: ACER Press.

Evans, T. D. (1989). Taking place: The social construction of place, time and space and the (re) making of distances in distance education. *Distance Education, 10*, 170–183. https://doi.org/10.1080/0158791890100203

Evans, T. D. (2008). Transforming doctoral education through distance education. In T. D. Evans, M. Haughey, & D. Murphy (Eds.), *The international handbook of distance education* (pp. 303–318). Bingley, England: Emerald Publishing.

Evans, T. D., & Green, R. (2013). Doctorates for professionals through distance education. In M. G. Moore (Ed.), *Handbook of distance education* (3rd ed., pp. 654–669). New York, NY: Routledge.

Evans, T. D., & Jakupec, V. (1996). Research ethics in open and distance education: Context, principles and issues. *Distance Education, 17*, 72–94. https://doi.org/10.1080/0158791960170106

Evans, T. D., & Nation, D. E. (1989). Dialogue in practice, research and theory in distance education. *Open Learning, 4*(2), 37–43. https://doi.org/10.1080/0268051890040207

Evans, T. D., & Nation, D. E. (1992). Theorising open and distance education. *Open Learning, 7*(2), 3–13. https://doi.org/10.1080/0268051920070202

Evans, T. D., & Nation, D. E. (1996). Theories of teaching and learning in open and distance education. *Open Learning, 11*(3), 50–53. https://doi.org/10.1080/0268051960110309

Evans, T. D., & Nunan, T. (1993). Creating a course on research in distance education. In M. Parer (Ed.), *Developing open courses* (pp. 145–158). Monash University, Centre for Distance Learning: Churchill, MB.

Evans, T. D., & Pauling, B. (2021). Repositioning and re-purposing distance education for the future. In M. Cleveland-Innes & R. Garrison (Eds.), *An introduction to distance education: Understanding teaching and learning in a new era* (2nd ed., pp. 121–146). New York, NY, Abingdon, England: Routledge.

Farnes, N. (1993). Modes of production: Fordism and distance education. *Open Learning, 8*(1), 10–20. https://doi.org/10.1080/0268051930080103

Fritsch, H. (2001). Distance education. In N. J. Smelser & P. B. Baltes (Eds.), *International encyclopedia of the social & behavioral sciences* (1st ed., pp. 3781–3784). Oxford, UK: Pergamon.

Gadamer, H.-G. (1975). *Truth and method*. New York, NY: Seabury Press.

Garrison, D. (1993). *An analysis of the control construct in self-directed learning.* Norman, Oklahoma: Research Centre for Continuing Professional and Higher Education, University of Oklahoma.

Garrison, R. (2000). Theoretical challenges for distance education in the 21st century: A shift from structural to transactional issues. International Review of Research in Open and Distance Learning*,* 1(1). Retrieved from https://doi.org/10.19173/irrodl.v1i1.2.

Ginev, D. (1998). Rhetoric and double hermeneutics in the human sciences. *Human Studies, 21*, 259–271. Retrieved from http://www.jstor.org/stable/20011201

Habermas, J. (1972). *Knowledge and human interests*. London, England: Heinemann.

Harris, D. (1987). *Openness and closure in distance education*. Lewis, England: Falmer Press.

Hawkridge, D. (2002). Media, texts and technologies. In *Applications of information technology in open and distance education H802 course guide block* (Vol. 4, pp. 26–29). Milton Keynes, England: The Open University.

Hennessey, P. (2019). *Winds of change: Britain in the early sixties*. London, England: Alan Lane.

Holmberg, B. (1983). Guided didactic conversation in distance education. In D. Sewart, D. Keegan, & B. Holmberg (Eds.), *Distance education: International perspectives* (pp. 114–122). London, England: Croom Helm.

Holmberg, B. (1985). *Feasibility of a theory of teaching for distance education and a proposed theory* (ZIFF Papiere 60. Zentrales Institut für Fernstudienforschung). Hagen, Germany: FernUniversität.

Holmberg, B. (1986). *Growth and structure of eistance education*. London, England: Croom Helm.

Holmberg, B. (2003). *Distance education in essence an overview of theory and practice in the early twenty-first century* (2nd ed.). BIS-Verlag: Oldenburg, Germany.

Holmberg, B. (2005). *The evolution, principles and practices of distance education* (Vol. II). Oldenburg, Germany: BIS-Verlag.

Holmberg, B., Schuemer, R., & Obermeier, A. (1982). *Zur Effizienz des gelenkten didaktischen Gespräches*. Hagen, Germany: FernUniveität, ZIFF.

Hülsmann, T. (2008). Peters, Holmberg, Moore – A personal configuration. *Distances et Savoirs, 3*(6), 455–470. Retrieved from https://www.cairn.info/revue-distances-et-savoirs-2008-3-page-455.htm

Jakupec, V. (1996). Reforming distance education through economic rationalism: A critical analysis of reforms to Australian higher education. In T. D. Evans & D. E. Nation (Eds.), *Opening education: Policies and practices in open and distance education* (pp. 77–89). London, England: Routledge.

Jakupec, V. (2011). *Distance education: Upgrading teaching qualifications at secondary education undergraduate level*. Ministry of Education, Bangladesh / ADB (ADB Loan No. 2101 BAN (SF).

Jakupec, V., & Nicoll, K. (1994). Open learning: Politics or pedagogy? *Distance Education, 15*, 217–233. https://doi.org/10.1080/0158791940150204

Juler, P. (1992). Discourse or discord? A dilemma of distance education. In T. D. Evans & P. Juler (Eds.), *Research in distance education 2* (pp. 5–15). Geelong, VIC: Deakin University Press.

Keegan, D. (1986). *The foundations of distance education*. London, England: Croom Helm.

Keegan, D. (1993). Reintegration of the teaching acts. In D. Keegan (Ed.), *Theoretical principles of distance education* (pp. 13–134). London, England and New York, NY: Routledge.

Keegan, D. (1996). *The foundations of distance education* (3rd ed.). London, England: Croom Helm.

Kuhn, T. S. (1996). *The structure of scientific revolutions*. Chicago, IL: Chicago University Press.

Kuhne, G. W. (2013). Continuing professional education. In M. G. Moore (Ed.), *Handbook of distance education* (3rd ed., pp. 625–640). New York, NY: Routledge.

Latchem, C. (2019). Independent study, transactional distance, guided conversation and adult learning. In I. Jung (Ed.), *Open and distance education theory revisited* (pp. 11–19). Singapore, Singapore: Springer.

Macarthur, B. (1974). An interim history of the Open University. In J. Tunstall (Ed.), *The Open University opens* (pp. 3–17). London, England: Routledge & Kegan Paul.

Meier, B., & Jakupec, V. (in press). Digital education: The Covid-19 pandemic impact on the higher education sector. In S. Ruda, B. Egbert, J. Erdmann, & M. Wojewoda (Eds.), *Bildung auf Distanz: Medien, Technologie, Politik und Lebenswelten in aktuellen Lernprozessen Technischen Universität Chemnitz*. Berlin, Germany: CultMedia.

Moore, M. G. (1972). Learner autonomy: The second dimension of independent learning. *Convergence, 5*(2), 76–88. Retrieved from https://www.proquest.com/openview/026768752863637ca2c2f4efd6eb0140/1?pq-origsite=gscholar&cbl=2030445
Moore, M. G. (1973). Towards a theory of independent learning and teaching. *Journal of Higher Education, 44*, 661–679. https://doi.org/10.1080/00221546.1973.11776906
Moore, M. G. (1976). Investigation of the interaction between the cognitive style of field independence and attitudes to independent study among adult learners who use correspondence independent study and self-directed independent study (Doctoral dissertation). Retrieved from ProQuest Dissertations & Theses (A&I 302834197).
Moore, M. G. (1993). Is teaching like flying? A total systems view of distance education. *American Journal of Distance Education, 7*, 1–10. https://doi.org/10.1080/08923649309526806
Moore, M. G. (1997). Theory of transactional distance. In D. Keegan (Ed.), *Theoretical principles of distance education* (pp. 22–38). New York, NY: Routledge.
Moore, M. G. (2013). The theory of transactional distance. In M. G. Moore (Ed.), *Handbook of distance education* (3rd ed., pp. 66–85). London, England: Routledge.
Moore, M. G., & Kearsley, G. (2005). *Distance education: A systems view*. Belmont, CA: Thomson Wadsworth.
Morgan, A. R. (1990). Whatever happened to the silent revolution? Research, theory and practice in distance education. In T. D. Evans (Ed.), *Research in distance education 1* (pp. 9–20). Geelong, VIC: Deakin University Press.
Morgan, A. R. (1993). *Improving your students' learning: Reflections on the experience of study*. London, England: Kogan Page.
Perraton, H. (1987). Theories, generalisation and practice in distance education. *Open Learning, 2*(3), 3–12. https://doi.org/10.1080/0268051870020302
Perry, W. (1976). *The Open University*. Milton Keynes: Open University Press.
Peters, O. (1971). Theoretical aspects of correspondence instruction. In O. Mackenzie & E. L. Christensen (Eds.), *The changing world of correspondence study* (pp. 223–228). University Park, PA: Pennsylvania State University.
Peters, O. (1973). *Die didaktische Struktur des Fernunterrichts: Untersuchungen zu einer industrialisierten Form des Lehrens und Lernen.* [Unpublished doctoral dissertation]. University of Tübingen.
Peters, O. (1993a). Understanding distance education. In K. Harry, M. John, & D. Keegan (Eds.), *Distance education: New perspectives* (pp. 10–18). London, England: Routledge.
Peters, O. (1993b). Distance education in a post-industrial society. In D. Keegan (Ed.), *Theoretical principles of distance education* (pp. 39–58). London, England and New York, NY: Routledge.
Peters, O. (2003). Models of open and flexible learning in distance education. In S. Panda (Ed.), *Planning and management in distance education* (pp. 13–27). London, England: Kogan Page.
Peters, O. (2007). The most industrialized form of education. In M. G. Moore (Ed.), *Handbook of distance education* (pp. 57–68). Mahwah, NJ: Lawrence Erlbaum Associates Publishers.
Peters, O. (2013). *Against the tide: Critics of digitalisation*. Oldenburg, Germany: der Carl von Ossietzky Universitat, BIS-Verlag.
Plowden Report. (1967) *Children and their prim*ary schools *report of the Central Advisory Council For Education* (England). London, England: HMSO.
Pyari, D. (2011). Theory and distance education: At a glance. *International Proceedings of Computer Science and Information Technology, 12*, 94–99. Retrieved from http://www.ipcsit.com/vol12/18-ICDLE2011E10011.pdf
Rumble, G. (1989). On defining distance education. *American Journal of Distance Education, 3*, 8–21. https://doi.org/10.1080/01587918000010102

Smith, K. (Ed.). (1984). *Diversity downunder in distance education*. Toowoomba, QLD: Darling Downs Institute of Advanced Education Press.

Tait, A. (2003). Reflections on student support in open and distance learning. *International Review of Research in Open and Distance Learning, 4*(1). Retrieved from https://doi.org/10.19173/irrodl.v4i1.134.

Verduin, J. R., & Clark, T. A. (1991). *Distance education: The foundations of effective practice*. San Francisco, CA: Jossey-Bass Publishers.

Zawacki-Richter, O. (2019). The industrialization theory of distance education revisited. In I. Jung (Ed.), *Open and distance education theory revisited: Implications for the digital era* (pp. 21–30). Springer.

9 Newer Theories for Digital Learning Spaces

Stephen Downes

Contents

Abstract

The emergence of newer theories for digital learning spaces occurs because of a general dissatisfaction with the theorizing of earlier generations of open and distance education (ODE). After an outline of the traditional conception of the requirements for a "learning theory," this chapter traces the sources for this dissatisfaction in traditional theories such as behaviourism and cognitivism, then traces some theoretical attempts to address them. It identifies a range of emerging theories, including connectivist pedagogy, personal learning environments, and open educational practices, characterizing these in terms of their response to the original dissatisfaction. It then returns to the characterization of a "learning theory," suggesting that in the light of this new work a reconceptualization of theory may be required.

Keywords

Open and distance education · Connectivism · Theory · Digital learning · Open educational practices

S. Downes (✉)
National Research Council Canada, Casselman, Canada
e-mail: stephen@downes.ca

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_8

Introduction

If it is true that “There is nothing so practical as a good theory” (Lewin, 1952, p. 169), then open and distance education (ODE) has been awash in practicality since its inception more than a century ago. We are at once told that key research questions were already answered decades ago and yet see for ourselves the proliferation of new theories with the development of each new delivery technology. Is this because of an ahistorical perspective, as Selwyn (2012, p. 216) suggests? Is it true that we are locked in an endless cycle of contextualization and generalization, as Jung (2020) suggests? Or is it different this time?

The emergence of newer theories for digital learning spaces occurs because of a general dissatisfaction with the theorizing of earlier generations of ODE and not as a result of ignorance of it. This dissatisfaction is manifest in several dimensions, each of which will be explored through the course of this chapter.

In earlier generations, for example, distance education (DE) was presented as addressing a *transmission* challenge, while in the digital era a much broader conception of learning *environments* is considered. Earlier generations reflected an emphasis on *content* and learning design, while in the digital era context and community assume a much greater importance. Earlier generations depict knowledge as consisting of idealized *representations* and schemas, while in the digital context knowledge is intuitive and contextual. And finally, earlier generations think of learning as a cognitive process based essentially in logical structures such as language and mathematics, while in the digital era learning is understood as a physical process based on adaptation to concrete experience.

These are important distinctions, though not without precedent in the historical literature. The philosophically minded will recognize elements of the historical division between rationalism and empiricism, while those schooled in the history of education will recognize the contrast between what might be called traditional and progressive education. What’s *new* with digital technology and digital learning spaces, however, is the possibility of expressing theory precisely in technology and experiencing for ourselves answers to questions that could not even be asked in pre-digital environments.

And so the dissatisfaction with more traditional forms of theorizing in education is also a dissatisfaction with the posing of questions and experimental methods rooted in non-digital forms of investigation and theorizing. For example, the problems of education are often represented as *statistical* problems, addressed through the social sciences or economics, rather. Complex phenomena are *interpreted* using the broad generalizations of folk psychology rather than analyzed and understood at an individual and personal level.

Finally, there is dissatisfaction with traditional conceptions of what sort of questions we are attempting to answer. This arises most clearly in the light of asking “what is a theory?” What *work* do we expect a theory for digital learning spaces to do? What sort of questions need it answer? Again, we find the question changes the more deeply we are engaged in digital learning technology. To this, then, we turn first, as a prelude to the remainder of the discussion.

What Is a Theory?

The word "theory" is used differently in different domains. In physics we see the "theory of gravity" while in language studies we see "critical theory." So too in the fields of education and technology, a theory may be taken as being anything from a "lens" through which to interpret phenomena to a set of causal mechanisms explaining learning behaviour and practice. The theory guiding the practice of ODE is often characterized under the auspices of "learning theory," which in the field of education has a broad connotation.

As Picciano (2017) writes,

> Learning theory is meant to explain and help us understand how people learn; however, the literature is complex and extensive enough to fill entire sections of a library. It involves multiple disciplines, including psychology, sociology, neuroscience, and of course, education. (p. 166)

This is most clear when we consider the multiple purposes to which theories are put in education. Gibbons and Bunderson (2005) describe theories that: *explore*: "what exists?" attempting to define, describe and categorize; *explain*: "why does this happen?" looking for causality, correlation, and relationships; and *design "*how I achieve this outcome?" describing interventions for reaching targeted outcomes and operational principles (Graham et al., 2013, p. 13). These correspond with three ways of seeking knowledge about the world: through exploration, typically through qualitative research methods, which may establish the existence of an entity (an object, a problem, a perspective); through explanation, which often involves quantitative methods, to address questions of identity, relatedness, and causality; and design, which explores the possibility of creating a particular outcome.

Much, if not most, discussion of technology in education revolves around the first and especially the second question. Learning (or pedagogy) and technology are presented as two *separate* domains, and theory addresses the causal relation between them. For example, Kanuka (2008) describes three major approaches to a theory of technology: *uses determinism*, which "emphasizes technological uses and focuses on the ways in which we use technologies"; *social determinism*, "concerned with the integration of technological artefacts within social systems and cultural contexts"; and *technological determinism*, where "technologies are viewed as causal agents determining our uses and having a pivotal role in social change" (pp. 96-98). Each of the three approaches also offers a platform for the criticism of technology in learning. For example, Kanuka quotes Jonassen (1996) on uses determinism: "carpenters use their tools to build things; the tools do not control the carpenter. Similarly, computers should be used as tools for helping learners build knowledge; they should not control the learner" (Kanuka, 2008, p. 4). Critics of social determinism include Putnam (*Bowling Alone,* 2000) and Turkle (*Alone Together*, 2011). Major critics of technological determinism include Noble (1998), Postman (1992), Dreyfus (2001), and Watters (2021).

Both the Gibbons and Bunderson discussion and the Kanuka discussion present as "theory" something along the lines of the classical Deductive-Nomological (DN) Model where a scientific explanation consists of an *explanandum*, a sentence "describing the phenomenon to be explained" and an *explanans*, "the class of those sentences which are adduced to account for the phenomenon" (Hempel and Oppenheim, 1948, reprinted in Hempel, 1965, p. 247). The relation between the explanans and the explanandum may be deductive, as in determinist theories, or it may be statistical, as commonly found in theories of the social sciences, including education. A common criticism of DN model theories is that they are *reductive*, that is, they are held to be *unificationist* in the sense of attempting to provide a unified account of a range of different phenomena, for example, by explaining learning through too "low" a science (Sayer, 2010, p.5) or attributing sole responsibility to individuals for their fates (Sayer, 2010, p. 7). And so, through a rejection of reductionism, theories proliferate, each specific to its own level of discourse, its own context, or its own discipline. And yet digital learning practitioners are expected to agree that "key research questions were already answered decades ago."

A deeper critique may be found in questioning the distinction between *explanans* and *explanandum* that forms the basis for HD-style theories. Digital technologies have fostered the rise of complex network technology that defies explanation in such simple terms. Network interactions, whether the conversations of a billion internet users or the workings of a billion-parameter artificial intelligence, cannot be understood in terms of anything like a DN model. There is no distinction that can be drawn between that which explains, and that which is being explained.

Traditional Learning Theories

Designers of early digital learning environments were influenced by, and drew from, a range of learning theories developed in previous generations. These theories, in turn, were influenced by major schools of thought in the philosophies of science and psychology.

Canonically, the first of these is *behaviourism*. Developed in the first part of the 1900s by authors including B.F. Skinner (*Beyond Freedom and Dignity*) and Gilbert Ryle (*The Concept of Mind*) behaviourism was offered as a response to dualist theories that posited a nonphysical "mind" that had special cognitive abilities and insights into the nature of the self and reality. behaviourism limits its conclusions to what may be observed and measured, and therefore describes learning and development in terms of stimulus-response (Skinner) and knowledge and skills as dispositions (Ryle, 1949). There is, according to behaviourism, no "mental state" constituting a single bit of knowledge or a skill; one might (in today's terms) think of it as a "whole of body" response.

Behaviourism, as Watters (2015) explains, is the philosophy behind the concept of the "teaching machine" and proceeds by incremental conditioning.

> By arranging appropriate 'contingencies of reinforcement,' specific forms of behaviour can be set up and brought under the control of specific classes of stimuli. . . a student is 'taught' in the sense that he is induced to engage in new forms of behaviour and in specific form upon specific occasions. (Skinner, 1958, p. 970)

"Behaviourism has persisted, although often unnamed and un-theorized - in much of the technology industry, as well as in education technology – in Turing machines not simply in teaching machines" (Watters, 2015).

In what might be thought of as a response to behaviourism, *cognitivism* emerged in the later 1900s. It postulates the existence of causally relevant *cognitive states* that can be located in the mind and are able to better explain mental phenomena such as reason and language better than stimulus and response (which, proponents such as Chomsky (1986, Preface, xxv) argue, cannot explain them at all). An example of cognitivism is the physical symbol system hypothesis, which as the name suggests references a possibly innate language of thought (Fodor 1975).

It is arguable that a combination of cognitivism and behaviourism lives on today in the form of adaptive learning. Such systems use digital technology to monitor student activities, including responses to learning tasks, interpret those responses based on domain-specific models, and present them with new activities or resources in order to address learning needs, hence embracing a cognitivist model of learning. However, as a procedural system, adaptive learning is inherently behaviourist. Stimuli and student responses are mapped to cognitive schema or frames, perhaps as "production rules" as in the Intelligent Tutoring System of Anderson et al. (1985). Formally, however, production rules and dispositions amount to the same thing, a form of counterfactual reducible (in theory) to observed behaviour.

Digital learning design drawing from *transactional theories* of ODE is similarly both cognitivist and behaviourist in nature. In such theories, the central problem is the communication of information from a sender (in the case of learning, an instructor or learning resource) to a recipient (a student or learner). Such theories describe the forms of online interactions, in the case of Moore (1989), instructor-to-student, student-to-student, and student-to-content, and mechanisms for ensuring the fidelity of transmission where separation between the teacher and students can "lead to communication gaps, a psychological space of potential misunderstandings between the behaviours of instructors and those of the learners" (Moore and Kearsley, 1996, p. 200).

Both traditional education and ODE were influenced by a wave of theories that push back against the idea that knowledge or learning could be "delivered" in the sense that a message or piece of information is delivered, of which the most prominent is *social constructivism*. Constructivism in general is the thesis that knowledge is generated by means of the creation of models, schemas or representations by means of physical symbol systems. As a philosophy of science, constructivism is a form of empiricism (van Fraassen, 1980), while as a theory of learning constructivism responds to innatism by describing learning and development as *social* phenomena (hence, *social* constructivism) employing language, storytelling, community structures, and similar methods of "making meaning."

A related theoretical approach, *discovery learning*, is based on a model of learning and discovery as problem-solving activities (Laudan, 1978) where learners draw on their own activities and experiences to discover facts and construct theories about the world. The suggestion is that learners are more likely to remember facts and theories they discover on their own than those merely presented to them by instructors (Bruner, 1973). The theory of experiential learning formalizes this idea, describing a process resembling scientific models of hypothesis, prediction, and deduction and in education can be described as a "learning cycle" (; Kolb and Kolb, 2005, p. 195; Kolb, 1984). Papert's theory of constructionism is a less formal example of this, taking from Piaget "a model of children as builders of their own intellectual structures," where learners solve problems and develop ideas through an open-ended creative process working hands on with physical or digital objects (Papert 1980, p. 7).

In what might be considered the cumulation of traditional learning theories, the theory of *direct instruction* was developed through criticism of discovery and inquiry-based teaching (Kirschner et al., 2006). Based on the idea of "cognitive load," which is a limit to a person's ability to process information at any given time, it suggests that such theories require too much extraneous work on the part of the learner. For example, in problem-based learning, a learner might waste time and effort discovering which formula should be used to find the answer. This extraneous effort, it is argued, limits the learner's capacity to absorb and retain information. Rather, instruction should be based on directly explaining the concept or theorem to be taught, and then providing a set of "worked examples" that students can follow in order to learn how the problems are solved.

Traditional learning theories have in common a conception of knowledge and learning as a *cognitive* function, even if (as in the case of behaviourism) that function cannot be directly observed. Learning is in some way the stimulation, transmission, or construction or creation of models, schemas or representations that are symbolic in nature and consist of statements of fact and sets of rules or generalizations about those facts. Learning objectives could be stated by enumerating the factual domains to be mastered, or (as in the case of Bloom's taxonomy) evidence of progressively more abstract actions demonstrating internalization of those rules and representations. In this way, traditional theories of knowledge and learning are structurally isomorphic with DN theories of science.

Toward Newer Theories

Another way of saying that traditional learning theories have in common a conception of knowledge and learning as a *cognitive* function is by saying that such theories are all *knowledge centered*. The dissatisfaction with, and replacement of, traditional theories begins with a challenge to this conception of learning. What we understand by "knowledge and learning" is something more than or different from the cognitive function as traditionally conceived. Thus, for example, we see Bransford et al. (1999) argue that effective learning is community-centered, knowledge-centered, learner-centered, and assessment-centered. "All learning takes place in settings that have particular sets of cultural and social norms and expectations and that these settings influence learning and transfer in powerful ways" (Bransford et al., 1999, p.4).

Bransford et al. (1999) also describe (following Dreyfus and Dreyfus, 1980, p. 15) how expert knowledge differs from novice knowledge. Experts

> notice features and meaningful patterns of information that are not noticed by novices. Experts' knowledge cannot be reduced to sets of isolated facts or propositions but, instead, reflects contexts of applicability: that is, the knowledge is "conditionalized" on a set of circumstances. (Bransford et al., 1999, p. 31)

Or, learning is *more* than cognitive; it "changes the physical structure of the brain and, with it, the functional organization of the brain" (Bransford et al., 1999, p. 4).

Context, self, community: the emergence of newer theories of learning begins with a new understanding of their importance and "the unique characteristics or affordances of the Web to enhance these generalized learning contexts" (Anderson 2008b, p. 46). None of these were in and of themselves new to the field; as mentioned above, constructivism already emphasized the role of community, and Kolb's version of discovery learning was based on his understanding of human psychology, for example. But it took engagement with the World Wide Web – the ultimate information processing system – to underline the importance of these other factors.

Several early theories drew on these factors. One such is *adaptive learning*, which is in essence the use of digital (or other) technology in order to select or recommend unique sets of learning resources or activities based on a learner's prior knowledge and demonstrated capabilities. Intelligent Tutoring Software (ITS), for example, was based in a combination of domain knowledge, a pedagogical model, and a student model (Kravcik et al., 2005, p. 9), which then gave way to adaptive hypermedia models and web-based adaptive educational systems. These were based to a large degree on Semantic Web technologies, and implemented using a combination of learning rules and reusable learning resources, or "learning objects."

Another was *situated cognition*, the idea that "activity and situations are integral to cognition and learning" and that "by ignoring the situated nature of cognition, education defeats its own goal of providing useable, robust knowledge" (Brown et al., 1989). For example, consider the difference between learning words according to dictionary definitions and learning words in the context of using them in sentences.

> Teaching from dictionaries assumes that definitions and exemplary sentences are self-contained "pieces" of knowledge. But words and sentences are not islands, entire unto themselves. Language use would involve an unremitting confrontation with ambiguity, polysemy, nuance, metaphor, and so forth were these not resolved with the extra linguistic help that the context of an utterance provides. (Nunberg, 1978)

Significantly, learning how to use a tool (for example) is not rule-based. In learning how to use tools, people

> build an increasingly rich implicit understanding of the world in which they use the tools and of the tools themselves… Learning how to use a tool involves far more than can be accounted for in any set of explicit rules. The occasions and conditions for use arise directly out of the context of activities of each community that uses the tool, framed by the way members of that community see the world. (Brown et al., 1989, p. 33)

Similarly,

> Conceptual tools similarly reflect the cumulative wisdom of the culture in which they are used and the insights and experience of individuals. Their meaning is not invariant but a product of negotiation within the community. Again, appropriate use is not simply a function of the abstract concept alone. It is a function of the culture and the activities in which the concept has been developed. (Brown et al., 1989, p. 33)

The situatedness of cognition is obscured by the nature and function of schools. Most school activity exists in a culture of its own separate from what students will experience in their workplace and culture. In the school, learning transfer is "assumed to be the central mechanism for bringing school-taught knowledge to bear in life after school." (Lave, 1988, p. 23) In such a context, problem-solving activities are "always a quest for truth or the 'right answer'" (Lave, 1988, p. 36). The problem context is "the only context germane to problem-solving activity (Lave, 1988, p. 39). Contrast this account of learning in school with "life after school" where problem-solving is a "process of transformation" (Lave, 1988, p. 59). "The same activity in different situations derives structuring from, and provides structuring resources for, other activities." (Lave, 1988, p. 122). Doing mathematics in a math class is very different from doing mathematics in a grocery store.

One major outcome of situated learning is the concept of the *community of practice*. "A person's intentions to learn are engaged and the meaning of learning is configured through the process of becoming a full participant in a sociocultural practice" (Lave and Wenger, 1991, p. 29). A good example of this is the apprenticeship, where new members of the profession are gradually moved from peripheral participation involving limited duties to more and more central roles. This same process takes place less formally in other professions. A "person" becomes a "practitioner" "whose changing knowledge, skill, and discourse are part of a developing identity" (Lave and Wenger, 1991, p. 122). Hence, on this theory, "*knowing* is inherent in the growth and transformation of identities and is located in the relations among practitioners, their practice, the artifacts of that practice, and the social organization and economy of communities of practice" (Lave and Wenger, 1991, p. 122).

We see a similar perspective represented in the "community of inquiry" model for online learning environments developed by Garrison et al. (1999). This model is based on the interplay of three types of "presence": social presence, cognitive presence, and teaching (or perhaps learning) presence. The concept of social presence especially identifies a connectedness between people in a learning environment.

> Collaboration must draw learners into a shared experience for the purposes of constructing and confirming meaning. Realizing understanding and creating knowledge is a collaborative process. The difference between collaboration and common information exchange is: . . .the difference between being deeply involved in a conversation and lecturing to a group. The words are different, the tone is different, the attitude is different, and the tools are different. (Garrison et al., 1999, p. 95)

We see in this work of the late 1990s and the early 2000s the development of each of the major themes characterizing emerging theories for digital learning spaces. It became apparent that knowledge and learning are based on much more than mere transmission of information, as the nature of the learner and the learner's environment play key roles, and context and community assume a much greater importance. Because these must be explicitly created in a digital learning environment, rather than inherent in, say, a classroom or workplace, their nature and development assumed a greater importance in learning theory and design. It also became apparent that learning and domain knowledge consist of more than idealized representations and schemas, more even than logical structures such as language and mathematics. While these cognitive phenomena continue to play a major role in learning theory, there is an increasing recognition of the importance of the ineffable properties of personal knowledge and learning communities.

Newer Theories for Digital Learning Spaces

Much of digital learning research in the early twenty-first century was devoted to the idea of learning communities, collaboration, and co-construction of knowledge. Haythornthwaite et al. (2007) provide a good overview of six major approaches, including living technologies, co–evolution of technology and learning practices, and technology and social tie formation. The importance of interaction was emphasized. "The main function of reasoning, we claim, is argumentative. Reasoning has evolved and persisted mainly because it makes human communication more effective and advantageous" (Mercier and Sperber, 2011, p. 60).

Such discussion also led to the idea that cognition is not confined to the brain but partly distributed and realized in our interactions with the environment.

> The human organism is linked with an external entity in a two-way interaction, creating a *coupled system* that can be seen as a cognitive system in its own right. All the components in the system play an active causal role, and they jointly govern behaviour in the same sort of way that cognition usually does. (Clark and Chalmers, 1998, p. 8)

Paper-and-pencil calculation is the standard example. The social processing of information can be conceived as a species of extended cognition where our cognitive processing is distributed into the social environment and supported and constrained by social interaction.

It therefore became a matter of considerable importance to understand *how* such social processes can lead to knowledge. For example, factors such as the role of diversity were widely discussed. “Both cognitive and social diversity have similar effects on group deliberation. No diversity, no disagreement, and no critical feedback; but too much diversity erodes trust and mutual understandings and prevents the convergence of opinion” (Pesonen, 2022, p. 14). Rather than seeking sameness, it became clear that knowledge and learning require *difference*.

Connectivism was offered in 2004 as an answer to such questions. It at once embraced the role of context, community and interaction in the development of knowledge and learning, and it drew from the unique affordances of digital learning environments to describe how such a process might be implemented. It pushes back at once against the idea of knowledge acquisition through transmission and also against the idea of knowledge as consisting of purely formal, and purely internal, schemas and representations.

In his paper introducing connectivism, Siemens quotes an undated comment from Karen Stephenson to underline the first point:

> Experience has long been considered the best teacher of knowledge. Since we cannot experience everything, other people’s experiences, and hence other people, become the surrogate for knowledge. “I store my knowledge in my friends” is an axiom for collecting knowledge through collecting people. (Siemens, 2005)

And he points to the complexities of chaos theory to make the second point:

> Chaos is the breakdown of predictability, evidenced in complicated arrangements that initially defy order. Unlike constructivism, which states that learners attempt to foster understanding by meaning making tasks, chaos states that the meaning exists—the learner’s challenge is to recognize the patterns which appear to be hidden. (Siemens, 2005)

In the explicit embrace of an idea of knowledge and learning as embedded in chaos and context, the nature of knowledge is transformed from formal schemas and representations to connections between entities and pattern recognition. Formal representations may continue to be used, and may constitute the *content* of communication, but knowledge and learning are found in the structure and organization that grows around such content. “The learner’s challenge is to recognize the patterns which appear to be hidden. Meaning-making and forming connections between specialized communities are important activities…” (Siemens, 2005) leading to the “spontaneous formation of well-organized structures, patterns, or behaviours, from random initial conditions” (Rocha, 1998, p.3).

Connectivism makes these phenomena explicit in the definitions of knowledge and learning. “At its heart, connectivism is the thesis that knowledge is distributed across a network of connections, and therefore that learning consists of the ability to construct and traverse those networks” (Downes, 2007). As a theory of digital learning environments, therefore, connectivism as a theory describes the formation structures and processes that lead to self-organizing networks in education. The first and most important of these is the Massive Open Online Course (MOOC).

Developed in 2008, the “Connectivism and Connective Knowledge” MOOC (CCK08) was intended not only to introduce the theory but also to offer an example or model of the theory in action (Downes and Siemens, 2008). Rather than being centered around a body of structured content and defined in terms of learning objectives, the MOOC was arranged around a series of loosely defined topics as social networks, intentionalism and meaning, groups and networks, complexity, chaos and randomness. While course organizers offered material in the form of papers, blog posts, and recorded conversations, the course as a whole consisted of the contributions of more than 170 separate blogs or websites; posts from these were syndicated using RSS and distributed to the 2200 participants in an email and RSS newsletter called *The Daily*.

The design of CCK08, while still rooted to a degree in traditional pedagogy (a Moodle environment was employed alongside the blog posts, newsletter, and wiki, and formal assessment was offered to a small group of University of Manitoba students taking the course for credit), was based in what might be characterized as the principle for successful networks (Downes, 2005) and in particular around what came to be called *the semantic principle* outlining four major conditions for successful knowledge creation in self-organizing networks. The first two, *autonomy* and *diversity*, can be seen in many of the earlier theories discussed above. The latter two, *openness and interactivity*, are derived from the development of the digital networks used to support the internet in general and online learning in particular.

Following the development and success of the connectivist MOOC model, e-learning developers and designers began to ask how best to support both learner autonomy and learner diversity, a discussion that led to the articulation of the *personal learning environment* (PLE) as a conceptual design.

> Rather than integrate tools within a single context, the system should focus instead on coordinating connections between the user and a wide range of services offered by organizations and other individuals. Rather than interacting with the tools offered within the contexts supplied by a single provider, the PLE is concerned with enabling a wide range of contexts to be coordinated to support the goals of the user. (Wilson et al. 2007, p.5)

No viable commercial product was developed along the lines of the PLE; however, the development of a successor technology, the *learning experience platform (LXP)*, may be attributed to the PLE. For example, one contemporary LXP vendor writes that the LXP

> is a consumer-grade learning software designed to create more personalized learning experiences and help users discover new learning opportunities. By combining learning contents from different sources, recommending and delivering them with the support of Artificial Intelligence, across the digital touch points, e.g., desktop application, mobile learning app and others. (Valamis, 2022)

The concepts of openness and interactivity were drawn from the example of digital network technology, and most especially, the Internet itself. In addition to the physical properties underlying the Internet that made it a reliable and useful network, properties such as decentralized design and distributed resources, the success of the

Internet was also attributed to open standards and open source software. As Berners-Lee (1989) wrote in 1989,

> the hope would be to allow a pool of information to develop which could grow and evolve with the organisation and the projects it describes. For this to be possible, the method of storage must not place its own restraints on the information. This is why a "web" of notes with links (like references) between them is far more useful than a fixed hierarchical system.

It was noticed by many that the structure of the Internet – a digital network consisting of a set of dynamically changing links reflecting the knowledge and learning of a society – and some forms of artificial intelligence – described under the heading of *connectionism* and consisting of dynamically changing links between interconnected artificial neurons reflecting the knowledge and learning of a computer system – were in many important respects the same. Connectivist theory made this association explicit and extended the association to include examples from theories of self-organizing social networks (as described by Barabási 2003, Shirky 2008; Watts 2003) as well as graph theory. The key tenet of all four sets of theories is the same: knowledge is not content, it is *organization*. And as such, connectivism reflects back directly to the concepts of the community of practice and the community of inquiry, where, as noted above, "*knowing* is inherent in the growth and transformation of identities and is located in the relations among practitioners, their practice, the artifacts of that practice, and the social organization and economy of communities of practice" (Lave and Wenger, 1991, p. 122).

Recent work in digital learning environments reflects and builds on these themes. One line of enquiry of note can be found under the heading of *open educational practices* (OEP), which emphasize at once the openness characteristic of learning in digital networks but also the need for a more humane approach based on an ethic of care (Farrow, 2016, p. 100) where the traditional conception of education as "the transfer of information and knowledge to learners is being replaced with a view of learners as active participants in their own learning" (Kaatrakoski et al., 2017). "OEP are defined as practices which support the (re)use and production of OER through institutional policies, promote innovative pedagogical models, and respect and empower learners as co-producers on their lifelong learning path" (Ehlers, 2011, p. 4). Cronin (2017) identifies the following dimensions of OEP: balancing privacy and openness, developing digital literacies, valuing social learning, and challenging traditional teaching role expectations.

Another more recent body of work revolves around the concept of embodied cognition and learning. "Embodied cognition involves how the body and mind work in tandem to create the human experience. Embodied cognition literature suggests that the physical actions we perform, as well as the actions being performed around us, shape our mental experience" (Sullivan, 2018, p. 129). Based on work by, among others, Varela et al. (1991, p. 172), embodied learning also draws from Papert's theory of constructionism, referenced above, but also builds on the concept of non-cognitivist and non-formal knowledge, as described by Dreyfus and Dreyfus (1980) and Bransford et al. (1999). Shapiro and Stolz (2019) outline "some of the main ideas that distinguish embodied cognition from computational cognitive science" and argue "traditional cognitivist accounts of the mind should be challenged because they exclude the close relationship that exists between mind and body that is more profound than initially considered"(p. 20).

Similarly, the work of Princeton scientist Fei-Fei Li and her colleagues (Liu et al., 2022, p. 1) points to the development of *embodied AI* as a field involving "AI agents that don't simply accept static images from a data set but can move around and interact with their environments in simulations of three-dimensional virtual worlds" (Whitten, 2022). It suggests a type of AI that "could power a major shift from machines learning straightforward abilities, like recognizing images, to learning how to perform complex humanlike tasks with multiple steps, such as making an omelet"(Whitten, 2022). The difference here is like the difference between presenting a student with text and images to learn from and giving them a real environment where they can move about and try things. "The meaning of embodiment is not the body itself, it is the holistic need and functionality of interacting and doing things with your environment" (Whitten, 2022).

Also enjoying a renaissance is an approach called *enactivism* which is a combination of constructivism and embodied learning and "is a theory wherein cognition and environment are inseparable, and learning is drawn from the interaction between learner and environment" and "emphasises *emergent* cognitive structures that *self-organize* as a result of interactions between organism and environment" (Ward et al., 2017, p. 368). Again, we see the link not only to connectivism but to other emerging theories of digital learning environments. "Views of the mind as embodied, embedded, extended, affective, or some combination of these, are members of the enactivist family at least in virtue of sharing important common ancestry" (Ward et al., 2017, p. 373).

The definitive theory of digital learning spaces is perhaps yet to be written, but there is a sense in which a sea change has occurred in some areas of educational technology and e-learning, even if the proponents of traditional learning, content-based MOOCs, and cognitivist theories of knowledge have not yet yielded the field. Knowledge and learning are based, minimally, in complex processes. These processes defy simple description and explanation, but at a minimum depend in important ways on one's environment, whether by engaging in conversation or manipulating objects, and vary significantly depending on context, which may include both the learner's prior experiences, but also the nature of the culture, workplace or community in which one finds themselves immersed.

What Is a Theory: Revised

In an earlier section of this chapter we discussed the traditional conception of a theory and in particular the HD model that informs much of the common discourse around learning theories in general and those concerning digital learning environments in particular. Such theories, we noted, are based on *explanations* of phenomena such that, with the appropriate intervention and a correct theory, we may reliably predict a learning outcome. Traditional learning theories were developed within the context of traditional theory. So when we say that key research questions have been answered, what we mean is that researchers have provided *explanations* for learning phenomena such that pedagogical interventions may reliably produce desired learning outcomes. But learning, as we detail in this chapter, is based on complex and context-based phenomena, and cannot be understood in terms of anything like a DN model.

Another way of saying the same thing is to say that humans, and human learning, cannot be subject to *mechanistic* explanation, and therefore, processes and pedagogies based on mechanistic theories of knowledge and learning. It may be that mechanistic processes may reliably produce some or another *outcome*, but the error consists in describing that outcome as "learning." It is merely a production, an offering of content for the content machine, and not in and of itself indicative of a capacity expressed that can only be developed in a learning community or environment through a process of practice, reflection and interaction.

It therefore merits speculation that what we understand as a "theory" ought to be reflected in, and informed by, what we understand as "learning." And though there is much more that can be studied and researched in that regard, the recent successes of connectionist artificial intelligences, today known as "deep learning," is instructive. In particular, we can examine the application of AI to learning environment design that is, *learning analytics*. And we have learned that

> at the petabyte scale, information is not a matter of simple three- and four-dimensional taxonomy and order but of dimensionally agnostic statistics. It calls for an entirely different approach, one that requires us to lose the tether of data as something that can be visualized in its totality... faced with massive data, this approach to science — hypothesize, model, test — is becoming obsolete. (Anderson 2008a)

So instead, the *model* – which is now what theories have become – is not so much a set of schemas, ontologies and representations, but rather, a large body of data combined with a description of a learning network such that a characteristic set of weighted connections can be employed to perform useful tasks in complex environments in a variety of contexts. These weighted connections do not "stand for" anything. They constitute a "representation" only in the loosest sense of the word. And the elements of the learning network, consisting of neural-level descriptions of activation functions and thresholds, among other physical properties, describe only the learning environment itself, and not the environment about which it learns. Meanwhile, explanation for the output of the neural network that would enable us to manipulate it and force certain results, defies us.

What, then, do such theories do? Popular accounts of analytics describe four major functions: description, diagnosis, prediction, and prescription (Boyer and Bonnin 2016; Brodsky et al., 2015). A study of contemporary deep learning systems suggests (Downes, 2021) two additional categories may be added: generation (or content creation), and deontology (or identifying what the best, or desired, option may be). It is arguable that, given what we now know about knowledge and learning, a scientific theory may come to be regarded *just as* a neural network model trained on a data set such that it may reliably perform these six functions. While it would perhaps be *nice* to expect simply causal explanations rooted in deep cosmic laws or principles, it may be that these are simply not forthcoming. The universe might not, after all, be like a machine.

References

Anderson, C. (2008a). The end of theory: The data deluge makes the scientific method obsolete. *Wired*. Retrieved from https://www.wired.com/2008/06/pb-theory/

Anderson, T. (2008b). Towards a theory of online learning. In T. Anderson (Ed.), *The theory and practice of online learning* (pp. 45–74). Edmonton: Athabasca University Press.

Anderson, J. R., Boyle, C. F., Reiser, B., & J. (1985). Intelligent Tutoring Systems. *Science, 228*(4698), 456–462. https://doi.org/10.1126/science.228.4698.456.

Barabási, A. (2003). *Linked: How everything is connected to everything else and what it means for business, science and everyday life*. New York: Plume Books.

Berners-Lee, T. (1989). *Information management: A proposal*. CERN. Retrieved from https://www.w3.org/History/1989/proposal.html

Boyer, A., & Bonnin, G. (2016). *Higher education and the revolution of learning analytics*. ICDE Insight Paper. Reieved from https://static1.squarespace.com/static/5b99664675f9eea7a3ecee82/t/5beb449703ce644d00213dc1/1542145198920/anne_la_report+cc+licence.pdf

Bransford, J., Brown, A., & Cocking, R. (1999). *How people learn: Brain, mind experience and school*. Washington, DC: National Research Council. Retrieved from http://www.nap.edu/html/howpeople1/.

Brodsky, A., Shao, G., Krishnamoorthy, M., Narayanan, A., Menascé, D., & Ak, R. (2015). Analysis and optimization in smart manufacturing based on a reusable knowledge base for process performance models. In *IEEE International Conference on Big Data (Big Data)* (pp. 1418–1427). IEEE. Retrieved from https://ieeexplore.ieee.org/abstract/document/7363902

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher, 18*(1), 32–42. https://doi.org/10.3102/0013189X018001032.

Bruner, J. S. (1973). *Beyond the information given: Toward a psychology of knowing*. New York: Norton.

Chomsky, N. (1986). *Knowledge of language: Its nature, origin, and use*. New York: Praecer Special Studies.

Clark, A., & Chalmers, D. (1998). The extended mind. *Analysis, 58*(1), 7–19. Retrieved from https://philpapers.org/rec/CLATEM.

Cronin, C. (2017). Openness and praxis: Exploring the use of open educational practices in higher education. *The International Review of Research in Open and Distributed Learning, 18*(5), 10.19173/irrodl.v18i5.3096.

Downes, S. (2005, May). *Learning networks: Theory and practice*. Lecture at international conference on methods and Technologies for Learning, Institute for Educational Technology, Italian National Research Council, Palermo, Italy. Retrieved from https://www.downes.ca/presentation/32

Downes, S. (2007). What Connectivism is. *Half an Hour* (weblog). https://halfanhour.blogspot.com/2007/02/what-connectivism-is.html

Downes, S. (2021). Applications of learning analytics. *Ethics, Analytics and the Duty of Care*. MOOC. https://ethics.mooc.ca/cgi-bin/page.cgi?module=6

Downes, S., & Siemens, G. (2008). *Connectivism and connective knowledge* (MOOC). Retrieved from http://connect.downes.ca/

Dreyfus, H. (2001). *On the internet: Thinking in action*. Routledge Press.

Dreyfus, S. E., & Dreyfus, H. L. (1980). *A five-stage model of the mental activities involved in directed skill acquisitio*. Washington, DC: Storming Media. Retrieved from https://apps.dtic.mil/sti/pdfs/ADA084551.pdf.

Ehlers, U. (2011). Extending the territory: From open educational resources to open educational practices. *Journal of Open, Flexible and Distance Learning, 15*(2), 1–10. Retrieved from http://www.jofdl.nz/index.php/JOFDL/article/view/64.

Farrow, R. (2016). A framework for the ethics of open education. *Open Praxis, 8*(2), 93–109. https://doi.org/10.5944/openpraxis.8.2.291.

Fodor, J. A. (1975). *The language of thought*. New York: Thomas Y. Crowell.

Garrison, D. R., Anderson, T., & Archer, W. (1999). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education, 2*(2–3), 87–105. https://doi.org/10.1016/S1096-7516(00)00016-6.

Gibbons, A. S., & Bunderson, C. V. (2005). Explore, explain, design. In K. K. Leondard (Ed.), *Encyclopedia of social measurement* (pp. 927–938). New York: Elsevier.

Graham, C. R., Henrie, C. R., & Gibbons, A. S. (2013). Developing models and theory for blended learning research. In A. G. Picciano, C. D. Dziuban, & C. R. Graham (Eds.), *Blended learning: Research perspectives* (Vol. 2, pp. 13–33). New York: Routledge.

Haythornthwaite, C., Bruce, B. C., Andrews, R., Kazmer, M. M., Montague, R-A., & Preston, C. (2007). Theories and models of and for online learning. *First Monday*, volume 12, number 8 (August 2007). http://firstmonday.org/issues/issue12_8/haythorn/index.html

Hempel, C. G., & Oppenheim, P. (1948). Studies in the logic of explanation. *Philosophy of Science, 15*(2), 135–175. https://doi.org/10.1086/286983.

Hempel, C. (1965). *Aspects of scientific explanation and other essays in the philosophy of science*. New York: Free Press.

Jonassen, D. H. (1996). *Computers in the classroom: Mindtools for critical thinking*. Englewood Cliffs: Prentice Hall.

Jung, I. (2020). A contextualization-generalization-recontextualization cycle in open and distance education theory building and application: A cultural perspective. *Distance Education in China, 8*, 33–44. https://doi.org/10.13541/j.cnki.chinade.2020.08.005.

Kaatrakoski, H., Littlejohn, A., & Hood, N. (2017). Rethinking practice in higher education: A study on how the use of open educational resources triggers the adoption of open educational practice. *Open and Interdisciplinary Journal of Technology, Culture and Education., 12*(2), 2017. http://www.ckbg.org/qwerty/index.php/qwerty/article/view/261.

Kanuka, H. (2008). Understanding e-learning technologies-in-practice through philosophies-in-practice. In T. Anderson (Ed.), *The theory and practice of online learning* (2nd ed., pp. 91–118). Edmonton: Athabasca University Press.

Kirschner, P. A., Sweller, J., & Clark, R. E. (2006). Why minimal guidance during instruction does not work: An analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching. *Educational Psychologist, 41*(2), 75–86. https://doi.org/10.1207/s15326985ep4102_1.

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development* (Vol. 1). Englewood Cliffs: Prentice-Hall.

Kolb, A. Y., & Kolb, D. A. (2005). Learning styles and learning spaces: Enhancing experiential learning in higher education. *Academy of Management Learning & Education, 4*(2), 193–212. https://doi.org/10.5465/AMLE.2005.17268566.

Kravcik, M., Angelova, G., Ceri, S., Cristea, A., Damjanović, V., Devedžić, V., ... Weibelzahl, S. (2005). *Requirements and solutions for personalized adaptive learning*. hal-00590961. Retrieved from https://hal.archives-ouvertes.fr/hal-00590961/document

Laudan, L. (1978). *Progress and its problems: Towards a theory of scientific growth*. Oakland: CA University of California Press.

Lave, J. (1988). *Cognition in practice: Mind, mathematics, and culture in everyday life*. Cambridge: Cambridge University Press.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge: Cambridge University Press.

Lewin, K. (1952). *Field theory in social science: Selected theoretical papers*. London: Tavistock.

Liu, Z., Martín-Martín, R., Xia, F., Wu, J., & Li, F. (2022). *behaviour in habitat 2.0: Simulator-independent logical task description for benchmarking embodied AI agents*. arXiv:2206.06489v1 [cs.AI] 13 Jun 2022. https://doi.org/10.48550/arXiv.2206.06489

Mercier, H., & Sperber, D. (2011). Why do humans reason? Arguments for an argumentative theory. *behavioural and Brain Sciences, 34*(2), 57–111. https://doi.org/10.1017/S0140525X10000968.

Moore, M. G. (1989). Editorial: Three types of interaction. *American Journal of Distance Education, 3*(2), 1–7. https://doi.org/10.1080/08923648909526659.

Moore, M., & Kearsley, G. (1996). *Distance education: A systems review*. Belmont: Wadsworth Publishing Company.

Noble, D. F. (1998). Digital diploma mills: The automation of higher education. *Science as Culture, 7*(3), 355–368. https://doi.org/10.1080/09505439809526510.

Nunberg, G. (1978). *The pragmatics of reference*. Bloomington: Indiana University Linguistics Club.

Papert, S. (1980). *Mindstorms: Children, computers, and powerful ideas*. New York: Basic Books.

Pesonen, R. (2022). *Argumentation, cognition, and the epistemic benefits of cognitive diversity*. Retrieved from http://philsci-archive.pitt.edu/20819/1/RP-Argumentation2022ps.pdf

Picciano, A. G. (2017). Theories and frameworks for online education: Seeking an integrated model. *Online Learning, 21*(3), 166–190. https://doi.org/10.24059/olj.v21i3.1225.

Postman, N. (1992). *Technopoly: The surrender of culture to technology*. New York: Knopf.

Putnam, R. D. (2000). *Bowling alone: The collapse and revival of American community*. Touchstone Books/Simon & Schuster. https://doi.org/10.1145/358916.361990.

Rocha, L. M. (1998). Selected self-organization and the semiotics of evolutionary systems. In S. Salthe, G. Van de Vijver, & M. Delpos (Eds.), *Evolutionary systems: The biological and epistemological perspectives on selection and self- organization* (pp. 341–358). Kluwer Academic Publishers. Retrieved from https://web.archive.org/web/20040816073412/http://informatics.indiana.edu/rocha/ises.html.

Ryle, G. (1949). *The concept of mind*. London/New York: Hutchinson's University Library.

Sayer, A. (2010). Reductionism in social science. In R. Lee (Ed.), *Questioning nineteenth-century assumptions about knowledge: II reductionism* (pp. 5–39). New York: SUNY Press.

Selwyn, N. (2012). Ten suggestions for improving academic research in education and technology. *Learning, Media and Technology, 37*(3), 213–219. https://doi.org/10.1080/17439884.2012.680213.

Shapiro, L., & Stolz, S. A. (2019). Embodied cognition and its significance for education. *Theory and Research in Education, 17*(1), 19–39. https://doi.org/10.1177/1477878518822149.

Shirky, C. (2008). *Here comes everybody: The power of organizing without organizations*. Penguin.

Siemens, G. (2005). Connectivism: A learning theory for a digital age. *International Journal of Instructional Technology and Distance Learning, 2*(1). Retrieved from http://www.itdl.org/Journal/Jan_05/article01.htm.

Skinner, B. F. (1958). Teaching machines. *Science, New Series., 128-3330*, 969–977. Retrieved from https://app.nova.edu/toolbox/instructionalproducts/edd8124/fall11/1958-Skinner-TeachingMachines.pdf.

Sullivan, J. V. (2018). Learning and embodied cognition: A review and proposal. *Psychology Learning & Teaching, 17*(2), 128–143. https://doi.org/10.1177/1475725717752550.

Turkle, S. (2011). *Alone together: Why we expect more from technology and less from each other*. Basic Books. Retrieved from https://www.basicbooks.com/titles/sherry-turkle/alone-together/9780465093656/

Valamis. (2022). *Learning experience platform*. Webnsite. Retrieved from https://www.valamis.com/hub/learning-experience-platform

van Fraassen, B. (1980). *The scientific image*. Oxford: Oxford University Press.

Varela, F. J., Evan Thompson & Eleanor Rosch. (1991). *The Embodied Mind: Cognitive Science and Human Experience*. MIT Press.

Ward, D., Silverman, D., & Villalobos, M. (2017). Introduction: The varieties of enactivism. *Topoi, 36*, 365–375. https://doi.org/10.1007/s11245-017-9484-6.

Watters, A. (2015, February 19). *Skinner's Box. Hack Education*. Retrieved from https://hackeducation.com/2015/02/10/skinners-box

Watters, A. (2021). *Teaching machines: The history of personalized learning*. Cambridge: MIT Press.

Watts, D. J. (2003). *Six degrees: The science of a connected age*. New York: Norton.

Whitten, A. (2022, June 24). *By exploring virtual worlds, AI learns in new ways*. Quanta Magazine. Retrieved from https://www.quantamagazine.org/ai-makes-strides-in-virtual-worlds-more-like-our-own-20220624/

Wilson, S., Liber, O., Johnson, M., Beauvoir, P., Sharples, P., & Milligan, C. (2007). Personal learning environments: Challenging the dominant design of educational systems. *Journal of E-Learning and Knowledge Society, 32*(2), 27–38. Retrieved from https://www.learntechlib.org/p/43419/.

Pedagogical Paradigms in Open and Distance Education

10

Jon Dron and Terry Anderson

Contents

Abstract

Building on earlier work that identified historical paradigm shifts in open and distance learning, this chapter is concerned with analyzing the three broad pedagogical paradigms – objectivist, subjectivist, and complexivist – that have characterized learning and teaching in the field over the past half century. It goes on to discuss new paradigms that are starting to emerge, most notably in "theory-free" models enabled by developments in artificial intelligence and analytics,

J. Dron (✉)
Faculty of Science & Technology, Athabasca University, Athabasca, AB, Canada
e-mail: jond@athabascau.ca

T. Anderson
Athabasca University, Edmonton, AB, Canada

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_9

hologogic methods that recognize the many cultures to which we belong, and a "bricolagogic," theory-agnostic paradigm that reflects the field's growing maturity and depth.

Keywords

Paradigms · Generations · Pedagogy · Subjectivist · Objectivist · Complexivist · Hologogy · Bricolagogy

Introduction

Successive generations of open and distance learning have often been defined by the most dominant physical technologies of the era (e.g., Garrison, 1985; Moore & Kearsley, 2005; Taylor, 1995). Such technologies provide the most obvious contrasts between distance and in-person learning, and there is no doubt that the inventions on which they have relied have played a dominant enabling – though not determining – role in supporting different ways of teaching and learning. Heydenrych and Prinsloo (2010) question this technology-first perspective, instead calling for a multidimensional view that considers communication, pedagogy, and context on at least equal footing. This chapter represents an answer to that call, building on our previously published work over the past decade (e.g., Anderson & Dron, 2011; Dron & Anderson, 2014) in which we have presented an evolving generational model of our own that considers broad trends in *pedagogical* paradigms that have evolved alongside and, often, in tandem with these changing tools. By examining how pedagogical approaches have developed in a complex dance with tools and systems that enable them, we seek to highlight how distance learning pedagogies owe their origins to in-person learning, how this has impacted their development, and how the pedagogical pathways of open and distance learning have increasingly diverged from their in-person ancestors.

Why Do Physical Technologies Not Seem to Matter for In-Person Learning?

Distance learning relies upon and is enabled by tools – books, postal services, radio, TV, networked computers, etc. – so it is unsurprising that many authors have defined each era of its history through its dominant tools. In-person teaching, though, is at least as dependent on distinctive and ever-evolving technologies as distance learning, from classrooms to electronic whiteboards, yet we do not normally view its history in terms of its dominant tools, even when (such as through the invention of blackboards or textbooks) those tools have been quite transformational. In part this might be because, as Alan Kay quipped, "'technology' is anything invented after you were born" (as cited in Brand, 2008, loc. 189), so we simply fail to see them as technologies. It might be due to a slower rate of change in the dominant motifs of in-person educational systems. *Some* physical teaching spaces have persisted in largely unaltered form for thousands of years, as have *some* of the teaching methods used within them. However, though some dominant motifs – like classes, lectures, curricula, timetables, and so on – have long persisted, there have been massive upheavals in both process and tools, so that can only be part of the story. In part it might be that the diversity and range of technologies used for in-person teaching mean that few are perceived as being particularly dominant, albeit that classrooms, blackboards, and textbooks, for instance, clearly *have* dominated over lengthy periods.

We suspect that the biggest reason for the relative insignificance of tools in defining generations of in-person learning might be that, beyond language, writing, and drawing, very few of its physical technologies are essential. For learning in a classroom, you could often take away almost anything apart from a teacher and students, including the classroom itself, and it would still be recognizably the same thing. Without the media and tools that enable distance teaching, it would not occur at all.

From a naïve perspective, new technologies of in-person learning are typically introduced into an already well-established system rather than changing the system itself. The tools are usually incrementally better ways of addressing the same problems, and their significance is usually limited because they seldom change structural components of the overall system. This helps to entrench a widespread belief that pedagogy must come first (e.g., Chumley-Jones, Dobbie, & Alford, 2002; Nation & Evans, 2000; Wilkinson, Forbes, Bloomfield, & Fincham Gee, 2004).

Generation 0

While *pedagogy* (in the sense of being the art and science of teaching) underpins all our teaching interventions and is the *purpose* of what we do, *pedagogies* (by which we mean methods of teaching or instructional methods) *never* come first. There are countless other technologies (from curricula to timetables to classroom architecture) that impose limits and create problems that pedagogies must solve. Most of these are prior to pedagogical methods and provide a foundation upon which pedagogies are utterly dependent. Novel technologies can, in solving such problems, create new ones of their own, so the system evolves. As Postman (2011) put it, all technologies are a Faustian bargain, where each problem solved results in new problems caused by the solution. For example, the introduction of blackboards in the nineteenth century changed how teachers could teach. They could draw, provide shared notes, provide structure and emphasis to lectures and discussions, capture student ideas, and so on, in ways that were difficult, expensive, or impossible before. However, blackboards also created many new problems, from diverting the teachers' gaze from the class to issues of teacher competence in drawing and writing, to required changes in pacing, to concerns for students with reading disabilities. Blackboards thus often required teachers to invent counter-technologies (Dubos, 1969) to deal with them. It is possible to see similar patterns in every teaching innovation, including familiar inventions like lectures, classrooms, courses, faculties, and universities. Pedagogical methods evolve in a specific context in which they solve new problems and take advantage of new opportunities.

The Problems that In-Person Learning Has to Solve

Perhaps the most fundamental problem that an in-person pedagogy has to solve is motivation. In-person teaching (at least in its paradigmatic lecture form) must grapple with the fact that few students will want to be there all of the time, and it is really difficult to sustain everyone's interest when they do attend. Self-determination theory posits that, for intrinsic motivation to occur, support must occur for autonomy (students must feel in control), competence (students must feel capable of overcoming meaningful challenge), and relatedness (students must feel that there is social value and meaning in the activity) (Ryan & Deci, 2017). In-person teaching easily supports relatedness. However, especially in its raw full-frontal lecture form (that originally solved problems of the scarcity of books and reading skills), it is inevitable that some will feel insufficiently challenged (bored) and some will feel over-challenged (confused). Students will not experience autonomy because the nature of classroom activity means that the teacher must be in control of every second. Some of the most common solutions to these problems just make them worse. Notably, the use of extrinsic rewards and punishments such as grades and gold stars, though achieving some kind of motivation (in the sense of encouraging students to comply with teachers' demands), reliably and persistently inhibits intrinsic motivation (Deci, 1972; Gneezy & Rustichini, 2000; Kohn, 1999). Most of what we nowadays recognize as good pedagogy aims to at least partially address the lack of autonomy and inappropriate level of challenge of the in-person context. Problem-based, discussion-based, project-based, and similar individualized/group approaches, for instance, allow greater student control, including more control over the pace and level of challenge. Textbooks allow greater freedom to study at a pace more suited to the learner. Lecturers who enthuse, who ask questions that intrigue students, who seek to know their students so that they can make connections with their interests, and so on are dealing with these issues, as are those who take advantage of the inherent social nature of the situation by encouraging discussion or just by remembering every student's name. Though some of our pedagogies are appropriate to all learners, regardless of their motivation, many of those that characterize classroom teaching are inventions and techniques that solve problems created by classroom teaching.

The Problems that Distance Learning Has to Solve

Evolution in the field of distance learning has occurred, at least in part, due to the affordances and constraints of new technologies. These have, in ways that have seldom been so profound for in-person learning, repeatedly changed the sorts of problems that distance pedagogies must solve. From a motivation perspective, these are (in principle) largely the inverse of those faced by in-person learners. With few exceptions, distance learners almost always have more autonomy because a teacher is not determining what happens every moment. Students are also far better able to control the level of challenge, because they can reread, rewind, or seek alternative sources for their learning. Relatedness, however, tends to be harder to support because all communication must normally be intentional, focused, and mediated through further technologies, often with limitations on cues such as voice intonation, body language, and touch.

However, the discipline of distance education has grown up in the context of its ancestor, in-person learning, and must often coexist and interoperate with it. Often, teachers who have learned to solve problems in in-person learning bring their expertise – and their assumptions – to the distance context. The same is often true of distance education students, who have nearly all grown up with in-person learning and the problems that it has to solve, which leads to expectations that distance institutions and teachers are expected to meet. Unfortunately, this means that distance learning has inherited many of the problems of its forebear, including assumptions about teacher control and the need to extrinsically motivate students, mainly through examinations, grades, and credentials, with all the damage to intrinsic motivation that this entails. Only recently has this begun to shift. With this in mind, we move on to describe how distance education has evolved over the past 50–60 years.

The Three Generations of Distance Learning Pedagogical Paradigms: Objectivist, Subjectivist, and Complexivist

In our previous work (Anderson & Dron, 2011), we described the evolution of pedagogies in distance education as falling into three fairly distinct generations – the behaviorist/cognitivist, the social constructivist, and the connectivist – each of which was codetermined not just by developments in pedagogical knowledge but by changes in the affordances and constraints of the information and communication technologies that emerged during each period, as well as other systemic factors. No generation replaced any that preceded it, and all survive to this day. We also speculated about what form the next generation might take, predicting that it might be more holistic, incorporating elements of them all. In this section we will return to this model, presenting a revised and refined version that takes into account developments – including in our own understanding – that have occurred since our original work.

The names for the generations that we originally chose were clumsy and overspecific. The behaviorist/cognitivist generation also included instructivist approaches informed by neither behaviorism nor cognitivist models, the social-constructivist generation included much that was either not very social or not particularly constructivist in its underpinnings, while the connectivist generation emerged nearly two decades before the advent of the named theory of Connectivism and included many models and theories that at least one of Connectivism's creators has explicitly disowned. It is also easy to confuse connectivism, the paradigm, with Connectivism, the theory. On reflection, we now prefer to refer to them as the *objectivist*, the *subjectivist*, and the *complexivist* generations, which more concisely characterize the central differences between them, as explained in more detail below. However, they still denote the same basic concepts.

Objectivism: A Paradigm of Teaching

The objectivist paradigm, as the name implies, involves pedagogies that assume both that there is an objective reality to learn about and that there are clearly defined objectives to be achieved. There are two broad psychological models underpinning this paradigm. The first (behaviorist) focuses on ways to bring about terminal behaviors. The second (cognitivist) focuses on the ways that people are believed to learn, in terms of internal cognitive processes. There are many theories and resultant practices of learning and teaching in both approaches. Both behaviorist and cognitivist models have a clear focus on *teaching*, trying to identify and predict the ways that teachers may most effectively bring about learning of the desired skills or knowledge, and both therefore focus mainly on instruction (and, hence, are often referred to as instructivist approaches), although the principles they entail – such as spaced learning (Fields, 2005), direct instruction (Stockard, Wood, Coughlin, & Rasplica Khoury, 2018), or media mixing theories (e.g., Clark & Mayer, 2011) – may also be of value when learning is self-guided. Before widespread availability of affordable two-way or multi-way communication technologies, an objectivist approach was the main pedagogical paradigm available to distance educators. Telephones, two-way radio, occasional meetings at learning centers, fax machines, and other alternatives have been available for decades, and letters have been an option for many centuries. However, all had limitations in cost, speed, reliability, or range that made their widespread or ubiquitous use problematic. By far the shortest path for the bulk of the learning process itself was, for the teacher, to provide instructions on how to learn and, for the learner, to follow those instructions independently. At least, that was the paradigm. In reality, learners rarely followed such instructions to the letter (Haughey & Muirhead, 2005). Additional pedagogies used by the learners themselves in their homes or offices were seldom observed, because they could not be observed.

The objectivist paradigm evolved over the course of a century or so, starting with newspaper instruction lacking much theoretical basis at all. However, it was only in the 1960s that pedagogical theory and practice began to emerge into the mainstream that was distinct from its in-person cousins. By far the most significant developments in this era were in the systematization of the pedagogical and organizational processes employed, much of it stemming from the work of Charles Wedemeyer (Diehl, 2012), whose analysis of the components of the teaching process enabled it to be reinvented in a form that could be orchestrated with available technologies to produce measurable outcomes that closely resembled those of in-person teaching.

The field advanced through the work of Otto Peters (Peters & Keegan, 1994) who developed and promoted an industrial model of education, in which different teaching roles were assigned to different team members (editors, subject matter experts, media production staff, artists, and so on) to create carefully crafted content, combined with a process model that typically involved interaction with tutors who supported these courses to provide personal support akin to that of a conventional teacher. This industrial model was extremely scalable and provided the foundations needed for the formation of most open universities, such as the Open University in the UK, Athabasca University in Canada, Indira Gandhi National Open University in India, and many others in Turkey, China, and elsewhere. These new distance universities often enrolled vast numbers of students. Currently, IGNOU, Anadolu, and the Open University of China each enroll over a million students a year, but even smaller institutions see the benefit of scale. It is significant that not only were these distance universities but they were also open, meaning that many of their students lacked formal qualifications or experience, unlike the highly selective models of the vast majority of conventional universities. Again, this was heavily influenced by technological factors. On the one hand, in-person universities suffer from problems of finite space and location dependence that inherently limits their enrollment capacity, so selective filtering is as much a necessity as an aspiration. On the other hand, traditional in-person universities that demand attendance are simply not an option for many nonconventional learners with jobs, families, or physical constraints on attendance. Though completion rates were (and often remain) lower than their in-person cousins, the fact that the unfiltered students of open universities achieve similar if not greater measured learning outcomes to those of highly selective in-person institutions suggests that the methods work. At least part of the reason for this might be that the freedoms – especially in autonomy and competence – that they offer make it possible for students with far more diverse abilities and experience to thrive, without the need to remain in lockstep with other students, utilizing their own learning skills, without being hampered by sometimes poor or controlling teachers.

Subjectivism: A Paradigm of Learning

As the name implies, the focus of the subjectivist paradigm is the subject: the learner. Subjectivist theories acknowledge that learning is a subjective process in which knowledge is constructed in the context of existing knowledge. There are two main models in this paradigm, the cognitive constructivist and the social constructivist. The cognitive constructivist model, epitomized in the work of Piaget (1970)*, focuses on how knowledge is constructed by individuals. The more influential social constructivist model, which builds on the work of* Dewey (1938) *and* Vygotsky (1978)*, sees construction of knowledge as both an individual and a shared process, in which not only is individual knowledge constructed with, for, and through others, but knowledge itself is perceived as a social and situated phenomenon. The focus of subjectivist models is on how we know and how we come to know: these are not* *theories of teaching, as such, but of learning. They do not dictate any particular method, though they do imply that some approaches – especially those that involve social interaction, open-ended tasks, and active engagement – will be more promising than the typically instructivist approaches of objectivist models.*

Subjectivist approaches to teaching gained support in traditional education throughout the twentieth century, but the limited opportunities for learner-teacher or (especially) learner-learner interaction that could be supported through communications tools of the time made it difficult to implement for distance learners. Some – such as the School of the Air in Australia – managed something like it through the distribution of two-way radio sets to learners. Others – such as many of the open universities – relied on sporadic in-person get-togethers to support such needs. The costs, however, were high, and thus such models also relied heavily on print publication, recorded TV lectures, or similar one-to-many tools to provide much of the content and process, so they began as hybrid pedagogies that concatenated objectivist and subjectivist models at different times.

The advent of the Internet and, especially, the World Wide Web brought subjectivist approaches into the mainstream. Suddenly it became possible to learn at a distance with others, in ways that closely resembled those of in-person institutions, at low cost, with broad and often global reach. Due to network speeds and costs of connection, real-time teaching using audio and/or video tools and that closely replicated in-person classroom teaching remained on the fringes for a long time, allowing a distinctive set of pedagogies to be invented to address the asynchronous context. A wide range of research-backed theories and models emerged from this, such as communities of inquiry (Garrison & Anderson, 2003), transactional distance (Moore, 1993), and curated or shared web explorations (Furuta, 2000). It is notable, however, that this paradigm emerged from and into a traditional teaching context in which distance institutions had to replicate many of the central features of in-person learning that, it will be recalled, emerged in response to the limitations of physics and organization in a physical world. Though subjectivist pedagogies acknowledge that every learner will learn something different, and in different ways, their context of application remains firmly rooted in the institutional paradigms of mediaeval universities. Subjectivism focuses on collaborative processes to support shared but largely teacher-led goals, and though its emblematic view of the teacher is that of a "guide on the side" rather than a "sage on a stage," the role of the teacher is as leader of a named group of students, who retains control, who assesses student learning, and who establishes and enforces group norms and rules.

Complexivism: A Paradigm of Knowledge

The complexivist paradigm goes further than the social constructivist paradigm in seeing knowledge as non-negotiably distributed, situated, complex, and emergent. Learning must, by necessity, inherit the same characteristics, and the knowledge that results does reside not only in the heads of students but also in the networks of both individuals and the physical or conceptual artifacts they create. Complexivist theories posit that individual knowledge cannot be neatly separated from the knowledge of others and that our minds are not just phenomena emerging in the brains but are extended and instantiated in the world around us; that learning is an inherently complex, unrepeatable phenomenon, always including emergent as well as planned consequences; that learners must be active agents, in control of their own learning; and that connections between what we learn matter as much as or more than what they connect. The term "complexivist" was coined in an educational context by Davis and Sumara (2006) as a means to describe a sensibility towards the world informed by complexity theories and models, through which "the named learner can be considered simultaneously a coherent unity, a complex of interacting unities, or a part of a grander unity" (p. 14), though the educational use of theories and ideas drawn from complexity science went back a decade or two before (e.g., Brown, Collins, & Duguid, 1989; Pea, 1993; Wenger, 1998). However, the archetypal complexivist model is Connectivism, building on the work of Siemens (2005) and Downes (2008), which drew mainly from network theories and models extending from social network theory to connectionism. Complexivist models are concerned with how knowledge emerges in individuals and populations, so seldom dictate ways to teach though, again, some methods, such as open sharing of the process and products of learning, are strongly implied, and many methods are frowned upon as imposing too much structure and order on a complex system. That said, any kind of learning event can be treated as part of the complex whole, including formal lectures and discussions within a course-bound community of inquiry, and most contain within them much that is complex, unpredictable, and emergent. However, while instructivist and subjectivist accounts normally treat these events as the sum total of the instantiation of the pedagogy, complexivists recognize them as only one complex component in a far more complex ecosystem of learning.

Complexivist pedagogies are digitally native, for two main reasons. The first is the enormous scale yet relatively low cost of information and connections to others that is enabled by the Internet, especially in supporting one person sharing with many. The second is that interactions and outputs of learning are reified persistently, allowing learners to participate in the learning of others for years or even decades after the initial interactions occurred. This speaks to the "complex" part of the name because, through such reified interactions, the environment for learning itself is constantly transformed. Unlike the earlier subjectivist and objectivist models, complexivist approaches are not rooted in the classroom, albeit that a complexivist view of classroom learning can have value (Davis & Sumara, 2006). From a complexivist viewpoint, teachers may play important roles in the network, especially as role models and sources of wisdom, but they are not so much guides on the side nor sages on stages as they are co-travellers, part of a complex matrix of interacting agents who learn together, in a broader networked context that extends far beyond that of a defined, goal-focused group.

Among the most notable benefits of complexivist models of learning come from the fact that, far more than subjectivist models, they solve the problems of learning that in-person pedagogies sought to address, *without* the problems caused by a reliance on the physical infrastructure that in-person pedagogies had to solve. Online learners do not have to follow the same pace as others, keep the same time, or follow the same paths, and they do not have to relocate in order to learn. Meanwhile, they benefit from many of the advantages of social interaction that classrooms support, as well as new affordances enabled by the vast numbers of people with whom they might interact, at any time of day, in any place, with any degree of personal involvement that suits them, at times and places far beyond the classroom. In previous work, building on Paulsen's (1993) theory of cooperative freedoms, the authors (Dron & Anderson, 2014) identified ten distinctive realms of freedom that may be potentially available to online learners that are, without complex and demanding pedagogical processes, rarely available to their in-person counterparts:

- Place – where learning happens
- Content – what you learn and where you learn it from
- Pace – how fast you learn it
- Method – the pedagogies you use and how you are assessed
- Relationship – who with and how you relate to others
- Technology – what tools you use
- Medium – what form media take
- Time – when you learn
- Delegation – who dictates what happens next
- Disclosure – what you reveal to whom

Unlike previous generations, complexivist models natively extend beyond formal learning and intentional training, seamlessly blending into our living and working lives. From Google Search to LinkedIn, from MOOCs to Wikipedia, an increasing amount of our knowledge is enabled by and embedded in the digital environment around us, and we are not just consumers but producers of it, from simple chats in social media to full-blown blogging sites and shared videos. The inevitable increase in complexity of technologies and culture that drives us into an ever-expanding adjacent possible requires us to learn continuously throughout our lives – what Barnett (2011) calls "life-wide learning." Digital tools and systems are both means and co-participants in this. Increasingly we learn just in time because the skills we need would have become redundant by the time we had taken a traditional program of study, and our tools play an ever greater role in our cognition, supporting, enabling, and storing what we know, often reified and expanded in connections and conversations with others.

Blurred Lines and Overlaps

Although we first presented these as distinct generations, the reality of the lived learning experience is and has always been that all generations coexist in any learning journey of any length or complexity. Though only recently recognized, complexivist learning has always occurred in classrooms and families and especially for distance learners who, at least as much as campus-based students, learn in a social space with others, influenced by many people and many things. Even the most full-frontal behaviorist teaching in a classroom is mitigated by the fact that students live much more of their lives outside it, and complex things can happen within it. Furthermore, none of the generations excludes the possibility of the others. The most free form of complexivist networks still relies on individuals constructing knowledge in a social context and on content that is intended (and sometimes designed) to support ways of learning informed by cognitivist theories. There are even times when behaviorist methods can be useful in otherwise far less structured ways of learning, from actors learning their lines to children learning to ride bicycles. Each provides a perspective and tools. Though there are overlaps, each sees and treats education as a different problem to solve, taking advantage of available phenomena to achieve that. None provide a definitive solution to all learning problems.

Emerging Paradigms

Beyond these three existing paradigms, new models of open and distance pedagogies are emerging. In this section we discuss three of the more significant of these.

Data-Driven Pedagogy: A Theory-Free Paradigm

Cloud-based learning management systems, MOOCs, and similar tools that farm data from massive numbers of students can use such data in an attempt to understand and often to influence the learning process. Educational data mining and learning analytics systems seek patterns in datasets that provide clues about how students are learning, often relating them to intended learning outcomes (in the objectivist tradition) though sometimes to explore other aspects of behavior, such as social engagement or self-directedness. Often, such as in adaptive systems like Knewton (Wilson & Nichols, 2015), the data are used to provide recommendations about how to learn, based on how others have done so, not (like traditional adaptive hypermedia) based on teacher-specified paths, but on the interactions of countless other learners with the resources and one another. The pedagogical underpinnings of these recommendations are often opaque to even their creators as patterns mined from the crowd come to dictate how and what we learn and who we learn from.

These invisible, “theory-free” pedagogies are not neutral but goal driven: machines are trained to seek specific outputs and patterns, even though the paths to reaching them may be unknown. When those outputs are credentials or grades, they are seated firmly within the objectivist paradigm and to a large extent to the behaviorist end of the spectrum, where what matters is not how learning occurs, but what results are achieved. However, similar tools can be trained to seek more than just teacher-determined learning outcomes. For example, Joksimović et al. (2015) have used learning analytics methods to explore patterns of social capital development in MOOCs, while Gašević, Dawson, Rogers, and Gašević (2016) have used learning analytics to analyze the effects of instructional design on learning behaviors, as well as to mine for student learning strategies (Gašević, Jovanovic, Pardo, & Dawson, 2017).

There are risks that, whether through algorithms or training sets, such systems intentionally or unintentionally embed values and assumptions of their creators and may create filter bubbles (Pariser, 2011) or echo chambers (Dubois & Blank, 2018) that reinforce ineffective pedagogies or falsehoods. The goals of the system are determined by the means of measuring success, and these will, in most cases, fail to recognize what they are not trained to seek: the creative, the tangential, and the expansive outcomes that a human teacher could celebrate. There are therefore risks that systems will lead to "good enough" ways of learning that fail to stretch learners' boundaries. Artificial "intelligence" is often anything but intelligent, because, until artificial generalized intelligence is achieved (which, in the opinion of the authors, may be never), it never can understand what it means to be human, the values, the beliefs, the culture, the motivations, and the meanings that education, in its broad sense, seeks to develop.

Though the field is young and much of it is dominated by the objectivist paradigm, it affords the potential for the development of data-driven pedagogies that have no paradigmatic underpinnings. Much as Google Translate embodies no rules of grammar or syntax, and has no understanding of the meaning of the sentences it translates, yet achieves functional results, so will AI-embodied pedagogical agents teach without understanding or caring how their pedagogies work, measuring success by goals they have been trained to measure, with no knowledge of other effects, the contexts and needs of the learners, nor the value of what they do.

Hologogy: A Cultural Paradigm

The term "hologogy" has been defined to describe ways of learning to be a part of a culture with shared values and practices (Cumbie & Wolverton, 2004), though largely as an extension of the subjectivist paradigm in an in-person setting. At its heart is a networked-individualist (Wellman, 2002) view of humans as individual agents, becoming part of a culture, that Cumbie and Warburton describe as a pedagogical process of identifying, connecting, relating, becoming, and joining as they learn together. To a significant extent, education is concerned with the transmission and development of culture. As education becomes more global and the dominance of Western culture recedes, the networked individualist perspective that underpins subjectivist and complexivist paradigms is being challenged. We belong not just to networks and groups but to *sets* with which we identify (Dron & Anderson, 2014) such as nations, genders, age groups, or adherents to belief systems. We expect to see the development of distance pedagogies that more clearly acknowledge the many tribes and other identity-defining sets to which we belong. Such pedagogies recognize that learning is not just about the person or their immediate network, but the rich, complex, and meaningful ways that we belong to and contribute to multiple interlocking and distributed cultures. Such issues have historically been addressed by the "hidden curriculum" of in-person teaching – for instance, ways that teachers address problems and invite students into the cultures of disciplines – but play out in different (though no less significant) ways at a distance (Anderson, 2001). This is an emerging paradigm with, as yet, relatively little explicit underpinning pedagogical theory about how it may be supported in an open and distance setting.

Bricolagogy: A Theory-Agnostic Paradigm

The wealth of pedagogical paradigms available to us makes it possible to think of learning as a process of bricolage, selecting the most appropriate pedagogical models for our current needs from the many available options. More and more learning is about charting (Littlejohn, Milligan, & Margaryan, 2012) and wayfinding (Siemens, 2012) in a cornucopia of information, competing values, and incompatible world-views where we are members of not one society but millions of fragmented sets, networks, and groups. Pedagogically, the challenge is not one of integrating, constructing, or knowing, but of being able to know what is worth knowing, and how best to learn in the whitewater world of conflicting ideals and opinions. We see the increasing need for critical and reflective approaches to *choosing* pedagogies (by both students and teachers), more than how to learn *using* those pedagogies, as a distinct pedagogical challenge in itself. From this perspective, pedagogical methods and paradigms are just tools among many in a tool chest. There is a need for learning how to choose the right tools and how to assemble and orchestrate them most effectively in different contexts. Though lessons can be drawn from the field of critical pedagogy (Giroux, 2020), complexivist accounts, and the discoveries of the emerging theory-free paradigm, this theory-agnostic approach may become a paradigm in itself. We hereby christen this bricolage-based approach "bricolagogy."

Conclusions

Among the positive outcomes of increasing globalization and connection is increasing recognition that we share a common global environment, that there are different ways of learning, different ways of knowing, and different ways of acknowledging competence. The blends and hybrids that result can make all stronger. The risks of truth denial, though, are great when multiple truths are embraced with equal fervor, regardless of internal validity or consistency, or social or ethical foundation. Much of the time, rather than combining or inspiring one another, the egalitarian nature of the Internet separates and polarizes. This is a better alternative, perhaps, than the non-egalitarian approach that is increasingly seen in different nations, where decisions about what can be seen or how we can participate within a digital environment are often made by totalitarian governments. Both alternatives have consequences that demand the invention of counter-technologies, including pedagogies. No longer (if it ever was) can education be seen solely as the passing of wisdom from one generation to the next, nor as a stabilizing social force that maintains and/or evolves a culture, let alone (as some would have it) as a feeder to business, though powerful forces will conspire to retain these (often competing) roles. Acolytes celebrate the efficiency and effectiveness of large-scale, automated, deeply instructivist learning systems that rely on AI for their effectiveness, and, in fairness, they do bring "education" – in the sense of an opportunity to gain credentials – to many who could only have dreamt of it before. In the process they inculcate the outcomes and values chosen – sometimes unwittingly – by their creators and converge ever closer to an average norm, as data-driven approaches that treat humans as vectors on a graph replace human mentors, guides, and supporters. Chatbots that pretend to be human play an increasing role in the educational process not just as a better form of automated help but as entities that give students a sense of belongingness and being cared for (Eicher, Polepeddi, & Goel, 2018), thus learning values embedded by their creators that represent humanity only in caricature. We learn to be human from the examples and recommendations of machines.

We foresee a fragmented future of increasing diversity, where paradigms rarely blend but instead compete for the ever more valuable attention of those seeking to learn. The powerful *will* succeed: we will see the robot-taught and goal-driven big-data-based variant of the objectivist paradigm become ever more successful, competing more and more with traditional institutions and, often, being embraced by those institutions as essential to a viable future where economic constraints make traditional roles less affordable. Powerful group- and identity-based hologogic learning that stresses affective commitment and belonging, some driven by echo chambers and filter bubbles, will also thrive. Finally, we see the growth of theory-free approaches as inevitable. These pedagogical designs will become the remit of machines that have no intrinsic care for the needs of people and their communities.

Compensating for this arguably dystopian trend, the powerless will become – collectively – more powerful, despite and perhaps in reaction to the dominant players, be they political, commercial, or ideological. We will learn more together, through what we share, and we will learn to share more wisely, more capably, more respectfully, and more openly. It is notable that, despite the very well-reported dominance of a few huge players in social media, independent WordPress sites still constitute more than 40% of all publicly accessible websites (https://w3techs.com/technologies/details/cm-wordpress, accessed June 1, 2021). These sites are all independent but networked, and a fair proportion of those are devoted to learning or teaching, whether formally or not. Just as increasing numbers of people are turning away from algorithmically determined sites and systems of the large corporates, so they will resist the invasion of machines in the educational process. Learners will not be products but producers, valued parts of a human collective that teaches, learning to learn in ever more diverse ways.

We stand at a very diffuse, fuzzily boundaried junction where many pedagogical paths can and will be taken. There is not one dominant pedagogical paradigm emerging in this complex maze, but many.

References

Anderson, T. (2001). The hidden curriculum in distance education an updated view. *Change: The Magazine of Higher Learning, 33*(6), 28–35.

Anderson, T., & Dron, J. (2011). Three generations of distance education pedagogy. *International Review of Research in Open and Distance Learning, 12*(3). http://www.irrodl.org/index.php/irrodl/article/view/890

Barnett, R. (2011). Lifewide education: A new and transformative concept for higher education. In *Learning for a complex world: A lifewide concept of learning, education and personal development* (pp. 22–38). Authorhouse.

Brand, S. (2008). *The clock of the long now: Time and responsibility*. New York: Basic Books.

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher, 18*(1), 32–42.

Chumley-Jones, H. S., Dobbie, A., & Alford, C. L. (2002). Web-based learning: Sound educational method or hype? A review of the evaluation literature. *Academic Medicine, 77*(10), S86–S93.

Clark, R. C., & Mayer, R. E. (2011). *E-learning and the science of instruction: Proven guidelines for consumers and designers of multimedia learning* (3rd ed.). Pfeifer.

Cumbie, S. A., & Wolverton, R. L. (2004). Building communities of scholars through a hologogy for online graduate nursing education: Reconnecting with the wisdom of nursing. *International Journal of Nursing Education Scholarship, 1*, Article14. https://doi.org/10.2202/1548-923x.1031.

Davis, B., & Sumara, D. J. (2006). *Complexity and education: Inquiries into learning, teaching, and research*. Lawrence Erlbaum Associates.

Deci, E. L. (1972). The effects of contingent and noncontingent rewards and controls on intrinsic motivation. *Organizational Behavior and Human Performance, 8*(2), 217–229. https://doi.org/10.1016/0030-5073(72)90047-5.

Dewey, J. (1938). *Experience and education*. Macmillan Press.

Diehl, W. C. (2012). Charles A. Wedemeyer. In *Handbook of distance education* (pp. 38–48). Abingdon: Routledge. https://doi.org/10.4324/9780203803738.ch3.

Downes, S. (2008). Places to go: Connectivism & connective knowledge. *Innovate, 5*(1). http://www.innovateonline.info/pdf/vol5_issue1/Places_to_Go-__Connectivism_&_Connective_Knowledge.pdf

Dron, J., & Anderson, T. (2014). *Teaching crowds: Learning & social media*. AU ePress. http://teachingcrowds.ca

Dubois, E., & Blank, G. (2018). The echo chamber is overstated: The moderating effect of political interest and diverse media. *Information, Communication & Society, 21*(5), 729–745. https://doi.org/10.1080/1369118X.2018.1428656.

Dubos, R. (1969). American Academy of allergy 25th anniversary series: The spaceship earth. *Journal of Allergy, 44*(1), 1–9.

Eicher, B., Polepeddi, L., & Goel, A. (2018). Jill Watson doesn't care if you're pregnant: Grounding AI ethics in empirical studies. In *Proceedings of the 2018 AAAI/ACM conference on AI, ethics, and society* (pp. 88–94).

Fields, R. D. (2005). Making memories stick. *Scientific American, 292*(2), 75–81.

Furuta, R. (2000). Evolution of the Walden's paths authoring tool. In *Proceedings from WebNet 2000*, San Antonio, Texas.

Garrison, D. R. (1985). Three generations of technological innovations in distance education. *Distance Education, 6*(2), 235–241.

Garrison, D. R., & Anderson, T. (2003). *E-learning in the 21st century*. Routledge.

Gašević, D., Dawson, S., Rogers, T., & Gašević, D. (2016). Learning analytics should not promote one size fits all: The effects of instructional conditions in predicting academic success. *The Internet and Higher Education, 28*, 68–84.

Gašević, D., Jovanovic, J., Pardo, A., & Dawson, S. (2017). Detecting learning strategies with analytics: Links with self-reported measures and academic performance. *Journal of Learning Analytics, 4*(2), 113–128.

Giroux, H. A. (2020). *On critical pedagogy*. Bloomsbury Publishing.

Gneezy, U., & Rustichini, A. (2000). A fine is a price. *The Journal of Legal Studies, 29*, 1.

Haughey, M., & Muirhead, B. (2005). Evaluating learning objects for schools. *E-Journal of Instructional Science and Technology, 8*(1). Retrieved from http://eric.ed.gov/ERICWebPortal/contentdelivery/servlet/ERICServlet?accno=EJ850358

Heydenrych, J. F., & Prinsloo, P. (2010). Revisiting the five generations of distance education: *Quo vadis*. *Progressio, 32*(1), 5–26. https://doi.org/10.10520/EJC88840.

Joksimović, S., Dowell, N., Skrypnyk, O., Kovanović, V., Gašević, D., Dawson, S., & Graesser, A. C. (2015). How do you connect? Analysis of social capital accumulation in connectivist MOOCs. In *Proceedings of the fifth international conference on learning analytics and knowledge* (pp. 64–68).

Kohn, A. (1999). *Punished by rewards: The trouble with gold stars, incentive plans, A's, praise, and other bribes* (Kindle ed.). Mariner Books.

Littlejohn, A., Milligan, C., & Margaryan, A. (2012). Charting collective knowledge: Supporting self-regulated learning in the workplace. *Journal of Workplace Learning, 24*, 226.

Moore, M. G. (1993). Theory of transactional distance. In D. Keegan (Ed.), *Theoretical principles of distance education* (pp. 23–38). Routledge.

Moore, M. G., & Kearsley, G. (2005). *Distance education: A systems view* (2nd ed.). Wadsworth.

Nation, D., & Evans, T. D. (2000). *Changing university teaching: Reflections on creating educational technologies*. RoutledgeFalmer.

Pariser, E. (2011). *The filter bubble: What the internet is hiding from you* (Kindle ed.). Penguin.

Paulsen, M. (1993). The hexagon of cooperative freedom: A distance education theory attuned to computer conferencing. *DEOS, 3*(2). Retrieved Dec 2007 from http://www.nettskolen.com/forskning/21/hexagon.html

Pea, R. (1993). Practices of distributed intelligence and designs for education. In G. Saloman (Ed.), *Distributed cognitions: Psychological and educational considerations* (pp. 47–87). Cambridge University Press.

Peters, O., & Keegan, D. (1994). *Otto Peters on distance education: The industrialization of teaching and learning*. Routledge.

Piaget, J. (1970). *Structuralism*. Basic Books.

Postman, N. (2011). *The end of education: Redefining the value of school*. Knopf Doubleday Publishing Group.

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guilford Publications.

Siemens, G. (2005). Connectivism: A learning theory for the digital age. *International Journal of Instructional Technology and Distance Learning, 2*(1). http://www.itdl.org/journal/jan_05/article01.htm

Siemens, G. (2012). *Orientation: Sensemaking and wayfinding in complex distributed online information environments*. University of Aberdeen.

Stockard, J., Wood, T. W., Coughlin, C., & Rasplica Khoury, C. (2018). The effectiveness of direct instruction curricula: A meta-analysis of a half century of research. *Review of Educational Research, 88*(4), 479–507.

Taylor, J. C. (1995). Distance education technologies: The fourth generation. *Australasian Journal of Educational Technology, 11*(2), 1.

Vygotsky, L. S. (1978). *Mind and society: The development of higher psychological processes*. Harvard University Press.

Wellman, B. (2002). Little boxes, glocalization and networked individualism. In M. Tanabe, P. van den Besselaar, & T. Ishida (Eds.), *Digital cities II: Second Kyoto workshop: Revised papers*. Springer. http://homes.chass.utoronto.ca/~wellman/publications/littleboxes/littlebox.PDF

Wenger, E. (1998). *Communities of practice: Learning, meaning and identity*. Cambridge University Press. https://doi.org/10.1017/CBO9780511803932.

Wilkinson, A., Forbes, A., Bloomfield, J., & Fincham Gee, C. (2004). An exploration of four web-based open and flexible learning modules in post-registration nurse education. *International Journal of Nursing Studies, 41*(4), 411–424. http://www.sciencedirect.com/science/article/B6T7T-4BM69FW-1/2/aa094952975f127dbccc8667a0d2db6e

Wilson, K., & Nichols, Z. (2015). *The Knewton platform. A general-purpose adaptive learning infrastructure*. Knewton.

Theories of Motivation and Empowerment in Open, Distance, and Digital Education 11

Empowering Attributes, Contexts, and Experiences

Clarence Ng

Contents

Abstract

Motivation instigates and guides learning in open, distance, and digital education (ODDE). It is indispensable to distance learners' engagement, persistence, and achievement. A lack of motivation is associated with perennial issues such as early dropout and poor performance in ODDE. This chapter provides an introduction to key theoretical perspectives on motivation, including sociocognitive theories, sociocultural theories, and the concept of perezhivanie. Each perspective provides a unique way for understanding and researching motivation in open and distance learning (ODL). Motivation is discussed as personal attributes internal to the distance learner from a sociocognitive perspective. Drawing attention to social processes and contextual influences, sociocultural theories situate motivation in relevant contexts and highlight motivation as a social, interactive, mediated, and evolving construct. The concept of perezhivanie gives prominence to distance learners' learning experiences and subjective meanings they derived

C. Ng (✉)
Institute for Learning Sciences and Teacher Education, Australian Catholic University, Brisbane, QLD, Australia
e-mail: clarence.ng@acu.edu.au

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_10

from personally significant experiences in ODL. This perspective pinpoints motivation that is experiential, reflective, and affect-laden. To advance the goal of empowering distance learners to engage and persist in ODL, these theoretical perspectives are important as they underscore empowerment derived from enabling personal attributes (sociocognitive theories), motivating contexts (socio-cultural theories), and personally significant experiences (perezhivanie).

Keywords

Motivation · Engagement · Learning · Distance learner · Sociocognitive theory · Sociocultural theory · Perezhivanie · Vygotsky

Introduction

Motivation refers to states and processes, internal to the learner or originating from the social realm, that energize, direct, and sustain actions toward a valued goal (Nolen, Horn & Ward, 2015; Pintrich & Schunk, 2002). Motivation is important for open, distance, and digital education (ODDE) because it instigates engagement and promotes learning and achievement (Cho & Heron, 2015; Semenova, 2020; Vayre & Vonthron, 2017). It draws attention to open and distance learning (ODL) as goal-directed activities and offers answers to questions regarding why and how learners engage in ODL. Motivation is especially important for ODDE because distance learners can easily feel isolated, lonely, and helpless during the protracted journey of learning, despite improved interaction enabled by advanced computing technologies. It is hard to imagine that an unmotivated learner is able to persist and remain committed during the extended process of ODL. Expectedly, the critical role of motivation in ODDE has long been recognized as "a necessary pre-condition for distance education" (Cropley & Kahl, 1983, p. 31).

The purpose of this chapter is to provide an introduction to the key theoretical perspectives on motivation that have informed or have the potential to inform motivation research in ODDE. It is beyond the scope of this chapter to offer a comprehensive review on motivation research and associated theories in ODDE. According to Ng (2019), most of the published studies on motivation in ODDE emerged after 2000. These studies were predominantly conducted using socio-cognitive theories of motivation. Given the importance of this bulk of research, this chapter starts with a discussion of sociocognitive theories of motivation that conceptualize motivation as personal attributes internal to the distance learner. This is followed by a discussion of sociocultural theories that give prominence to social processes and contextual influences affecting motivation in ODDE. Extending this sociocultural discussion, this chapter goes on to argue that research attention is required to examine distance learners' learning experiences in ODDE as an important way to understand their motivation. To this end, the Vygotskian concept of perezhivanie (Vygotsky, 1994) is adopted, which is understood generally as emotional lived experiences (Blunden, 2016). The concept of perezhivanie has the potential to improve our understanding of distance learners' experiential motivation, as it anchors learning experiences in emotionally charged moments or episodes and offers an understanding of distance learners' motivation as dynamic interplays between personal attributes and social influences derived from the ODL context and other relevant social realms (cf., Ng & Renshaw, 2019).

Motivated Learners: Empowering Attributes

Sociocognitive theories define motivation as mental states and processes, such as "attributions, perceptions of competence, values, affects, goals, and social comparisons" (Pintrich & Schunk, 2002, p. 20), which is different from earlier conceptualizations that consider motivation as needs (McClelland, 1963), drives (Hull, 1943), or reinforcement (Skinner, 1971). Motivation, from a sociocognitive perspective, is therefore located in the mind of an individual. Aligning with this individualistic perspective, context is considered as a background variable for understanding personal motivation, and contextual influences are interpreted based on perceptions. Sociocognitive theories differ from each other in relation to targeted mental processes, hence leading to the development of a list of motivational models highlighting facilitating beliefs, goals, values, and strategies that enable learning motivation.

Sociocognitive theories on motivation empower distance learners in several ways. First, sociocognitive theories enable a multifaceted view of motivation, maintaining that learners can be motivated in multiple ways (Ng, 2019). An important research task is to locate and examine different cognitive enablers that facilitate distance learners' motivation and develop effective practices to promote them (Pintrich & Schunk, 2002). Second, sociocognitive theories consider learners as motivated agents capable of managing resources and regulating their actions to produce intended outcomes aligned with their motivation (Bandura, 1997). This position fits in with the conception of self-directed learners widely held among distance educators (Garrison, 2003). Third, while motivation is located in the mind, motivation is not static or fixed and should be considered changeable (Lee, 2015). In other words, distance learners' motivation may vary across context and over time. This theoretical position underscores the importance of developing and verifying ODL designs and practices to support distance learners' malleable motivation.

In what follows, four cognitive enablers, i.e., self-efficacy, achievement goals, intrinsic motivation, and self-regulation, that have attracted much research attention among distance education researchers are described (Ng, 2019). Conceptually, these cognitive enablers highlight motivation as beliefs (self-efficacy), reasons (achievement goals), values (intrinsic motivation), and strategy use (self-regulation).

Self-Efficacy

Self-efficacy is an individual's task-specific beliefs concerning "one's capabilities to organize and execute courses of action required to produce given attainments"

(Bandura, 1997, p. 3). Self-efficacy determines effort expenditure, goal setting, and persistence in facing challenges (Bandura, 1997; Vayre & Vonthron, 2017). It is considered a powerful predictor of learning and achievement (Pajares, 1996). Given its significance to learning, other motivational models, such as those included in the discussion below, have incorporated perceived competence in their formulations. In the context of ODDE, self-efficacy is critical because feeling efficacious is important for dealing with challenging tasks, regulating learning, and maintaining persistence. In relation to online learning, distance learners need to feel efficacious at using the Internet and online technologies and interacting with instructors and classmates (Tsai, Cho, Marra, & Shen, 2020) in order to gain benefits from using advanced technological tools for learning and interacting with others. Otherwise, distance learners may feel anxious which may jeopardize their ongoing participation in online settings. Most importantly, self-efficacy is a strong predictor of distance learners' performance (Puzziferro, 2008). It is also a predictor of a variety of adaptive responses and actions including persistence, engagement, satisfaction, and course completion (Vayre & Vonthron, 2017).

Promoting self-efficacy requires the provision of abundant opportunities for distance learners to experience success. How such opportunities can be designed and offered is undoubtedly a priority research topic in ODDE. To do this well, the issue of conceptual clarity needs research attention, as there are studies (e.g., Tladi, 2017) that have deviated from the task-specific conceptualization of self-efficacy. Further effort is required to examine self-efficacy at a finer grain size in relation to specific tasks central to ODL. For example, completing an assignment in an ODDE course involves a list of specific tasks related to comprehending distance learning materials, interacting with others, and regulating the writing process whereby self-efficacy for each task can be assessed. In the context of online learning, Tsai et al. (2020) provided a research example assessing different dimensions of online self-efficacy, including completing online courses, using online technologies, interacting with the instructor, and interacting with classmates socially and for academic purposes. Furthermore, additional effort is required to examine distance learners' changing beliefs in self-efficacy over time and the factors that have triggered such changes (Lee, 2015).

Achievement Goals

Achievement goals refer to students' perceived goals or reasons for learning and achievement (Dweck, 1986). In the past three decades, achievement goal research has focused predominantly on two categories of goals, i.e., mastery goals and performance goals. Mastery goals orient students to learn for the sake of improvement and comprehension; performance goals, however, orient students to focus on achievement and ability comparison. Achievement goal researchers (e.g., Harackiewicz, Barron, & Elliot, 1998) have elaborated approaching and avoidance orientations of these two categories of goals, resulting in a 2×2 conceptualization comprising mastery-approach, mastery-avoidance, performance-approach, and performance-avoidance goals. Remedios and Richardson (2013) verified this quadruple framework based on a study of British distance learners who rated mastery-approach goals as the most important goal. Convergent evidence supporting the importance of mastery-approach goals for distance learning has been reported in other studies (e.g., Cho & Shen, 2013; Ng, 2017, 2018), confirming that a mastery focus is highly motivating and closely related to self-efficacy beliefs and the use of self-regulatory and learning strategies. Nevertheless, the extent to which performance goals can be beneficial to learning and achievement is a major point of contention in achievement goal research. Accumulated evidence has shown that performance-approach goals bring motivational benefits to learning and achievement, leading to a call for the endorsement of performance-approach goals alongside mastery-approach goals (Harackiewicz et al., 1998). Therein, some studies in ODDE (Ng, 2017, 2018; Remedios & Richardson, 2013) have provided empirical support to the benefits of simultaneous adoption of both mastery- and performance-approach goals in ODL.

Thus far, few researchers have examined how achievement goals operate in online environments such as MOOCs and blended learning courses (see Cho & Shen, 2013). In addition, it is likely that distance learners may learn for reasons other than mastery or performance considerations. For example, personal development and career considerations are important reasons for learning in ODDE (Ng, 2018). It is important to examine these additional reasons and their motivational effects on beliefs, strategy use, and performance following the achievement goal conceptualization. Furthermore, future research should adopt qualitative methods, such as interview, to examine distance learners' reasons or goals for learning, as survey designs, the dominant method in the extant literature, constrain distance learners' responses to predetermined categories in a questionnaire. Given the motivating effects of mastery-approach goals, it is important to explore how a mastery focus can be instigated in ODL designs.

Intrinsic Motivation

Intrinsic motivation refers to engaging in an activity for its inherent values such as advancing one's interest in a topic, while extrinsic motivation refers to external rewards that are separable from the activity itself. In other words, intrinsically motivated learners engage in learning for its own "inherent satisfactions rather than for some separable consequence" (Ryan & Deci, 2000, p.56). In contrast, extrinsically motivated learners are driven by external stimuli, such as high scores and meeting a deadline. Past studies have compared and contrasted differential patterns of learning and engagement between intrinsically and extrinsically motivated learners, affirming the importance of intrinsic motivation to learning (Cerasoli, Nicklin, & Ford, 2014). In the context of ODDE, intrinsic motivation refers to distance learners' interest in enjoyment and valuing of learning tasks and activities offered through ODDE courses. Using a large student sample drawn from different degree programs, Fırat, Kılınç, and Yüzer (2018) found that distance learners' levels of intrinsic motivation were generally high. In terms of the effects of intrinsic motivation, Tang, Xing, and Pei (2018) found that intrinsically motivated learners were more engaged in learning compared to those whose intrinsic motivation was weak. Also, Semenova (2020) found that intrinsically motivated learners were more likely to complete MOOCs and earn a certificate. She attributed these affirmative results to intrinsically motivated learners' positive self-perceptions and their abilities to use strategies successfully to deal with learning challenges. In short, these research examples have provided convergent evidence, verifying the significance of intrinsic motivation to ODL.

Intrinsic motivation may vary with age because, as a learner ages, "the freedom to be intrinsically motivated becomes increasingly curtailed by social demands and roles that require individuals to assume responsibility for nonintrinsically interesting tasks" (Ryan & Deci, 2000, p. 60). This hypothesis of declining intrinsic motivation with age has not yet been tested among distance learners. In addition, the relationship between intrinsic and extrinsic motivation is a contentious topic in the literature. It has been argued that intrinsic motivation can be undermined by external rewards, especially those that are perceived as controlling (Deci, Koestner, & Ryan, 1999). But limited research in ODDE has explored this complex issue. There is, however, some evidence supporting the motivational benefits of extrinsic motivation to ODL. For example, Semenova (2020) showed that an intention to earn a certificate was associated with completion in MOOCs. Further research is required to examine the nature of extrinsic motivation in ODL, taking into account the mediational effect of distance learners' perceptions of external stimuli. In relation to the promotion of intrinsic motivation, recent studies have shown that supportive measures such as responsive tutor feedback (Simons, Leverett, & Beaumont, 2020) and offering of options in assignment (Hanewicz, Platt, & Arendt, 2017) can be effective, suggesting that satisfying distance learners' needs for autonomy and competence may hold the key to promoting intrinsic motivation (Ryan & Deci, 2000).

Self-Regulation

Self-regulation, according to Zimmerman (1989), offers a management perspective on learning that integrates motivation, emotion, and strategy use for attaining desired outcomes. In the literature, self-regulation is not normally taken as a motivation theory on its own. However, if motivation is about *why* and *how* students are instigated during the learning process, self-regulation offers an important account to the "how" question by examining students' use of cognitive and metacognitive strategies in managing the learning process. Importantly, self-regulated learners are motivated, confident, and strategic. They plan and set goals for their studies, monitor progress, and reflect on learning. They often feel positive about learning and know how to manage negative emotions such as boredom (Cho & Heron, 2015). Expectedly, self-regulated learners usually perform better than their counterparts who are weak in managing the learning process (Bernard, Brauer, Abrami, & Surkes, 2004).

Self-regulation is critical for distance learners, as they are expected to exert a high level of control during the process of learning. Conceptually, self-regulation is a natural fit aligning with the widely accepted notion of self-directed or self-independent learning in ODDE (Garrison, 2003). Self-regulated strategies including cognitive, metacognitive, and resource management strategies are important self-regulated abilities expected of distance learners who are required to self-direct their learning. Distance learners who effectively deploy these strategies to regulate their learning are engaged during the ODL process; they tend to have better achievement and are more likely to persist (Stephen, Rockinson-Szapkiw, & Dubay, 2020). Significantly, the review of Lee and Choi (2011) found that a lack of self-regulation was a major reason for distance learners who quit online courses, suggesting that promoting self-regulation is an important avenue to tackle the problem of dropout in MOOCs and other ODDE courses (Alario-Hoyos, Estévez-Ayres, Pérez-Sanagustín, Kloos, & Fernández-Panadero, 2017).

Given the benefits of self-regulation, course designs and the provision of support in ODDE need to develop effective practices to promote self-regulation. Andrade and Bunker (2009) depicted a design model for promoting autonomy and self-regulation in distance learning language courses. However, few have built on or adapted their model to promote distance learners' self-regulation. In relation to online learning, Cho and Cho (2017) verified a self-regulation scale to measure interaction online. This represents a new area of research on self-regulation in ODDE, and more research efforts should be expended on this area, given that online interaction has already become a critical component in ODDE. The work of Park and Yun (2018) draws attention to an under-researched area of self-regulation, i.e., regulating motivation, which is important to distance learners because their motivation may fluctuate during the lengthy period of learning. Finally, interview or qualitative studies on self-regulation in ODDE are rarely found, despite the fact that Zimmerman's pioneer work on self-regulation was built on structured interviews (Zimmerman & Martinez-Pons, 1986).

In summary, sociocognitive theories of motivation offer parsimonious models centering around cognitive enablers for understanding motivation and engagement in ODDE. Empirical studies in ODDE, as discussed above, have examined and confirmed the motivational effects on learning and achievement of four cognitive enablers including self-efficacy, achievement goals, intrinsic motivation, and self-regulation. Thus far, motivation research in ODDE has seldom been conducted using motivational models other than those discussed in this section. Future research should broaden theoretical understanding of distance learners' motivated learning and explore additional cognitive enablers using other influential sociocognitive models, such as expectancy-value model and flow theory. In addition, more research effort is certainly required to examine how verified motivational enablers can be used to inform instructional designs to promote distance learners' motivation and engagement.

Motivating Communities: Empowering Contexts

In this section, sociocultural theories of learning, inspired by the work of Vygotsky, are used to understand motivation and engagement in ODL. Sociocultural theories situate learners, learning, and motivation within cultural and historical contexts. From a sociocultural perspective, the learner and learning context are reciprocally related (Nolen et al., 2015); learners are not subjects independent of the context. Learning, motivation, and engagement are embedded in and constituted by a matrix of relationships and interactive processes that are facilitated by advanced peers and cultural tools in a learning context (Renshaw, 1998). This is different from socio-cognitive models that consider learning and motivation as internal processes or individual phenomena. Based on conventional Vygotskian concepts such as zone of proximal development, assisted learning, and cultural tools, Sivan (1986) was the first to argue that a sociocultural perspective enables an examination of contextual and cultural influences on motivation while addressing intra-psychological functioning and inter-psychological influences. Hence, Sivan's theoretical analysis avoids social reductionistic treatment of motivation and broadens our understanding of the social origin of motivation and how it operates beyond an individualistic orientation.

Several major developments in ODDE have made sociocultural theories highly relevant to researching motivation in ODL. First, advanced Internet and computing technologies have enabled asynchronous and synchronous interaction, highlighting ODL as an interactive learning process (Cho & Cho, 2017). This technological turn situates ODL in a technology-enabled social context and challenges the characterization of distance learners as lone learners working through guided materials in a solitary manner. Second, increased learner diversity has become a feature of ODDE. This is especially the case in MOOCs which enroll distance learners from different countries and cultures who hold different purposes and motivations for learning (Alario-Hoyos et al., 2017). Addressing complex issues of motivation arising from learner diversity requires a theoretical framework that is effective in capturing social and cultural influences on motivation and learning. Third, high dropout rates in MOOCs and other ODDE courses accentuate the importance of motivation (Semenova, 2020). A key question is whether ODL environments are engaging to the extent that distance learners' initial motivation is supported and sustained until completion (Ng, 2019). Considering these developments, sociocultural theories of learning, inspired by the work of Vygotsky, are theoretically important for understanding distance learners' motivation and engagement in evolving contexts beyond what an individualistic framework can offer. Context here is not a static entity; neither can it be reduced to distance learners' perceptions, as conceptualized and measured in studies conducted using a sociocognitive perspective.

Different sociocultural theories of learning and development have been proposed in the past several decades, including, but not limited to, communities of practice (Wenger, 1998), situated learning (Lave & Wenger, 1991), guided participation (Rogoff, 1990), activity theory (Engeström, 1987), and distributed cognition (Salomon, 1997). It is impossible to provide a detailed discussion of each of these theoretical frameworks. Below, how motivation can be understood from these sociocultural models is succinctly explained.

Common to these sociocultural models is a Vygotskian principle of social origin of learning and motivation. Differing from sociocognitive models of motivation discussed in the previous section, these sociocultural models maintain that motivation and engagement originate not from internal processes or beliefs but from external realms, as individuals participate in cultural activities, acquire important cultural tools, collaborate with or are assisted by others, develop a sense of belonging, and build new identities in different communities. Based on Wenger's communities of practice (1998), motivation can be understood as part of a joint enterprise in a community where newcomers acquire shared knowledge and practices through interacting with core members and participating in valued activities. From the perspective of activity theory (Engeström, 1987), motivation is situated in a specific activity system wherein a team of subjects or individuals' tool-mediated actions and interactions toward a shared object and outcome are constrained by a distinct set of norms, rules, and roles shared among members of relevant communities. Rogoff's work on guided participation (1990) highlights motivation derived from collaboration with and guidance offered by carers or advanced peers who help apprentices acquire culturally valued knowledge and skills and understand not only how to use them but also why they are important in complex social settings. Offering a similar focus on collaboration, the work of Salomon (1997) on distributed cognition highlights that cognition is not confined to our head but also located in the social and material worlds wherein collaboration is an important way for improving cognitive performance. Ng (2019) built on this work and proposed the notion of distributed motivation, pointing out that motivation is not confined to individuals' cognitive attributes but also present in different aspects of an ODL activity system. To sum up, based on these sociocultural theories, motivation is social, contextual/situated, mediated, interactive, and evolving. Further discussions on a sociocultural perspective on motivation can be found in recent motivational analyses that have built purposefully on these sociocultural theories (e.g., Nolen et al., 2015).

Researching motivation from a sociocultural perspective is to examine how motivation is socially constructed, emerges through social interaction, and manifests in participation and engagement in a social setting. In short, motivation is context-embedded and cannot be fully understood if it is removed from the context. This also means that the research unit is no longer confined to individuals or their perceptions or cognitions but should involve the person and the context, i.e., a community together with its members. To illustrate, Nolen (2007) provided longitudinal data to show how grade 4 students' motivation to read and write was influenced by social meanings of literacy activities that were co-constructed among collaborating students and teachers in classroom communities. These students' motivation to read and write could not be accurately understood if social influences derived from the classroom communities were not considered.

When it comes to ODL, a sociocultural perspective on motivation draws attention away from distance learners or whether they are motivated. Analytic primacy should focus predominantly on the provision of motivational support through careful instructional designs and delivery of engaging materials and collaborative opportunities. This is empowering, as it shifts the research focus from motivated learners to motivating learning environments (Ng, 2019) and avoids a deficit perspective that places the blame mainly on distance learners when they fall behind or quit prematurely. Though sociocultural studies on motivation in ODL, compared to sociocognitive investigations, remain scarce (Ng, 2019), impactful studies were reported elaborating how community-of-practice designs promote participation (e.g., Cowan & Menchaca,

2014) and how collaboration and peer supports mediate learning and engagement (e.g., Engle, Mankoff, & Carbrey, 2015). As a case in point, Nye (2015) described the development of an online academic community for an arts degree program where lecturers, students, and alumni participated as members. Specific activities and sharings, such as lecturers' and alumni's sharings of their learning experiences, were designed to promote interaction and facilitate students' aspiration for postgraduate research studies. Off-campus students acknowledged that participating in this online portal promoted a sense of belongingness and connection.

However, current sociocultural studies on motivation in ODDE, as illustrated in the examples cited above, share a common weakness in that motivation is not explicitly addressed, monitored, or measured. In this case, arguments concerning how sociocultural designs in ODL promote motivation and improve engagement remain inconclusive. In addition, it should be noted that many ODL studies (e.g., Fung, 2004) that have investigated topics such as interaction and collaboration are not always designed using or aligning with sociocultural theories or models. Therefore, more concerted efforts are required to examine motivation from a sociocultural perspective given the issues of dropout, increased diversity, and the critical importance of deploying technologies as a cultural tool for learning. Following Vygotsky, a sociocultural perspective on motivation and engagement in ODDE should focus on the social nature of motivation and to understand how motivation is initiated, developed, and changed, as distance learners participate and co-participate in different ODL contexts that are socially, culturally, and technologically constructed (cf. Nolen et al., 2015; Walker, 2010). This requires an orchestration of a suite of research methodologies including interview and observation to capture contextual particularities and influences. Research attention should also be given to developing and examining effective sociocultural designs utilizing advanced technologies as a cultural tool to promote motivation, participation, and engagement in ODDE.

Experiencing Motivation-as-Lived: Empowering Experiences

In the previous two sections, motivation is discussed as personal attributes from a sociocognitive perspective and as socially originated and contextually embedded constructs based on sociocultural theories. Extending the sociocultural discussion of motivation, an important theoretical issue is how the social becomes individual, and vice versa. Addressing this issue, Walker (2010) discussed the relationship between the social and individual. Based on Valsiner's notion of inclusive separation (1997), Walker argues that the social and individual are dynamically interdependent. This theoretical argument is important for understanding and researching motivation, as it points to the fact that motivation is not socially determined and should be understood as dialectical relations between the social and individual, which is also an important issue that Vygotsky discussed toward the end of his life using the concept of perezhivanie (i.e., emotional lived experience; Vygotsky, 1994). In this section, the Vygotskian concept of perezhivanie is invoked to explore motivation as an ongoing experiential process whereby motivation is derived from distance learners' lived experiences of ODL and how they make sense of them. This situates motivation in dialectical relations between the person and context (cf. Ng, 2021).

In "The Problem of Environment," Vygotsky (1994) recounted three children's distinct perezhivaniya (plural) in an abusive home environment where each child felt uniquely about this shared problem/context and responded differently due to differences in social roles and cognitive understanding. Vygotsky (1994) used this case to illustrate the generative function of the concept of perezhivanie for understanding child development, stating:

> the emotional experience (perezhivanie) arising from any situation or from any aspect of his [sic] environment determines what kind of influence this situation or this environment will have on the child. Therefore, it is not any of the factors in themselves (if taken without reference to the child) which determines how they will influence the future course of his development, but the same factors refracted through the prism of the child's emotional experience (perezhivanie). (p. 339)

The refractive process, mentioned in the quote above, highlights the importance of locating significant factors and conditions derived from both internal and external sources that one uses to make sense of an event or experience. Hence, perezhivanie represents how an individual "becomes aware of, interprets, [and] emotionally relates to a certain event" (Vygotsky, 1994, p. 341).

Perezhivanie is understood generally as an emotional lived experience in western scholarship (Blunden, 2016). It was Vygotsky's attempt to define a unit of analysis that avoids divisions between person and environment, between thinking and feeling, and between consciousness and action (González Rey, 2011; Roth, 2017; Veresov & Fleer, 2016). Perezhivanie can be understood as a phenomenon and as a theoretical concept (Veresov & Fleer, 2016). As a phenomenon, perezhivaniya are anchored to actual emotionally charged episodes or dramatic events that are lived through and relived (Blunden, 2016). As a concept, perezhivanie involves dialectical relationships between the person and context (Veresov & Fleer, 2016), complex connections between emotion and cognition (Roth, 2017), and a refractive process whereby individuals construct a subjective configuration uniting the internal and external realms (González Rey, 2011). Aligned with a perezhivanie perspective, motivation is derived from distance learners' learning experiences and their refraction of these experiences across time and space. Motivation and engagement can therefore be recast as in-the-moment experience and beyond-the-moment reflection, hence experiential and reflective in nature (see Ng, 2021; Ng & Renshaw, 2019 for research examples elaborating these ideas). This conceptualization offers a way of theorizing motivation and motivated engagement as an ongoing process that is simultaneously sense-making, self-making, and laden with affect (Renshaw & Tooth, 2016). It addresses the conceptual limitation of separating the personal and social realms into independent entities. It also highlights the historical process of motivation and engagement, as learners bring their life experiences to every socially and culturally constructed context they participate as a member (Ng & Renshaw, 2019). Furthermore, perezhivanie acknowledges the critical role of emotions during the motivational process (Roth, 2017).

Research on perezhivanie, though limited, has begun to attract interest among educational researchers working in different areas. In the field of early childhood education, Chen (2022) showed how parents' own perezhivaniya play a significant role in supporting children's emotional regulation. In the field of teacher education, Golombek and Doran (2014) highlighted the pervasiveness of emotional content and its link with novice teachers' perezhivaniya of teaching. In relation to learning and engagement, Ng and Renshaw (2019) used this concept to track the evolvement of and changes in reader identities of an Indigenous Australian student, Lisa, over 3 years. In this study, motivation to read was shaped constantly by Lisa's experiences of reading in school and at home, her feelings and interpretations of these experiences, and the identities that she created or was assigned to her, as she read for different purposes to meet personal needs and others' expectations in different settings. In another study (Ng, 2021), two middle school students' learning intentions and subject choice plans in mathematics were tracked for 3 years. The findings showed that subject choice is not just a decision that is made at a specific point of time but also involves an extended socially constructed process that is interspersed with contradictions, uncertainties, and struggles. Complex connections between emotions and cognitions were involved, as these students engaged in mathematics activities and considered their future in this subject area.

These empirical examples, alongside the theoretical works of Blunden (2016), González Rey (2011), Roth (2017), and Veresov and Fleer (2016), have significant implications for researching motivation in ODDE. First, distance learners' motivation can be understood as experiential in nature. Motivation is derived from distance learners' in-the-moment experiences as they engage in different components of ODL, alone or in collaboration with others in online or offline settings. Motivation can be derived from distance learners' own psychological realm, as well as technological, material, and other external realms in each learning occasion or event. From a perezhivanie perspective, the key is to consider these different elements as a united whole for understanding distance learners' personal learning experiences and their experiential motivation in a specific situation. Importantly, different interpretations and meanings can be imbued from a shared experience by different learners, which may be associated with differential motivation responses. Also, a distance learner may feel differently about a past experience or a similar event and hence be motivated differently, as relevant circumstances and considerations may change over time. Second, distance learners' motivation involves complex connections between emotion, cognition, and action, which, at times, can be inconsistent. For example, a distance learner may persist even though limited motivation can be derived from distance learning materials that are perceived as disengaging. Understanding this learner's perezhivanie provides an important insight on how conflicting emotions and cognitions are interpreted and resolved to inform his or her motivated action to persist. Third, distance learners' experiential motivation involves a refractive process. To understand distance leaners' refraction means to understand how they make sense of their learning experiences in ODL, i.e., learners' subjective understanding of a learning experience. In this context, as Vygotsky argues (1994), it is important to locate the factors and conditions derived from distance learners' personal and social contexts that influence how they interpret their experiences or how these experiences become personally significant or meaningful, hence representing a source of motivation. Locating these constitutional factors in personal and social realms and examining complex interplays between them in relation to a specific learning situation are critical for understanding distance learners' motivation and its origin, changes, and consolidation. In short, from a perezhivanie perspective, distance learners' motivation is not confined solely to personal attributes; neither can it be fully understood by examining exclusively a learning situation or context. Simultaneous assessment of both personal and social realms and their complex transactions distinguishes a perezhivanie perspective for researching motivation from other sociocultural models, such as those discussed in the previous section.

Elaborating the relationship between perezhivanie and identity, Blunden (2016) writes:

> if you were to write a biography of a person, wouldn't you have to connect together the perezhivaniya of their life and demonstrate to the reader who the person was and how they came to be that person – the experiences they had and how they overcame them? And as a writer, you would be unlikely to view the series of life-crises, the experiencing and overcoming of which made the person who they were, to be simply events that happened to the person. (pp. 277–278)

Replacing "a person" in the quote above with "a distance learner" will reveal clearly why perezhivaniya are important for understanding motivation and engagement during the lengthy process of ODL. Inherently, the motivational process in ODL is changeable; distance learners may feel motivated at one time but less so at another time. The concept of perezhivanie facilitates a better understanding of distance learners' evolving motivation (including inconsistencies in motivation) in their lived experiences of learning and refraction across different times and spaces of ODDE. Research attention is required to examine the phenomenon of perezhivanie in ODL with a focus on distance learners' emotionally charged experiences and dramatic events during the protracted journey of distance learning. Crafting such empirical base is critical for unleashing the pedagogical potentials of the generative concept of perezhivanie that Vygotsky turned to shortly before his untimely and premature death that ended his impactful academic life.

Conclusion

ODDE empowers distance learners. A widely accepted aim for ODDE is to offer an alternative pathway or a second chance education for learners who have somehow missed the opportunity in mainstream education. In addition, many ODDE courses, mostly in the higher education sector, aim to provide flexible learning options addressing students' needs and accommodating student diversity. In advancing both aims, how ODL motivates distance learners is critical. If ODL fails to motivate and engage distance learners, it inevitably falls short of its ideal in providing a second chance education empowering the disadvantaged or offering a flexible option addressing learners' needs.

This chapter discusses motivation theories that conceptualize motivation as individualistic (sociocognitive), contextual (sociocultural), and experiential (perezhivanie), underscoring the importance of several key questions about motivation in ODDE: are distance learners motivated? Are distance learning environments motivating? How do distance learners make sense of their ODL experiences? Each of these theoretical perspectives offers a unique way for researching and promoting motivation, highlighting empowering personal attributes, and motivating contexts and personally meaningful experiences, respectively. Put specifically, sociocognitive theories focus on cognitive enablers that motivated distance learners hold and use to propel their learning. These cognitive enablers provide parsimonious models for understanding distance learners' motivation and for informing the development of engaging instructional designs. Nevertheless, the image of a lone learner working through self-guided correspondence materials is no longer a valid characterization of distance learners in ODDE. ODL has become complex due to advanced technologies that enable asynchronous and synchronous interaction, large enrolments, and increased student diversity. Sociocultural theories of motivation enable a better understanding of motivation that is situated and evolving in these complex contexts of ODDE. Importantly, sociocultural theories have the potential to unravel the enablement of a motivating learning context, highlighting the critical role of motivational support. Finally, a perezhivanie perspective pinpoints the importance of examining how ODL is being experienced and what personal meanings are imbued from different ODL experiences during the protracted journey of learning. This new perspective holds the potential to improve our understanding of distance learners' evolving motivation during the extended process of ODL. In short, the key theoretical perspectives discussed in this chapter, i.e., sociocognitive, sociocultural, and perezhivanie perspectives of motivation, are equally important for ODL and for advancing the goal of empowering distance learners through ODDE.

References

Alario-Hoyos, C., Estévez-Ayres, I., Pérez-Sanagustín, M., Kloos, C. D., & Fernández-Panadero, C. (2017). Understanding learners' motivation and learning strategies in MOOCs. *The International Review of Research in Open and Distance Learning, 18*(3), 119–137.

Andrade, M. S., & Bunker, E. L. (2009). A model for self-regulated distance language learning. *Distance Education, 30*(1), 47–61.

Bandura, A. (1997). *Self-efficacy*. New York, NY: Macmillan.

Bernard, R. M., Brauer, A., Abrami, P. C., & Surkes, M. (2004). The development of a questionnaire for predicting online learning achievement. *Distance Education, 25*, 31–47.

Blunden, A. (2016). Translating perezhivanie into English. *Mind, Culture, and Activity, 23*(4), 274–283.

Cerasoli, C. P., Nicklin, J. M., & Ford, M. T. (2014). Intrinsic motivation and extrinsic incentives jointly predict performance: A 40-year meta-analysis. *Psychological Bulletin, 140*(4), 980–1008.

Chen, F. (2022). Co-development of emotion regulation: shifting from self-focused to child-focused perezhivanie in everyday parent-toddler dramatic collisions. *Early Child Development and Care, 192*(3), 370–383.

Cho, M. H., & Cho, Y. (2017). Self-regulation in three types of online interaction: A scale development. *Distance Education, 38*, 70–83.

Cho, M.-H., & Heron, M. L. (2015). Self-regulated learning: The role of motivation, emotion, and use of learning strategies in students' learning experiences in a self-paced online mathematics course. *Distance Education, 36*, 80–99.

Cho, M.-H., & Shen, D. (2013). Self-regulation in online learning. *Distance Education, 34*, 290–230.

Cowan, J. E., & Menchaca, M. P. (2014). Investigating value creation in a community of practice with social network analysis in a hybrid online graduate education program. *Distance Education, 35*(1), 43–74.

Cropley, A. J., & Kahl, T. N. (1983). Distance education and distance learning: Some psychological considerations. *Distance Education, 4*, 27–39.

Deci, E. L., Koestner, R., & Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological Bulletin, 125*(6), 627.

Dweck, C. S. (1986). Motivational processes affecting learning. *American psychologist, 41*(10), 1040–1048.

Engeström, Y. (1987). *Learning by expanding: An activity-theoretical approach to developmental research*. New York, NY: Cambridge University Press.

Engle, D., Mankoff, C., & Carbrey, J. (2015). Coursera's introductory human physiology course: Factors that characterize successful completion of a MOOC. *The International Review of Research in Open and Distance Learning, 16*(2), 46–68.

Fırat, M., Kılınç, H., & Yüzer, T. V. (2018). Level of intrinsic motivation of distance education students in e-learning environments. *Journal of Computer Assisted Learning, 34*(1), 63–70.

Fung, Y. Y. (2004). Collaborative online learning: Interaction patterns and limiting factors. *Open Learning, 19*(2), 135–149.

Garrison, D. R. (2003). Self-directed learning and distance education. In M. G. Moore & W. G. Anderson (Eds.), *Handbook of distance education* (pp. 161–168). Mahwah, NJ: Erlbaum.

Golombek, P., & Doran, M. (2014). Unifying cognition, emotion, and activity in language teacher professional development. *Teaching and Teacher Education, 39*, 102–111.

González Rey, F. (2011). A re-examination of defining moments in Vygotsky's work and their implications for his continuing legacy. *Mind, Culture, and Activity, 18*(3), 257–275.

Hanewicz, C., Platt, A., & Arendt, A. (2017). Creating a learner-centered teaching environment using student choice in assignments. *Distance Education, 38*, 273–287.

Harackiewicz, J. M., Barron, K. E., & Elliot, A. J. (1998). Rethinking achievement goals: When are they adaptive for college students and why? *Educational Psychologist, 33*(1), 1–21.

Hull, C. L. (1943). *Principles of behavior*. New York, NY: Appleton-Century-Crofts.

Lave, J., & Wenger, E. (1991). *Situated learning*. Cambridge, UK: Cambridge University Press.

Lee, C. Y. (2015). Changes in self-efficacy and task value in online learning. *Distance Education, 36*, 59–79.

Lee, Y., & Choi, J. (2011). A review of online course dropout research: Implications for practice and future research. *Educational Technology Research and Development, 59*, 593–618.

McClelland, D. C. (1963). *The achieving societies*. Princeton, NJ: Van Nostrand.

Ng, C. (2017). Distance learners' multiple goals, learning and achievement in different contexts. *Distance Education, 38*(1), 37–58.

Ng, C. (2018). "I learn for a job promotion!": The role of outcome-focused career goals in motivating distance learners to learn. *Distance Education, 39*(3), 390–410.

Ng, C. (2019). Shifting the focus from motivated learners to motivating distributed environments: A review of 40 years of published motivation research in distance education. *Distance Education, 40*(4), 469–496.

Ng, C. (2021). Subject choice and perezhivanie in mathematics: A longitudinal case study. *Educational Studies in Mathematics, 107*, 547–563.

Ng, C., & Renshaw, P. (2019). An indigenous Australian student's perezhivanie in reading and the evolvement of reader identities over three years. *Learning, Culture and Social Interaction, 22*, 100310.

Nolen, S. B. (2007). Young children's motivation to read and write: Development in social contexts. *Cognition and Instruction, 25*(2-3), 219–270.

Nolen, S. B., Horn, I. S., & Ward, C. J. (2015). Situating motivation. *Educational Psychologist, 50*(3), 234–247.

Nye, A. (2015). Building an online academic learning community among undergraduate students. *Distance Education, 36*, 115–128.

Pajares, F. (1996). Self-efficacy beliefs in academic settings. *Review of Educational Research, 66*(4), 543–578.

Park, S., & Yun, H. (2018). The influence of motivational regulation strategies on online students' behavioral, emotional, and cognitive engagement. *American Journal of Distance Education, 32*(1), 43–56.

Pintrich, P. R., & Schunk, D. H. (2002). *Motivation in education*. Upper Saddle River, NJ: Merrill Prentice Hall.

Puzziferro, M. (2008). Online technologies self-efficacy and self-regulated learning as predictors of final grade and satisfaction in college-level online courses. *American Journal of Distance Education, 22*(2), 72–89.

Remedios, R., & Richardson, J. T. (2013). Achievement goals in adult learners: Evidence from distance education. *British Journal of Educational Psychology, 83*(4), 664–685.

Renshaw, P. (1998). Sociocultural pedagogy for new times: Reframing key concepts. *Australian Educational Researcher, 25*(3), 83–100.

Renshaw, P., & Tooth, R. (2016). Perezhivanie mediated through narrative place-responsive pedagogy. In A. Surian (Ed.), *Open spaces for interactions and learning diversities* (pp. 13–23). Rotterdam, The Netherlands: Sense Publishers.

Rogoff, B. (1990). *Apprenticeship in thinking*. New York, NY: Oxford University Press.

Roth, W.-M. (2017). *The mathematics of mathematics*. Rotterdam, The Netherlands: Sense Publishers.

Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology, 25*(1), 54–67.

Salomon, G. (Ed.). (1997). *Distributed cognitions*. Cambridge, UK: Cambridge University Press.

Semenova, T. (2020). The role of learners' motivation in MOOC completion. *Open Learning*, 1–15. https://doi.org/10.1080/01587919.2022.2064823

Simons, J., Leverett, S., & Beaumont, K. (2020). Success of distance learning graduates and the role of intrinsic motivation. *Open Learning, 35*(3), 277–293.

Sivan, E. (1986). Motivation in social constructivist theory. *Educational Psychologist, 21*(3/4), 290–233.

Skinner, B. F. (1971). Operant conditioning. In *Encyclopedia of education* (Vol. 1, pp. 29–33). New York, NY: Macmillan and Free Press.

Stephen, J. S., Rockinson-Szapkiw, A. J., & Dubay, C. (2020). Persistence model of non-traditional online learners: Self-efficacy, self-regulation, and self-direction. *American Journal of Distance Education, 34*(4), 306–321.

Tang, H., Xing, W., & Pei, P. (2018). Exploring the temporal dimension of forum participation in MOOCs. *Distance Education, 39*, 353–372.

Tladi, L. S. (2017). Perceived ability and success: Which self-efficacy measures matter? *A distance learning perspective. Open Learning, 32*(3), 243–261.

Tsai, C. L., Cho, M. H., Marra, R., & Shen, D. (2020). The self-efficacy questionnaire for online learning (SeQoL). *Distance Education, 41*(4), 472–489.

Valsiner, J. (1997). Magical phrases, human development and psychological ontology. In B. D. Cox & C. Lightfoot (Eds.), *Sociogenetic perspectives on internalization* (pp. 237–255). Mahwah, NJ: Erlbaum.
Vayre, E., & Vonthron, A. M. (2017). Psychological engagement of students in distance and online learning: Effects of self-efficacy and psychosocial processes. *Journal of Educational Computing Research, 55*(2), 197–218.
Veresov, N., & Fleer, M. (2016). Perezhivanie as a theoretical concept for researching young children's development. *Mind, Culture, and Activity, 23*(4), 325–335.
Vygotsky, L. S. (1994). The problem of the environment. In R. Van Der Veer & J. Valsiner (Eds.), *The Vygotsky reader* (pp. 338–354). New York, NY: Plenum Press.
Walker, R. A. (2010). Sociocultural issues in motivation. In P. Peterson, E. Baker, & B. McGaw (Eds.), *International encyclopedia of education* (3rd ed., pp. 712–717). Oxford, UK: Elsevier.
Wenger, E. (1998). *Communities of practice*. New York, NY: Cambridge University Press.
Zimmerman, B. J. (1989). A social cognitive view of self-regulated academic learning. *Journal of Educational Psychology, 81*, 329–339.
Zimmerman, B. J., & Martinez-Pons, M. (1986). Development of a structured interview for assessing student use of self-regulated learning strategies. *American Educational Research Journal, 23*(4), 614–628.

Technology Acceptance and Adoption in Education

12

Andrina Granić

Contents

Abstract

The chapter provides a comprehensive and up-to-date insight into main research findings in the area of educational technology acceptance, adoption, and usage. Over the past decades, a variety of theoretical perspectives have been advanced to provide an understanding of the determinants of adoption of various technologies used to support the process of knowledge transfer and acquisition. Although some prominent theoretical approaches in educational contexts include Innovation Diffusion Theory (IDT), Unified Theory of Acceptance and Use of Technology (UTAUT), as well as Motivational Model (MM), research reveals the Technology Acceptance Model (TAM) as the most influential model and leading scientific paradigm in investigating acceptance of educational technology by students, teachers, and other stakeholders. Aiming to increase their predictive validity, in numerous empirical studies, models have been extended with different predictive factors, like the most often validated self-efficacy, subjective norm, perceived enjoyment, perceived playfulness, anxiety, social influence, system quality, and facilitating conditions. Research revealed electronic learning (e-learning) as the

A. Granić (✉)
Faculty of Science, University of Split, Split, Croatia
e-mail: andrina.granic@pmfst.hr

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_11

most common validated mode of delivery, followed by mobile learning (m-learning), learning management system (LMS), personal learning environment (PLE), and massive open online course (MOOC), along with different supportive facilitating technologies used in education such as social media platforms, teaching assistant robots, simulators, as well as virtual reality (VR) and augmented reality (AR) technologies. To enhance explanatory power, new developments in educational technology acceptance and adoption have suggested the need of integration of TAM and UTAUT with other contributing adoption and post-adoption theories and models, together with several established approaches from other fields.

Keywords

Technology acceptance · Technology adoption · Models · Theories · Education · Educational technology

Introduction

More than a half-century of research has resulted in the development of a vast number of adoption theories and technology acceptance models, along with a plethora of their extensions and modifications. To test their applicability and enhance their predictive validity, established theories and models have been widely used to facilitate assessment of diverse information and communication technology (ICT) products and services, including all kinds of technologies, systems, environments, tools, applications, services, and devices. In general, technology adoption is a term that refers to the acceptance, integration, and embracement of new technology. Technology acceptance, as the first step of technology adoption, is an attitude toward technology, and it is influenced by various factors. According to the Innovation Diffusion Theory (IDT) (Rogers, 1962, 1995), adoption is a decision to make full use of technology innovation as the best course of action available. The key to adoption is that the adopter (individual or organization) must perceive the idea, behavior, or product as new or innovative. As for technology adoption research at the individual level, numerous theories and models have been used to predict and explain human behavior toward adoption of various technologies.

An area of great interest in incorporating new technologies is the educational field. Educational settings involve a great variety of potential users of various ICT technologies embraced in the process of learning, teaching, and assessment. Thus, technology acceptance and adoption theories and models are often used to inform research in the context of education. Some of the most influential theoretical approaches involve (listed in chronological order) IDT (Rogers, 1962, 1995), Theory of Planned Behavior (TPB) (Ajzen, 1985, 1991), Decomposed Theory of Planned Behavior (DTPB) (Taylor & Todd, 1995), Technology Acceptance Model (TAM) (Davis, 1986, 1989), Motivational Model (MM) (Davis, Bagozzi, & Warshaw, 1992), and Unified Theory of Acceptance and Use of Technology

(UTAUT) (Venkatesh, Morris, Davis, & Davis, 2003), along with extended UTAUT (UTAUT2) (Venkatesh, Thong, & Xu, 2012).

This chapter offers a comprehensive and up-to-date insight into main research findings in the area of educational technology acceptance and adoption. The chapter is divided into four sections. The second section provides a brief overview of basic concepts of major theories and models used in the educational field, along with some sample contributions. Most important research themes and findings, together with new developments in educational technology acceptance research, are introduced in the third section. The last section offers concluding remarks and further research directions.

Technology Acceptance Theories and Models in Educational Contexts

Over the past decades, a diversity of theoretical perspectives has been put forward to provide an understanding of the determinants of usage and adoption of different technologies to support the process of learning, teaching, and assessment. For example, IDT, proposed by Rogers (1962, 1995), is the oldest and very popular theory of adoption of innovations among individuals and organizations. In this context, "innovation" can be anything that is perceived as new from the perspective of the adopters and may be described by five characteristics: *relative advantage*, *compatibility*, *complexity*, *traceability*, and *observability*. IDT was used, for example, to identify the factors influencing the use of Moodle as a learning management systems (LMS) in the academic context (Pinho, Franco, & Mendes, 2021) and to investigate potential factors influencing students' behavioral intentions to use e-learning systems (Al-Rahmi et al., 2019).

Davis et al. (1992) applied the motivational theory to study information technology adoption and use. MM, based on the psychological aspects of technology acceptance, hypothesizes that the individual's behavior and her/his technology acceptance and usage are influenced by intrinsic and extrinsic motivation. An example of intrinsic motivation is *perceived enjoyment*, while *perceived usefulness*, *perceived ease of use*, and *subjective norm* can be considered as examples of extrinsic motivation. Accordingly, MM was employed to explore intrinsic (*effort expectancy*, *anxiety*, and *attitude toward e-learning*) and extrinsic (*performance expectancy*, *social influence*, and *facilitating conditions*) motivators aiming to explain why employees might accept the e-learning technology in the workplace (Yoo, Han, & Huang, 2012).

DTPB, introduced by Taylor and Todd (1995), suggests that the three predictors of the behavior intention and actual behavior adoption are *attitude*, *subjective norms*, and *perceived behavior control*. This model promotes decomposed belief structures since attitudinal, normative, as well as control beliefs are additionally decomposed into multidimensional belief constructs. DTPB was used, for example, to examine factors that impact the acceptance and usage of e-assessment by academics, specifically attitude (*perceived ease to use*, *perceived usefulness*, and *compatibility*), subjective norm (*peer influence* and *superior influence*), as well as perceived behavioral control factors (*self-efficacy*, *resource-facilitating conditions*, and *information technology support*) (Alruwais, Wills, & Wald, 2017).

Basic concepts of two major technology acceptance models and theories used in educational contexts, namely, UTAUT and TAM, are introduced in this section. To illustrate their broad potential and applicability, some relevant sample research is presented as well.

Technology Acceptance Model (TAM)

Theory of Reasoned Action (TRA)

Originating in the psychology-based Theory of Reasoned Action (TRA), TAM proposed by Davis (1986, 1989) has evolved to become the key model in understanding predictors of human behavior toward potential acceptance or rejection of technology in general and learning technology in particular. Assuming that individuals are usually rational, Fishbein and Ajzen (1975) developed TRA to predict and understand behaviors and attitudes. TRA suggests that a main predictor of *behavior* is an individual's behavioral intention, while an individual's intention is jointly determined by her/his attitude toward performing the behavior (attitude), as well as perceived social influence of people who are important to the individual (subjective norms). *Behavioral intention* has typically been defined as an individual's subjective probability that he/she will perform a specified behavior and *attitude* as an individual's degree of evaluative affect toward the target behavior, while *subjective norm* refers to the person's perception that most people who are important to him/her think he/she should or should not perform the behavior in question (Davis, 1986).

Emergence of TAM

To develop a reliable model which could predict actual use of any technology, Davis adapted TRA since he considered attitudes, rather than behavioral intentions, as the main predictors of behavior. Davis suggested that the user's motivation can be explained by three factors, in particular *perceived ease of use*, *perceived usefulness*, and *attitude toward using*. Thus, TAM specifies two beliefs, perceived usefulness and perceived ease of use, as determinants of attitude toward usage intentions and actual technology usage.

In his doctoral dissertation version of TAM, Davis (1986) hypothesizes that the attitude of a user toward the system (*attitude toward using*) is a major determinant of whether the user will use or reject the system (*actual system use*). The attitude of the user, in turn, is considered to be influenced by two major beliefs, perceived usefulness and perceived ease of use, with the perceived ease of use having a direct influence on the perceived usefulness. *Perceived usefulness* is defined as the degree to which the person believes that using the particular system would enhance her/his job performance, while the *perceived ease of use* is defined as the degree to which the person believes that using the particular system will be free of effort (Davis, 1986). Finally, both beliefs are hypothesized to be directly influenced by the *system design characteristics*.

Modifications and Extensions of TAM

During later stages, TAM was modified and extended to include new factors with significant influence on its two core variables. The strength of TAM and its many different versions that extend/modify the original model by simply adding other constructs (called "TAM++," cf. Benbasat & Barki, 2007) is confirmed by numerous studies emphasizing its broad applicability to various technologies, users, and contexts.

TAM's core variables, perceived ease of use and perceived usefulness, have been proven many times to be sound predictive factors that have affected acceptance of learning with technology as well. The intentions of a user toward using learning technology in a vast majority of research were explained by using or extending the TAM research model with numerous relevant constructs (predictive factors). While, for example, Farahat (2012), along with Chipps, Kerr, Brysiewicz, and Walters (2015), has tested application of the original (core) TAM in educational areas, Yu (2020) extended TAM with *perceived enjoyment* and two psychological constructs, *conformity behavior* and *self-esteem*, in order to test the acceptance of WeChat use in language learning, Lin and Yeh (2019) added *perceived playfulness* as an intrinsic motivator to explore the acceptance of virtual reality (VR) motion control technology for mental rotation learning, while Aburagaga, Agoyi, and Elgedawy (2020) used the extended TAM model to assess the faculty needs for adopting social networks into educational settings (used constructs: *privacy*, *infrastructure*, *institutional support*, and *access devices*).

Prevalence of TAM in Educational Technology Adoption

Overall, research has revealed that TAM is the most widely used powerful and valid model for prediction and explanation of user's behavior toward acceptance and adoption of educational technology (Abdullah & Ward, 2016; Granić & Marangunić, 2019). Empirical evidence for the predictive validity of TAM has been provided in numerous educational technology acceptance studies, with the most recent research addressing *electronic learning* (Prasetyo et al., 2021), *mobile learning* (Lai, 2020), *personal learning environments* (PLEs) (Rejón-Guardia, Polo-Peña, & Maraver-Tarifa, 2020), *virtual reality environments* (VLEs) (Fussell & Truong, 2021), *massive open online courses* (MOOCs) (Al-Adwan, 2020), and *learning management systems* (LMSs) in general (Dampson, 2021), as well as, for example, open-source LMS Moodle (Vanduhe, Nat, & Hasan, 2020) and commercial LMS Blackboard (Ibrahim et al., 2017) in particular.

Furthermore, various acceptance studies have explored TAM's applicability for different supportive facilitating technologies used in education, ranging from *social media platforms* (Al-Rahmi et al., 2021; Yu, 2020) to the technology aimed at helping the learning process through *teaching assistant robots* (Park & Kwon, 2016), *simulators* (Lemay, Morin, Bazelais, & Doleck, 2018), *virtual reality* (Lin & Yeh, 2019), and *augmented reality technologies* (Jang, Ko, Shin, & Han, 2021), among very many others.

Unified Theory of Acceptance and Use of Technology (UTAUT)

Emergence of UTAUT

Venkatesh et al. (2003) revised existing theories and models on acceptances of new technologies and proposed UTAUT by reviewing and integrating eight previously established user acceptance models, i.e., Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975), TAM, MM, TPB, augmented TAM (A-TAM) (Davis, 1986, 1989; Davis, Bagozzi & Warshaw, 1989), Model of Personal Computer Utilization (MPCU) (Thompson, Higgins & Howell, 1991), IDT, and Social Cognitive Theory (SCT) (Bandura, 1986). Three main constructs that directly determine behavioral intention are proposed, namely, *performance expectancy*, *effort expectancy*, and *social influences*. Besides, *behavioral intention* and *facilitating conditions* are foreseen as predictors of actual behavior (usage). Accordingly, the core UTAUT (i.e., the four principal determinants of intention and usage) was used, for example, to explore the factors that influence preservice teachers' acceptance of ICT integration in the classroom (Birch & Irvine, 2009), as well as to evaluate students' e-learning acceptance in a postgraduate program (Mahande & Malago, 2019), and students' usage of e-learning systems in developing countries (Abbad, 2021).

Usually, the original model is extended by simply adding additional constructs. For instance, to examine core factors affecting the university students' attitude toward adoption of online classes during COVID-19 (Tiwari, 2020), the UTAUT model was modified with single construct *perceived cost*. Yet, a majority of studies extended the core model with multiple constructs. For example, in the investigation of university students' behavioral intentions toward using m-learning in higher education, UTAUT was extended by incorporating the constructs of *mobile self-efficacy*, *perceived enjoyment*, *satisfaction*, and *trust* (Chao, 2019). In another study, the UTAUT model was applied to examine the effects of different factors that were identified from the literature on students' acceptance of mobile learning applications in higher education, in particular *perceived information quality*, *perceived compatibility*, *perceived trust*, *perceived awareness*, *availability of resources*, *self-efficacy*, and *perceived security* (Almaiah, Alamri, & Al-Rahmi, 2019).

UTAUT2 as an Extension of UTAUT

Paying particular attention to the consumer use context, Venkatesh et al. (2012) extended the original UTAUT and developed UTAUT2. To formulate UTAUT2, they added three new constructs that directly determine behavioral intention, in particular *hedonic motivation*, *price value*, and *habit*. Also, besides behavioral intention and facilitating conditions, the model also postulated habit as an additional predictor of usage. Extended UTAUT (UTAUT2) was used, for instance, to evaluate acceptance of blended learning in executive student education (Dakduk, Santalla-Banderali, & van der Woude, 2018), as well as to explore preservice teachers' acceptance of learning management software (Raman & Don, 2013). However, the construct price value is excluded in both studies since it has been used only to study consumer behavior in other technological conditions like e-commerce, e-banking, or online payment.

As already mentioned, TAM and UTAUT are the two most prominent theoretical approaches in educational contexts. Comparison of the two models is out of the scope of this chapter, but as concluding remarks of this section, few aspects should be noted. On the one hand, for practical, predictive applications of the model, fewest possible but still effective numbers of constructs/factors could be of great importance (called model's parsimony). Evidently, TAM's parsimony has been proven to be valid and powerful approach to explain technology acceptance. On the other hand, to obtain the most complete understanding of the validated technology, the level of parsimony may be sacrificed (Samaradiwakara & Gunawardena, 2014). It has been shown that UTAUT is rich in explaining behavioral intention and usage of technology. However, despite its good explanatory ability, it has been criticized for having too many independent constructs for predicting intentions and behavior (Bagozzi, 2007).

Major Findings in Educational Technology Acceptance Research

Educational settings involve a wide range of potential users of ICT products and services used to support the process of knowledge transfer and acquisition; thus, technology adoption investigation is often used to inform educational research. Major research themes and findings, along with recent developments in the field of educational technology acceptance and adoption, are given in the following.

Major Research Themes and Findings

Educational Technologies Validated and Users Involved

When it comes to the use of variety of technologies, it can be noted that the majority of acceptance studies in educational areas validated e-learning modes of delivery, referred to as e-learning systems, e-learning platforms, e-learning environments, and e-learning tools or just denoted as e-learning. Many studies also addressed mobile learning in which context mobile computing devices, mobile technology and applications, tablet personal computers, or just m-learning was considered.

Learning management systems (LMSs) in general, along with specific LMSs in particular, such as Blackboard and Moodle were also frequently researched. Besides, various studies in educational contexts counted on support of social media services and platforms at large, for example, WeChat and YouTube in particular. Educational affordances of virtual reality (VR) and augmented reality (AR) are attracting increasing attention; thus, several studies focus on VR, AR, and mixed reality technologies. Examination of technology acceptance work in the educational domain also includes validation of technology for collaborative learning, simulation-based learning environments, massive open online courses (MOOCs), as well as open educational resources (OER).

Regarding the type of users, in a great majority of research, university students were the most commonly chosen sample group (Abdullah & Ward, 2016; Granić &

Marangunić, 2019). Various studies also involved employees from different types of organizations and companies, university teaching staff, as well as teachers from preservice, in-service, and special education.

Most Researched Predictors of Technology Acceptance

The research in educational technology acceptance and adoption has revealed that the great majority of acceptance studies use TAM (cf. Al-Emran & Granić, 2021; Granić & Marangunić, 2019), but an employment of UTAUT model is also well accepted, albeit in a considerably smaller number of studies. Besides, aiming to increase the predictive validity of TAM and UTAUT, the models have usually been extended with different predictive factors. When using UTAUT model, those factors are related to behavioral intention, while when using TAM the majority of factors represent predictors of the two core variables, *perceived ease of use* and *perceived usefulness*, with a small number predicting behavioral intention.

Numerous empirical studies conducted in educational contexts have revealed that *self-efficacy*, i.e., an individual judgment of one's capability to use a specific technology, has a significant impact on the perceived usefulness and perceived ease of use. In addition, as one of the most commonly used predictors, self-efficacy was found to have a direct effect and a positive influence on behavioral intention to use e-learning, m-learning, and computers in educational settings in general.

Other widely researched predictive factors are *subjective norm*, defined as the degree to which an individual believes that people who are important to her/him think she/he should perform the behavior in question, as well as *perceived enjoyment* referring to the extent to which the activity of using a technology is perceived to be enjoyable in its own right. It has been revealed that subjective norm and enjoyment positively influence students' perceived usefulness and perceived ease of use of e-learning systems. Besides, *subjective norm*, as an important construct in providing an understanding of the determinants of usage in educational contexts, is shown to have a strong influence on the behavioral intention to use e-learning systems and platforms. Another predictor dealing with societal aspects which significantly affects learning technology adoption (m-learning) is *social influence*, the degree to which an individual perceives that others believe that he or she should use the new system.

Furthermore, *perceived playfulness* is found to be one of the key drivers for the adoption and use of blended learning as well as computer-assisted training programs. While perceived playfulness, which questions how intrinsic motivation affects an individual's acceptance of technology, has a direct impact on the variables of perceived usefulness and perceived ease of use, *anxiety* as a personal trait explained as evoking anxious or emotional reactions when it comes to performing a behavior negatively affects the two core TAM variables.

System quality and *system accessibility*, along with *facilitating conditions* which originally provide resource factors (such as time and money needed) and technology factors regarding compatibility issues that may constrain usage, are found to be essential factors that affect technology acceptance as well.

New Developments in Educational Technology Adoption

TAM and UTAUT have attracted significant attention in educational technology adoption research. To cover all significant components in determining technology adoption in educational settings, these models have been widely extended, as mentioned earlier, with other factors which have improved their overall predictability power. Furthermore, although both models proved to be applicable to various technologies and educational contexts at individual level, research has also revealed their successful integration with other relevant approaches from other fields.

Integration of TAM

Although TAM has proved to be a powerful model applicable to a variety of technologies and contexts at the individual level, research also reveals its successful integration with other contributing theories and models within a range of different application fields (Al-Emran & Granić, 2021). To advance the model's explanatory power in the educational research, TAM has been integrated with other technology adoption (e.g., IDT and TPB) and post-adoption (e.g., Information Systems Success Model (ISSM) and ECT) theories and models, as well as with a number of additional approaches, for example, Task-Technology Fit (TTF), Protection Motivation Theory (PMT), and System Usability Scale (SUS), among many others. The integration of TAM with the aforementioned approaches together with related sample research is presented below.

IDT, as the most popular model in investigating innovation acceptance and adoption, was integrated with TAM to empirically explore university students' intention to use e-learning systems (Al-Rahmi et al., 2019), investigate factors affecting business employees' behavioral intentions to use the e-learning system (Lee, Hsieh, & Hsu, 2011), as well as explore diffusion and adoption of an open-source learning platform (Huang, Wang, Yang, & Shiau, 2020).

TPB (Ajzen, 1985, 1991), an extension of TRA which asserts that behavior is a direct function of behavioral intention and perceived behavioral control, was used with TAM to explain how perceptions influence m-learning adoption among university students (Gómez-Ramirez, Valencia-Arias, & Duque, 2019).

ISSM, introduced by DeLone and McLean (1992) as a robust theoretical basis for the study of technology post-adoption, was combined with TAM in a couple of recent studies, in particular to help determine factors which affected acceptance of e-learning platforms during the COVID-19 pandemic (Prasetyo et al., 2021) and in exploring students' behavioral intention to use social media, specifically the perception of their academic performance and satisfaction (Al-Rahmi et al., 2021).

ECT, a post-adoption theory offered by Oliver (1980), was integrated with two other theories, TAM and ISSM, to understand and identify several attributes as likely predictors of e-learning continuance intention (Roca, Chiu, & Martinez, 2006).

TTF, a theoretical model proposed by Goodhue and Thompson (1995) which asserts that for information technology to have a positive impact on individual performance the technology must be utilized and must be a good fit with the tasks it supports, was used with TAM to explore the students' behavioral intention to adopt smartwatches for learning activities (Al-Emran, 2021), as well as to explore continuance intention to use massive open online courses (MOOCs) (Wu & Chen, 2017).

PMT, a theory postulated by Rogers (1975) and considered as a special case of a more general category of theories that employ "expectancy" and "value" constructs, was integrated with TAM to study students' behavioral intention to adopt smartwatch devices in learning activities (Al-Emran, Granić, Al-Sharafi, Nisreen, & Sarrab, 2021).

SUS, a reliable and low-cost attitude scale from the field of human-computer interaction (HCI) developed by Brooke (1986) and used for subjective assessments of technology usability (i.e., its ease of use in a particular context), was combined with TAM to evaluate perceived usability of the online learning platforms during COVID-19 (Pal & Vanijja, 2020).

Integration of UTAUT

UTAUT integration/enhancement with further models is mostly related to users' continuance intention of using mobile banking and payment, or to employees' adoption of e-government, but seldom used in education. In such a context, usually representative post-adoption theories and models have been considered. Some contributing theories along with relevant sample research are offered in the following:

Technology Acceptance Model (TAM), an extensively used powerful model in technology acceptance and adoption research in general, was integrated with UTAUT to explore and explain predictive factors that influence preservice teachers' intention to use learning management system (LMS) in developing countries (Buabeng-Andoh & Baah, 2020).

Expectation-Confirmation Theory (ECT) (Oliver, 1980), a leading cognitive theory in the area of consumer satisfaction which seeks to explain post-purchase or post-adoption satisfaction as a function of expectations, perceived performance, and disconfirmation of beliefs, was used in a most recent study which extended UTAUT with the aim of exploring students' perspectives regarding the acceptance of mobile learning in higher education (Alowayr & Al-Azawei, 2021).

Conclusion and Further Research Directions

Due to continuous development of new technologies, there is still a huge potential for further advancement, exploration, and practice in the field of educational technology adoption, despite the fact that extensive work has already been conducted. In light of current research findings, future work could follow new research directions listed below:

To explore predictive validity of technology acceptance models and theories when applied to various supporting ICT technologies employed in:

- Emerging teaching strategies, for example, *flipped learning*, an active teaching-learning approach which has proved to motivate students to engage in out-of-

classroom activities, as well as *gamification-based learning*, another approach to facilitating students' participation and proactive behaviors
- Encouraging communication support, for example, the broadly used online *discussion forums* and *discussion boards*, which extend the learning space beyond the classroom and provide asynchronous opportunities for peer-to-peer collaborations

To empirically validate predictive factors, i.e., determinants, influencing the acceptance and adoption of technology in education which have not been widely explored, for example, psychological influence factors such as:

- *Flow*, perceived as an intrinsic motivation and a holistic experience of an individual when involved in the action
- *Conformity behavior*, seen as the behavior that individuals tend to follow others or the phenomenon that their behaviors are greatly influenced by others
- *Self-esteem*, understood as a sort of attitude toward an individual's general subjective emotional assessment of her/his own value

To advance the explanatory power of individual technology acceptance and adoption models by considering contributions from established theories and models from other fields, for example:

- Social psychology – Bagozzi and Warshaw's (1990) *Theory of Trying* (TofT): Since intentions do not always lead to a specific action, the criterion of behavior in TRA is replaced with trying to reach a goal.
- Positive psychology – Seligman's (2011) *PERMA Theory*: As positive psychology is about the concept of well-being, the theory postulates five relevant elements: positive emotion, engagement, relationships, meaning, and accomplishment (PERMA).
- Information technology – Thompson et al.'s (1991) *MPCU*: Due to intensive spread of information technologies, Triandis' (1977) Theory of Interpersonal Behavior (TIB) is adapted and refined for ICT contexts and used to forecast individual acceptance and personal computer (PC) utilization.

References

Abbad, M. M. (2021). Using the UTAUT model to understand students' usage of e-learning systems in developing countries. *Education and Information Technologies*. Retrieved from https://doi.org/10.1007/s10639-021-10573-5.

Abdullah, F., & Ward, R. (2016). Developing a general extended technology acceptance model for E-learning (GETAMEL) by analysing commonly used external factors. *Computers in Human Behavior, 56*, 238–256. https://doi.org/10.1016/j.chb.2015.11.036.

Aburagaga, I., Agoyi, M., & Elgedawy, I. (2020). Assessing faculty's use of social network tools in Libyan higher education via a technology acceptance model. *IEEE Access, 8*, 116415–116430. https://doi.org/10.1109/ACCESS.2020.3004200.

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckmann (Eds.), *Action control: From cognition to behavior* (pp. 11–39). New York, NY: Springer.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T.

Al-Adwan, A. S. (2020). Investigating the drivers and barriers to MOOCs adoption: The perspective of TAM. *Education and Information Technologies, 25*, 5771–5795. https://doi.org/10.1007/s10639-020-10250-z.

Al-Emran, M. (2021). Evaluating the use of smartwatches for learning purposes through the integration of the technology acceptance model and task-technology fit. *International Journal of Human–Computer Interaction*. Retrieved from https://doi.org/10.1080/10447318.2021.1921481.

Al-Emran, M., & Granić, A. (2021). Is it still valid or outdated? A bibliometric analysis of the technology acceptance model and its applications from 2010 to 2020. In N. Al-Emran & K. Shaalan (Eds.), *Recent advances in technology acceptance models and theories. Studies in systems, decision and control* (pp. 1–12). Cham, Switzerland: Springer Nature.

Al-Emran, M., Granić, A., Al-Sharafi, M., Nisreen, A., & Sarrab, M. (2021). Examining the roles of students' beliefs and security concerns for using smartwatches in higher education. *Journal of Enterprise Information Management, 34*(4), 1229–1251. https://doi.org/10.1108/JEIM-02-2020-0052.

Almaiah, M. A., Alamri, M. M., & Al-Rahmi, W. (2019). Applying the UTAUT model to explain the students' acceptance of mobile learning system in higher education. *IEEE Access, 7*, 174673–174686. https://doi.org/10.1109/ACCESS.2019.2957206.

Alowayr, A., & Al-Azawei, A. (2021). Predicting mobile learning acceptance: An integrated model and empirical study based on the perceptions of higher education students. *Australasian Journal of Educational Technology, 37*(3), 38–55. https://doi.org/10.14742/ajet.6154.

Al-Rahmi, A. M., Shamsuddin, A., Alturki, U., Aldraiweesh, A., Yusof, F. M., Al-Rahmi, W. M., & Aljeraiwi, A. A. (2021). The influence of information system success and technology acceptance model on social media factors in education. *Sustainability, 13*(14), 7770–7770. https://doi.org/10.3390/su13147770.

Al-Rahmi, W. M., Yahaya, N., Aldraiweesh, A. A., Alamri, M. M., Aljarboa, N. A., Alturki, U., & Aljeraiwi, A. A. (2019). Integrating technology acceptance model with innovation diffusion theory: An empirical investigation on students' intention to use e-learning systems. *IEEE Access, 7*, 26797–26809. https://doi.org/10.1109/ACCESS.2019.2899368.

Alruwais, N., Wills, G., & Wald, M. (2017). Validating factors that impact the acceptance and use of e-assessment among academics in Saudi universities. *International Journal of Information and Education Technology, 7*(10), 716–721. https://doi.org/10.18178/ijiet.2017.7.10.960.

Bagozzi, R. P. (2007). The legacy of the technology acceptance model and a proposal for a paradigm shift. *Journal of the Association for Information Systems, 8*(4), 244–254. https://doi.org/10.17705/1jais.00122.

Bagozzi, R. P., & Warshaw, P. R. (1990). Trying to consume. *Journal of Consumer Research, 17*(2), 127–140. https://doi.org/10.1086/208543.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice- Hall.

Benbasat, I., & Barki, H. (2007). Quo vadis TAM? *Journal of the Association for Information Systems, 8*(4), 211–218. https://doi.org/10.17705/1jais.00126.

Birch, A., & Irvine, V. (2009). Preservice teachers' acceptance of ICT integration in the classroom: Applying the UTAUT model. *Educational Media International, 46*(4), 295–315. https://doi.org/10.1080/09523980903387506.

Brooke, J. (1986). SUS: A "quick and dirty" usability scale. In P. W. Jordan, B. Thomas, B. A. Weerdmeester, & A. L. McClelland (Eds.), *Usability evaluation in industry*. London: Taylor and Francis. Retrieved from https://www.taylorfrancis.com/books/edit/10.1201/9781498710411/usability-evaluation-industry-patrick-jordan-thomas-ian-lyall-mcclelland-bernard-weerdmeester

Buabeng-Andoh, C., & Baah, C. (2020). Pre-service teachers' intention to use learning management system: An integration of UTAUT and TAM. *Interactive Technology and Smart Education, 17*(4), 455–474. https://doi.org/10.1108/ITSE-02-2020-0028.

Chao, C. M. (2019). Factors determining the behavioral intention to use mobile learning: An application and extension of the UTAUT model. *Frontiers in Psychology, 10*. https://doi.org/10.3389/fpsyg.2019.01652.

Chipps, J., Kerr, J., Brysiewicz, P., & Walters, F. (2015). Survey of university students' perceptions of learning management systems in a low-resource setting using a technology acceptance model. *Computers Informatics Nursing, 33*(2), 71–77. https://doi.org/10.1097/CIN.0000000000000123.

Dakduk, S., Santalla-Banderali, Z., & van der Woude, D. (2018). Acceptance of blended learning in executive education. In *Online Teaching* (pp. 1–16). SAGE Open. https://doi.org/10.1177/2158244018800647.

Dampson, D. G. (2021). Determinants of learning management system adoption in an era of COVID-19: Evidence from a Ghanaian university. *European Journal of Education and Pedagogy, 2*(3), 80–87. https://doi.org/10.24018/ejedu.2021.2.3.94.

Davis, F. D. (1986). *A technology acceptance model for empirically testing new end-user information systems: Theory and results*. Doctoral dissertation. MIT Sloan School of Management, Cambridge, MA.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319–340. https://doi.org/10.2307/249008.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science, 35*(8), 982–1003. https://doi.org/10.1287/mnsc.35.8.982.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1992). Extrinsic and intrinsic motivation to use computers in the workplace. *Journal of Applied Social Psychology, 22*, 1111–1132. https://doi.org/10.1111/j.1559-1816.1992.tb00945.x.

DeLone, W. H., & McLean, E. R. (1992). Information systems success: The quest for the dependent variable. *Information System Research, 3*(1), 60–95. https://doi.org/10.1287/isre.3.1.60.

Farahat, T. (2012). Applying the technology acceptance model to online learning in the Egyptian universities. *Procedia – Social and Behavioral Sciences, 64*, 95–104. https://doi.org/10.1016/j.sbspro.2012.11.012.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.

Fussell, S. G., & Truong, D. (2021). Using virtual reality for dynamic learning: An extended technology acceptance model. *Virtual Reality*. Retrieved from https://doi.org/10.1007/s10055-021-00554-x.

Gómez-Ramirez, I., Valencia-Arias, A., & Duque, L. (2019). Approach to M-Learning acceptance among university students: An integrated model of TPB and TAM. *The International Review of Research in Open and Distance Learning, 20*(3), 141–164. https://doi.org/10.19173/irrodl.v20i4.4061.

Goodhue, D. L., & Thompson, R. L. (1995). Task-technology fit and individual performance. *MIS Quarterly, 19*(2), 213–236. https://doi.org/10.2307/249689.

Granić, A., & Marangunić, N. (2019). Technology acceptance model in educational context: A systematic literature review. *British Journal of Educational Technology, 50*(5), 2572–2593. https://doi.org/10.1111/bjet.12864.

Huang, C.-Y., Wang, H.-Y., Yang, C.-L., & Shiau, S. (2020). A derivation of factors influencing the diffusion and adoption of an open source learning platform. *Sustainability, 12*(18), 7532. https://doi.org/10.3390/su12187532.

Ibrahim, R., Leng, N. S., Yusoff, R. C. M., Samy, G. N., Masrom, S., & Rizman, Z. I. (2017). E-learning acceptance based on technology acceptance model (TAM). *Journal of Fundamental & Applied Sciences, 9*, 871–889. https://doi.org/10.4314/jfas.v9i4S.50.

Jang, J., Ko, Y., Shin, W. S., & Han, I. (2021). Augmented reality and virtual reality for learning: An examination using an extended technology acceptance model. *IEEE Access, 9*, 6798–6809. https://doi.org/10.1109/ACCESS.2020.3048708.

Lai, H. J. (2020). Investigating older adults' decisions to use mobile devices for learning, based on the unified theory of acceptance and use of technology. *Interactive Learning Environments, 28*(7), 890–901. https://doi.org/10.1080/10494820.2018.1546748.

Lee, Y. H., Hsieh, Y. C., & Hsu, C. N. (2011). Adding innovation diffusion theory to the technology acceptance model: Supporting employees' intentions to use e-learning systems. *Educational Technology & Society, 14*(4), 124–137. Retrieved from https://www.ds.unipi.gr/et&s/journals/14_4/12.pdf

Lemay, D. J., Morin, M. M., Bazelais, P., & Doleck, T. (2018). Modeling students' perceptions of simulation-based learning using the technology acceptance model. *Clinical Simulation in Nursing, 20*, 28–37. https://doi.org/10.1016/j.ecns.2018.04.004.

Lin, P. H., & Yeh, S. C. (2019). How motion-control influences a VR-supported technology for mental rotation learning: From the perspectives of playfulness, gender difference and technology acceptance model. *International Journal of Human-Computer Interaction, 35*(18), 1736–1746. https://doi.org/10.1080/10447318.2019.1571784.

Mahande, R. D., & Malago, J. D. (2019). An e-learning acceptance evaluation through UTAUT model in a postgraduate program. *Journal of Educators Online, 16*(2). https://doi.org/10.9743/JEO.2019.16.2.7.

Oliver, R. L. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions. *Journal of Marketing Research, 17*(4), 460–469. https://doi.org/10.2307/3150499.

Pal, D., & Vanijja, V. (2020). Perceived usability evaluation of Microsoft Teams as an online learning platform using system usability scale and technology acceptance model in India. *Children and Youth Services, 119*, 105535. https://doi.org/10.1016/j.childyouth.2020.105535.

Park, E., & Kwon, S. J. (2016). The adoption of teaching assistant robots: A technology acceptance model approach. *Program-Electronic Library and Information Systems, 50*(4), 354–366. https://doi.org/10.1108/PROG-02-2016-0017.

Pinho, C., Franco, M., & Mendes, L. (2021). Application of innovation diffusion theory to the E-learning process: Higher education context. *Education and Information Technologies, 26*(2), 421–440. https://doi.org/10.1007/s10639-020-10269-2.

Prasetyo, Y. T., Ong, A. K. S., Concepcion, G. K. F., Navata, F. M. B., Robles, R. A. V., Tomagos, I. J. T., . . . Redi, A. A. N. P. (2021). Determining factors affecting acceptance of e-learning platforms during the COVID-19 pandemic: Integrating extended technology acceptance model and DeLone & McLean IS success model. *Sustainability, 13*(15), 8365–8365. https://doi.org/10.3390/su13158365.

Raman, A., & Don, Y. (2013). Preservice teachers' acceptance of learning management software: An application of the UTAUT2 model. *International Education Studies, 6*(7), 157–164. https://doi.org/10.5539/ies.v6n7p157.

Rejón-Guardia, F., Polo-Peña, A. I., & Maraver-Tarifa, G. (2020). The acceptance of a personal learning environment based on Google apps: The role of subjective norms and social image. *Journal of Computing in Higher Education, 32*, 203–233. https://doi.org/10.1007/s12528-019-09206-1.

Roca, J. C., Chiu, C. M., & Martinez, F. J. (2006). Understanding e-learning continuance intention: An extension of the technology acceptance model. *International Journal of Human-Computer Studies, 64*(8), 683–696. https://doi.org/10.1016/j.ijhcs.2006.01.003.

Rogers, E. (1962). *Diffusion of innovations*. New York, NY: The Free Press.

Rogers, E. (1995). *Diffusion of innovations* (4th ed.). New York, NY: The Free Press.

Rogers, R. W. (1975). A protection motivation theory of fear appeals and attitude change. *Journal of Psychology, 91*(1), 93–114. https://doi.org/10.1080/00223980.1975.9915803.

Samaradiwakara, G. D. M. N., & Gunawardena, C. G. (2014). Comparison of existing technology acceptance theories and models to suggest a well improved theory/model. *International Technical Sciences Journal, 1*(1), 21–36.

Seligman, M. (2011). *Flourish*. New York, NY: Free Press.

Taylor, S., & Todd, P. A. (1995). Understanding information technology usage: A test of competing models. *Information Systems Research, 6*(2), 144–176. Retrieved from http://www.jstor.org/stable/23011007

Thompson, R. L., Higgins, C. A., & Howell, J. M. (1991). Personal computing: Toward a conceptual model of utilization. *MIS Quarterly, 15*(1), 124–143. https://doi.org/10.2307/249443.

Tiwari, P. (2020). Measuring the impact of students attitude towards adoption of online classes during COVID 19: Integrating UTAUT model with perceived cost. *Test Engineering and Management, 83*(1), 8374–8382. https://doi.org/10.1007/s10639-021-10573-5.

Triandis, H. C. (1977). *Interpersonal behavior*. Monterey, CA: Brooke/Cole.

Vanduhe, V. Z., Nat, M., & Hasan, H. F. (2020). Continuance intentions to use gamification for training in higher education: Integrating the technology acceptance model (TAM), social motivation, and task technology fit (TTF). *IEEE Access, 8*, 21473–21484. https://doi.org/10.1109/ACCESS.2020.2966179.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27*(3), 425–478. https://doi.org/10.2307/30036540.

Venkatesh, V., Thong, J. Y., & Xu, X. (2012). Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. *MIS Quarterly, 36*, 157–178. https://doi.org/10.2307/41410412.

Wu, B., & Chen, X. (2017). Continuance intention to use MOOCs: Integrating the technology acceptance model (TAM) and task technology fit (TTF) model. *Computers in Human Behavior, 67*, 1–12. https://doi.org/10.1016/j.chb.2016.10.028.

Yoo, S. J., Han, S., & Huang, W. (2012). The roles of intrinsic motivators and extrinsic motivators in promoting e-learning in the workplace: A case from South Korea. *Computers in Human Behavior, 28*(3), 942–950. https://doi.org/10.1016/j.chb.2011.12.015.

Yu, Z. G. (2020). Extending the learning technology acceptance model of WeChat by adding new psychological constructs. *Journal of Educational Computing Research, 58*(6), 1121–1143. https://doi.org/10.1177/0735633120923772.

Research Trends in Open, Distance, and Digital Education 13

Olaf Zawacki-Richter and Aras Bozkurt

Contents

O. Zawacki-Richter (✉)
Center of Open Education Research, Carl von Ossietzky University of Oldenburg, Oldenburg, Niedersachsen, Germany
e-mail: olaf.zawacki.richter@uni-oldenburg.de

A. Bozkurt
Open Education Faculty, Distance Education Department, Anadolu University, Eskişehir, Turkey
e-mail: arasbozkurt@anadolu.edu.tr

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_12

Abstract

This chapter sets out to explore the research field of open, distance, and digital education (ODDE) building upon the 3 M-Framework developed in the context of distance education along three broad lines of research: ODDE systems and theories (global macro-level); management, organization, and technology (institutional meso-level); and teaching and learning in ODDE (individual micro-level). Based on various bibliographic analyses, the flow of research areas and trends is described. The COVID-19 pandemic is discussed as a turning point that already has a huge impact on research and practice of the entire field of ODDE. According to thematic similarities and dissimilarities in the academic fields of educational technology (EdTech), distance education (DE), and instructional design (ID), four clusters of academic journals are identified with different thematic foci in various educational contexts. This information can be used to guide researchers to choose an appropriate journal in which to submit their work.

Keywords

Research · Academic journals · 3M-Framework · Scientific networks · Systematic review · Meta-analysis and synthesis · Bibliometrics

Introduction

Research into open and distance education and the application of educational technologies have matured over the last 70 years. In the foreword of the book *Online Distance Education: Towards a Research Agenda*, Otto Peters (2014), one of the pioneers who witnessed the development of the field since the 1950s, describes four periods of distance education: the first was characterized by the complete absence of research (except for the works by Charles A. Wedemeyer), the second in the 1960s by the dominance of comparative studies to prove that correspondence education is at least as good as conventional face-to-face education, the third in the 1970s which was shaped by a focus on educational technology and the emergence of open universities, and the fourth in the 1990s which was marked by the emergence of online learning and teaching. Digital technologies have shaped research and development in education substantially by the late 1990s and 2000 onwards. In recent decades, the academic fields of educational technology, distance education, and instructional design have been established with a number of academic journals, conferences, and scholarly societies, as well as universities offering study programs in those areas. To describe this situation, Peters (2014) states: “Looking back at the stark absence of academic research in the 1950s and its modest beginning in the 1960s, we become keenly aware of the enormous progress achieved in online distance education in a relatively short time” (p. xii).

This chapter sets out to explore this progress that has been made in the research field of open, distance, and digital education (ODDE) and to look ahead in the light of experiences and the shift in 2020/2021 towards online learning and teaching due to the COVID-19 pandemic.

The 3 M-Framework of Research Areas in ODDE

Research into ODDE is a relatively young scholarly discipline emerging in the 1960s and 1970s. High-quality academic journals have existed for only about 40 or 50 years (e.g., the *British Journal of Educational Technology* or *Distance Education*). Around 20 years ago, distance education research was subject to critique (see Saba, 2000) and characterized as "atheoretical and predominantly descriptive" (Perraton, 2000, p. 1). Given that research questions should be posed within a theoretical framework and embedded in a holistic structure of research areas within a discipline, Mishra (1998) called for "a comprehensive and cohesive structure internationally to provide a strong foundation to the discipline" (p. 281). However, in the field of ODDE, there was no validated meta-structure of research topics around that time, i.e., the absence of a map of research areas that would help to organize the body of knowledge in the field. The structure of a research discipline forms the foundation for identifying gaps and priority areas for researchers.

In order to meet this need and to better describe the broad and interdisciplinary nature of the field, Zawacki-Richter (2009) carried out an international Delphi study to develop a validated framework of research topics that became later known as the 3 M-Framework. Three broad categories of research were identified from the Delphi study:

- Macro-level: distance education systems and theories (the global system level)
- Meso-level: management, organization, and technology (the level of educational institutions)
- Micro-level: teaching and learning in distance education (the individual learner and teacher level)

Along those lines, 15 research areas were identified on the 3 levels that were further elaborated by a team of international scholars, administrators, and practitioners in the book *Online Distance Education: Towards a Research Agenda* (Zawacki-Richter & Anderson, 2014) (see Table 1).

According to Anderson and Zawacki-Richter (2014), a research agenda in any given discipline can be defined as an ongoing, iterative process consisting of six interdependent activities:

1. Quantify what research has previously been done.
2. Review and evaluate that research.
3. Describe new research needs on the basis of the quantification and evaluation.
4. Prioritize the research needs in a research agenda.
5. Perform and evaluate the new research, and by doing so…
6. Redefine the research agenda. (p. 486)

Table 1 Fifteen research areas in the 3 M-Framework

Research level	Research area
Macro-level: distance education systems and theories	1. Access, equity, and ethics 2. Globalization of education and cross-cultural aspects 3. Distance teaching systems and institutions 4. Theories and models 5. Research methods in distance education and knowledge transfer
Meso-level: management, organization, and technology	6. Management and organization 7. Costs and benefits 8. Educational technology 9. Innovation and change 10. Professional development and faculty support 11. Learner support services 12. Quality assurance
Micro-level: teaching and learning in distance education	13. Instructional design 14. Interaction and communication in learning communities 15. Learner characteristics

The structure of the 3 M-Framework is an important foundation for developing research agendas for individual researchers and scholars, research departments and institutions, and even national and international research cooperations. It is especially helpful to complete the first three tasks – to quantify what has been done in each area of the discipline, to review that research, and to identify gaps and priority areas for future research.

Before we look into the content of research publications to describe trends and research priorities, we provide an overview of the different academic journals in ODDE.

Thematic Scope of Academic Journals in ODDE

Research and development in the field of ODDE is addressed by a wide range of researchers, from a variety of disciplines. In the following section, we report hitherto unpublished findings from a cluster analysis of journals that was conducted in a research project led by the first author of this chapter. The study assumed that there are separate research communities in the broader field of ODDE, i.e., researchers with a background in distance education, educational technology, and instructional design. The identification of these clusters helps to understand the structure of the discipline(s). Furthermore, it may further help guide researchers new to publishing in ODDE, such as doctoral students and early-career researchers, to choose an appropriate journal in which to submit their work.

The analysis was based on 10,827 articles published between 2007 and 2016 in 26 educational technology, instructional design, and distance education journals (see full list of the journals in Appendix A). The journals were selected based on their high reputation and impact in the field. Twenty journals were listed in the 2016 Thomson Reuters Journal Citation Report in the "Education and Educational Research" category. A further six journals were chosen according to West's (2016) list of important and prestigious journals in the field of instructional design and technology. At this point we have to acknowledge a bias towards English language journals that are indexed in international databases, e.g., journals like Distances et Savoirs (French), Revista de Educación a Distancia (Spanish), or Distance Education in China (Chinese) were not included in this study.

The aim of the analysis was to identify similarities and dissimilarities in the thematic scope of the journals. The cluster analysis is based on the mean correlation of the journals in terms of the relative frequencies of the topics ("concepts" retrieved with a text-mining tool) covered in the publications. For example, a high correlation with the other journals was calculated for the British Journal of Educational Technology (BJET; $\bar{r} = 0.84$), making it a very representative journal for the field.

The dendrogram in Fig. 1 presents evidence that a four-cluster solution is appropriate to group the journals based on their thematic similarities.

Table 2 provides an overview of the journals in each of the four clusters, which are sorted according to their size. Table 3 lists the ten most frequent concepts in each cluster. Figure 2 reports the relative frequencies of the 20 most frequent concepts over the 4 clusters. This content-related information is used for the interpretation of the four journal clusters.

Journal Cluster 1: Educational Technology, Learning, and Computer Science

The first and biggest cluster (with over 7000 articles) contains leading, high-impact educational technology journals that cover a broad range of topics associated with instructional design, technology, and computer-supported teaching and learning in all levels of education, among them *Computers & Education* (CAE), the *British Journal of Educational Technology* (BJET), and *Educational Technology and Society* (ETS). There is also a focus on instructional and cognitive psychology research, represented by *Learning and Instruction* (LI), the *Journal of the Learning Sciences* (JLS), and *Instructional Science* (IS). In addition, the more technology-centered and computer science-related journals such as the *IEEE Transactions on Learning Technologies* (IEEETLT) and *Educational Technology Research & Development* (ETRD) are also in this cluster.

Journal Cluster 2: Educational Technology from K-12 to Higher Education

The second cluster is characterized by general, but smaller, educational technology journals representing about 16% of the articles in the sample, including *Learning,*

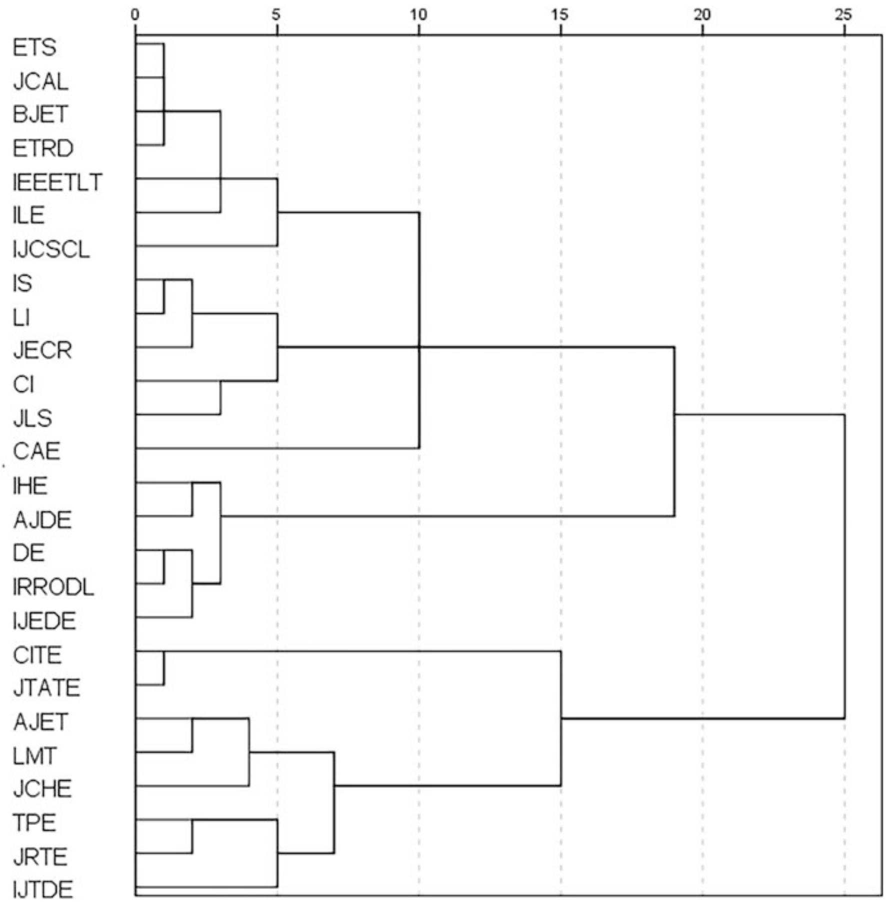


Fig. 1 Dendrogram of journal clusters, 2007–2016 (N = 10,827) (for abbreviations see Appendix A)

Media and Technology (LMT); *Technology, Pedagogy and Education* (TPE); and the *Journal of Computing in Higher Education* (JCHE). The scope of these journals is related to the application of educational technologies ranging from K-12 to higher education settings. However, in contrast to cluster 1, these journals have a stronger focus on the school context: *teacher*, *school*, and *teaching* are among the ten most frequent concepts (see Table 3).

Journal Cluster 3: Distance Education in the Context of Higher Education

This cluster is characterized by journals that focus on research into distance education and student learning in online courses, such as *Distance Education* (DE) or the

Table 2 Four journal clusters over 10-year and 5-year periods[a]

Cluster 1	N[b]	Cluster 2	N	Cluster 3	N	Cluster 4	N
BJET	762	AJET	565	DE	206	CITTE	211
CI	134	JCHE	125	IRRODL	552	JTTE	214
CAE	2201	LMT	249	IHE	308		
ETS	983	TPE	364	AJDE	164		
ETRD	427	IJTDE	304	IJEDE	120		
IEEETL	264	JRTE	179				
IS	373						
ILE	392						
IJCSCL	194						
JCAL	427						
JECR	438						
JLS	155						
LI	516						
Total %	7266 67.1		1786 16.5		1350 12.5		425 3.9

[a]Abbreviations see Appendix A
[b]Number of articles between 2007 and 2016

Table 3 The ten most frequent concepts in each cluster (ordered by frequency)

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
1	Learning	Learning	Student	Teacher
2	Student	Student	Learning	Present
3	Study	Technology	Online	Study
4	Knowledge	Study	Study	Technology
5	Teacher	Teacher	Course	Student
6	Design	Ease	Ease	Learning
7	Group	Design	Distance	Teaching
8	Support	School	Social	Ease
9	Online	Teaching	Teaching	Professional
10	Technology	Online	Learners	Development

American Journal of Distance Education (AJDE). In terms of their relative frequencies (see Fig. 2), *students*, *online,* and *course* are the most prevalent terms in these journals. The concept of *distance* does not appear in the upper 20 concepts in the other clusters at all. Contrary to prior assumptions, the journal *Internet and Higher Education* (IHE) is categorized in this cluster. It does not share the same distance education background as the other journals; however, its content-related proximity may be explained by the fact that the other journals in this cluster also focus on the higher education context. Another reason may be the widespread use of distance education and online learning in higher education and the frequent use of technologies such as the Internet in these processes.

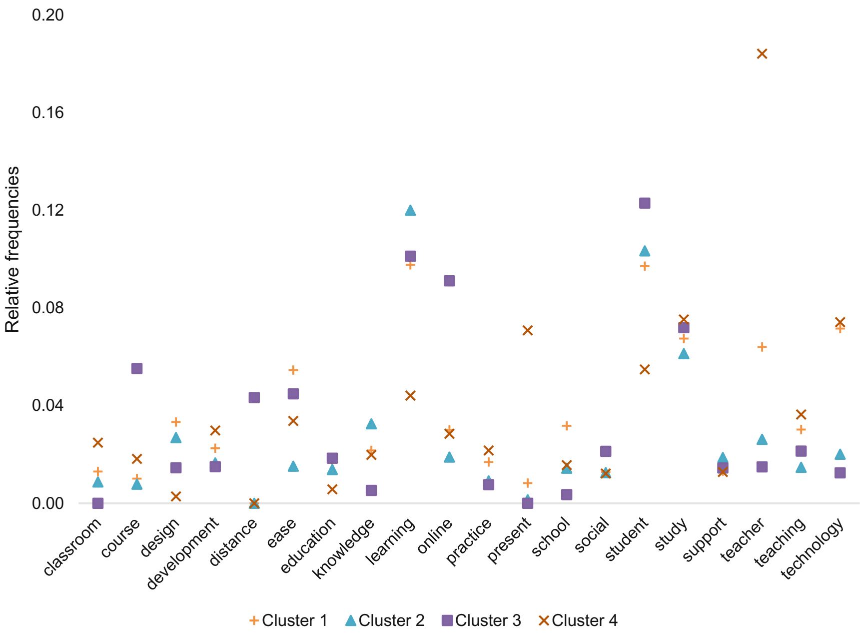


Fig. 2 The 20 most frequent concepts, unweighted over the 4 clusters

Journal Cluster 4: Technology-Enhanced Learning in School Settings

The two journals that constitute the smallest cluster, *Contemporary Issues in Technology & Teacher Education* (CITTE) and the *Journal of Technology and Teacher Education* (JTTE), clearly stand out, as they explicitly deal with topics related to teacher development and the design of technology-enhanced learning in school settings and subjects. The concepts of *teacher* and *classroom* show the highest relative frequencies (see Fig. 2), and the terms *professional* and *development* are among the ten most frequent concepts, together with *teacher* on the top of this list (see Table 3). Neither journal is listed in the Social Sciences Citation Index (SSCI).

Journals are one of the crucial means for the diffusion of scientific knowledge, and they can be considered "as indicators of the intellectual state of any given branch of knowledge and can be further used to identify the epistemic status of any discipline" (Bozkurt, 2019, p. 497). The results of the analysis confirm that ODDE is an interdisciplinary field and a discipline with many intersection points with educational technology (Bozkurt, 2019; Bozkurt & Zawacki-Richter, 2021).

With this understanding of the overall landscape of academic journals in ODDE, we can now turn towards reviewing the research trends, patterns, and areas covered in the scholarly publications.

Research Trends Emerging in Content Analysis and Systematic Reviews

The 3 M-Framework was the starting point for a number of bibliographic studies to quantify and review ODDE research. The first review that followed the Delphi study was published by Zawacki-Richter, Baecker, and Vogt (2009), who reviewed 695 articles in the time period between 2000 and 2008 in 5 major peer-reviewed journals: *Open Learning* (OL), *Distance Education* (DE), the *American Journal of Distance Education* (AJDE), the *Journal of Distance Education/International Journal of E-Learning & Distance Education* (JDE/IJEDE), and the *International Review of Research in Open and Distance/Distributed Learning* (IRRODL).

The major outcome of this study was a frequency tabulation of the research areas covered in the publications revealing a strong imbalance: the micro-perspective (teaching and learning in distance education) is highly overrepresented. Over 50% of all articles deal with the top three issues, interaction and communication in learning communities (17.6%), instructional design (17.4%), and learner characteristics (16.3%), whereas other important areas (e.g., costs and benefits, innovation and change management, or intercultural aspects of distance learning) are dreadfully neglected. This finding was also confirmed by other studies, for example, in a follow-up systematic review study of 861 articles published between 2009 and 2013 (Bozkurt et al., 2015). The results of these studies demonstrate that while some research areas are used widely, some others are neglected (see Fig. 3). Besides, the top three research areas identified by Zawacki-Richter et al. (2009) remain unchanged in Bozkurt et al.'s (2015) study. This view implies that there is a need to pay close attention to the ignored research areas if the field intends to explore different domains and build a solid basis for further growth. It is noteworthy to highlight that the *educational technology* research area is listed with the highest score on the meso-level which justifies the close relationship between the distance education and educational technology journals.

Quantitative Content Analysis and Text-Mining

Moving beyond the quantification of research areas and topics and the mapping of publication and authorship patterns, content analysis, text-mining, and topic modelling (see Krippendorff, 2013; Silge & Robinson, 2016) of academic journals allow for deeper insights into the development and flow of research trends over time. Content analysis examines the conceptual structure of text-based information and detects the most frequently occurring themes within large amounts of data. Fisk, Cherney, Hornsey, and Smith (2012) conclude that computer-aided content analysis is a suitable method by which to map a field of research. Thus, content analysis is an invaluable means of interpreting and coding the content of a research discipline and identifying gaps and priority areas for future research.

	Areas	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Trend	2000-2013 *f*	2000-2013 %
Macro	1-Access, equity and ethics	2	1	2	0	3	5	0	7	11	5	4	1	6	7		54	3.5
	2-Globalisation of education…	1	2	1	0	1	4	1	2	1	7	3	6	9	5		43	2.8
	3-Distance teaching systems…	1	13	15	1	3	9	3	8	9	13	15	14	15	11		130	8.5
	4-Theories and models	6	1	5	2	0	1	1	2	6	10	13	11	10	20		88	5.7
	5-Research methods in distance…	1	1	1	1	2	2	1	2	2	6	5	5	3	3		35	2.3
Meso	6-Management and organisation	2	3	3	1	4	3	0	0	2	6	7	8	15	15		69	4.5
	7-Costs and benefits	2	2	3	0	3	2	0	0	0	2	1	3	2	3		23	1.5
	8-Educational technology	6	4	4	3	2	8	4	10	7	24	20	23	22	34		171	11.2
	9-Innovation and change	4	1	0	1	0	3	2	1	1	6	6	13	4	7		49	3.2
	10-Professional development…	2	2	6	4	1	5	14	5	2	7	13	8	10	13		92	6.0
	11-Learner support services	2	3	0	6	5	3	2	2	0	6	10	9	5	5		58	3.8
	12-Quality assurance	5	1	5	3	4	7	5	6	5	2	8	1	3	0		55	3.6
Micro	13-Instructional design	14	11	15	12	10	8	22	14	15	23	16	23	19	13		215	14.0
	14-Interaction and communication..	7	12	14	17	25	13	8	15	11	14	25	18	35	21		235	15.3
	15-Learner characteristics	17	12	13	11	13	8	19	6	14	19	23	19	18	24		216	14.1

Fig. 3 The trends of 3 M-Framework (adopted from Bozkurt et al., 2015; Zawacki-Richter et al., 2009)

As West (2011) observes:

> There is practical value to understanding where we are right now, and where we have been in the very recent past. To understand this, it can be helpful to review some of the journals in our field to see what conversations are being held, research being conducted, tools being developed, and theories being accepted. (p. 60)

Special software is available to support the analysis of huge amounts of text-based data, for example, the text-mining tool Leximancer™. The software locates core concepts within textual data (conceptual analysis) and identifies how these concepts interrelate (relational analysis) by the frequency with which words co-occur in the text. Leximancer™ then produces a visual map, which clusters similar concepts that co-occur in close proximity (thematic regions). Packages for text-mining and topic modelling are also available for the open and free statistical programming language R (see: https://www.r-project.org), e.g., the *tidytext* package (Silge & Robinson, 2016).

Content analysis and text-mining studies in the field of ODDE are available based on publications in the major and most influential journals. By analyzing 515 research articles published in the journal *Distance Education* between 1980 and 2014, Zawacki-Richter and Naidu (2016) were able to identify the following main themes over seven 5-year time periods: professionalization and institutional consolidation (1980–1984); instructional design and educational technology (1985–1989); quality assurance in distance education (1990–1994); student support and early stages of online learning (1995–1999); the emergence of the virtual university (2000–2004); collaborative learning and online interaction patterns (2005–2009); and interactive learning, massive open online courses (MOOCs), and open educational resources (OER) (2010–2014). The concept map in Fig. 4 shows the major topics (concepts in five thematic regions) covered in the articles published over 35 years (1980–2014). Not surprisingly, the journal publishes *research* on open and distance *education* with a focus in the higher education context. The other two major topics covered in the articles (i.e., *students* and *learning*) are connected via the theme *interaction*. Learning is seen among these articles as a social process that is facilitated by interaction among participants. Furthermore, the provision of opportunities for interaction, communication, and collaboration between students and their teachers, as well as among students via two-way media, is proposed as constituent element of distance education. In such settings, teaching and learning are seen as the result of careful design and orchestration of the learning environment, communication processes, learner support, and use of learning materials.

A similar review was conducted for the journal *International Review of Research in Open and Distributed Learning* (IRRODL). Zawacki-Richter, Alturki, and Aldraiweesh (2017) analyzed 580 articles published between 2000 and 2015 and identified 3 broad themes emerging over this 15-year period: the establishment of online learning and distance education institutions (2000–2005); widening access to education and online learning support (2006–2010); and the emergence of MOOCs and OER (2011–2015). In the field of educational technology, Zawacki-Richter and

Fig. 4 Concept map of 515 articles published between 1980 and 2014 in the journal *Distance Education* (Zawacki-Richter & Naidu, 2016, p. 249)

Latchem (2018) reviewed 40 years of publications in the leading journal *Computers & Education*. The content analysis of abstracts and titles of 3674 full articles published between 1976 and 2016 revealed that research progressed through 4 distinct stages, reflecting major developments in educational technology and theories of learning with media: the advancement and growth of computer-based instruction (1976–1986); stand-alone multimedia learning (1987–1996); networked computers as tools for collaborative learning (1997–2006); and online learning in a digital age (2007–2016).

Mishra (2019) used a combination of bibliometrics and thematic content analysis to review contributions in the first 10 years to the *Journal of Learning for Development* (JL4D). He reports that JL4D's major focus is placed on student learning, teachers and teaching, and contextual needs in education, while citation analysis shows that "the contributions are by and large influenced from the field of educational technology in general and experts in the field of open and distance learning" (Mishra, 2019, p. 173). Thus, the journal is rooted in the field of open and distance learning, addressing a niche of research in the area of innovations in learning leading to development.

Citation and Journal Network Analysis

Social network analysis (SNA; Wasserman & Faust, 1994) of citations is another technique to explore relationships in scholarly knowledge networks. Garfield (1972) described journal networks as a "communication system" that reveals the intellectual structure of a discipline. In journal network analysis, the nodes in the scientific network are journals (actors), and the relations (ties) are based on citations (Narin, Carpenter, & Berlt, 1972). Bozkurt et al. (2015) used SNA to visualize the relationships between keywords of articles in distance education journals and found that the majority of published research deals with research on the micro-level, covering topics and issues such as 'teaching' and 'learning' processes in online distance education. Wolf, Andrzejewski, Clark, and Forney (2020) analyzed the qualitative research literature in distance education by constructing a two-mode network matrix of qualitative articles by theories and methodologies They showed how the theories and methodologies co-occurred. For example, case studies are often linked with social constructivism, the Community of Inquiry, transactional distance, and self-regulated learning. Park and Shea (2020) applied co-citation and cluster analysis to identify trends in online, distance, and blended learning research based on 5699 articles with 159,891 references retrieved from the Web of Science (WoS). The dataset was divided into two time spans from 2008 to 2012 and from 2013 to 2017. The study revealed that literature reviews, meta-studies on distance education, and research into communication patterns in asynchronous discussion were most cited in the first time period. In the second period, researchers turned their attention to online learner's satisfaction and self-regulation, informal learning, and MOOCs. In the entire 10-year period, the Community of Inquiry framework was the most prevalent theoretical foundation in the publications, a finding confirmed by Bozkurt (2019) and Bozkurt and Zawacki-Richter (2021).

Systematic Reviews and Meta-analysis Studies

Drilling further down into content and research findings, systematic reviews (Gough, Oliver, & Thomas, 2017; Petticrew & Roberts, 2006; for systematic reviews in education, see Zawacki-Richter et al., 2020), including or not including meta-analysis (Borenstein, Hedges, Higgins, & Rothstein, 2009), are the gold standard to synthesize research to inform evidence-based policy and practice. As Hammersley (2020) noted, systematic reviews became influential "in the context of the longstanding, and challenging, issue of how to 'translate' research findings into reliable guidance for practical decision-making – to determine which policies, programs, and strategies should (and should not) be adopted" (p. 23). The methodological approach of systematic reviewing became influential by the emergence of the evidence-based medicine movement in the second half of the twentieth century. Systematic reviews are also being carried out more and more frequently in the educational sciences. Dowd and Johnson (2020) report an increase in the number of systematic reviews published in the leading journal *Review of Educational Research* with a proportion of 41% in 2017 and 43% in 2018.

Rather than providing a general overview of research trends and scholarly networks in a given discipline, systematic reviews aggregate findings of primary studies to answer a review question, indicate the direction or size of effect in a meta-analysis, or qualitatively arrange research findings in a configurative synthesis: "Rather than looking at any study in isolation, we need to look at the body of evidence" (Nordenbo, 2010, p. 22). In contrast to traditional or narrative literature reviews, which are criticized as being biased and arbitrary, the aim of a systematic review is to carry out a review that is rigorous and transparent in each step of the review process, thereby making it reproducible and updatable.

Meta-analysis has a long tradition in ODDE research (see Bernard, Borokhovski, & Tamim, 2019) in comparing distance education with traditional face-to-face education (Bernard et al., 2004) or comparing learning outcomes (Zhao, Lei, Yan, Lai, & Tan, 2005) and learner performance (Means, Toyama, Murphy, Bakia, & Jones, 2009) between these two modes. Previous meta-analysis studies have focused on the impact of media on learning (e.g., see the second order meta-analysis by Tamim, Bernard, Borokhovski, Abrami, & Schmid, 2011), while meta-synthesis studies focused on factors influencing students' experiences (Blackmon & Major, 2012), course environments, learning outcomes, learners' characteristics, and institutional and administrative aspects (Tallent-Runnels et al., 2006).

Historically, it has often been the case that a triggering event at the macro- or meso-level has led to a new research direction at the micro-level. The next section will deal with these alternating research waves in ODDE.

Alternating Research Waves

Based on the different levels of 3 M-Framework, waves of alternating institutional and individual research perspectives were proposed by Zawacki-Richter and Naidu (2016). As an extended and updated version, four waves covering the past 40 years are presented in Fig. 5. Responding to a triggering event such as the foundation of open universities, quality problems at distance teaching institutions, or the emergence of virtual universities, researchers turned their attention to issues on the micro-level of teaching and learning. The four waves can be labelled as follows: (1) the consolidation of distance teaching institutions and instructional design; (2) quality assurance and student support; (3) virtual universities, online interaction, and learning; and 4) artificial intelligence, big data, and intelligent support systems.

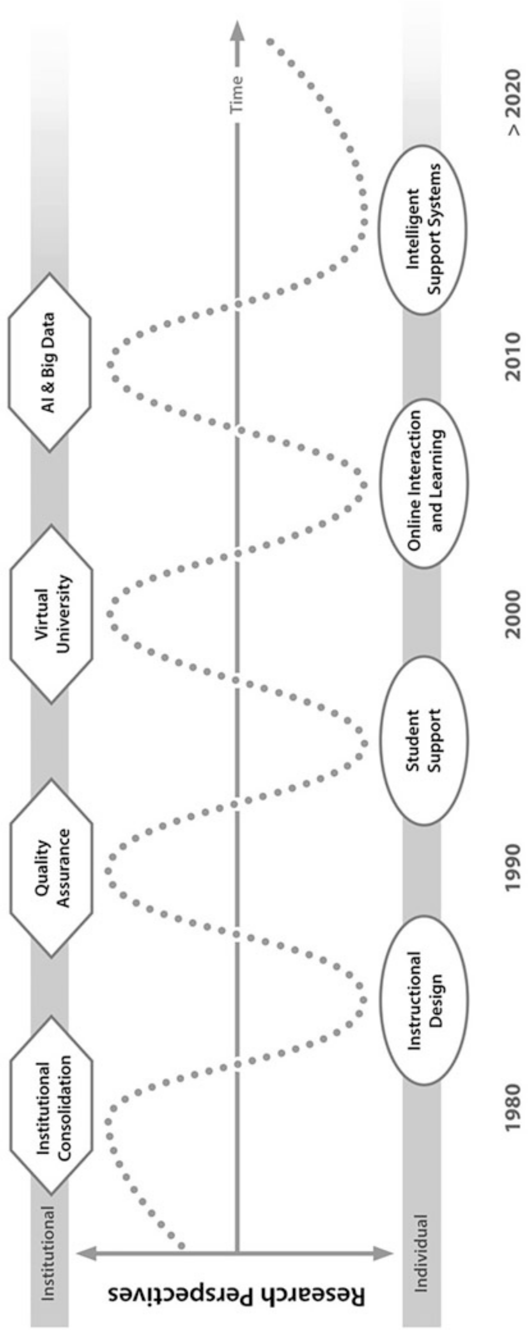


Fig. 5 Alternating research waves over time (based on Zawacki-Richter & Naidu, 2016)

The First Wave: Institutional Consolidation and Instructional Design

The establishment of open universities and distance teaching institutions around the world in the 1970s and 1980s was a critical milestone in the history of ODDE. This revolutionary new form of educational practice posed an enormous challenge on organizational management and professional practice. The idea of ODDE was embodied by these developments and found an opportunity to apply its theory and practice through a systems view (Moore & Kearsley, 2005). The temporal, spatial, and transactional distance between learners and learning sources (i.e., other learners, instructors, and learning materials) required the development of curriculum and instructional design strategies to effectively and efficiently deliver education.

The Second Wave: Quality Assurance and Student Support

With the removal of temporal and spatial barriers, more learners had the opportunity to access education. This situation also led to the emergence of massification in ODDE with mega universities (Daniel, 1996) of more than 100,000 or even millions of students. With the growth of distance teaching provision, quality problems emerged, resulting in low completion rates and dropout. It is not surprising to see that research focused on quality assurance and the implementation of learner support services along the student life cycle (see Reid, 1995). The ultimate purpose of quality assurance is to provide the best possible solutions to learners, and this requires a systematic approach, internal and external quality mechanisms, and policies and strategies in place. The nature and characteristics of learning processes in ODDE require a comprehensive and operational learner support system.

The Third Wave: Virtual Universities, Online Interaction, and Learning

The proliferation of information and communication technologies around the new millennium, and more specifically online networked technologies, allowed ODDE to expand its boundaries. Online learning is beginning to be seen as the new face of distance education. Researchers are fascinated by the enormous opportunities that the new information and communication technologies afford for collaborative online learning and teaching. The capacity increase that emerged with digital solutions has expanded the boundaries of not only education but also many concepts. For instance, openness, flexibility, and accessibility took new forms such as MOOCs, OER, and practices. With the integration of online distance learning, the boundaries between distance education institutions and conventional education providers are blurring, moving ODDE into the mainstream of education (Xiao, 2018).

The Fourth Wave: AI, Big Data, and Intelligent Support Systems

With the increasing digitalization and the spread of online technologies, a massive volume of (big) data has been produced that can be managed, processed, and analyzed. Artificial intelligence (AI) methods such as machine learning or deep learning are already used for learning analytics to identify students at risk (early warning systems), for automated assessment, and to design adaptive learning environments and intelligent tutoring systems (Zawacki-Richter, Marín, Bond, & Gouverneur, 2019). Despite the enormous potential of AI in education, challenges remain in terms of ethical implications and issues of privacy and data protection.

COVID-19 Pandemic: The Turning Point

As noted earlier, alternating research waves are shaped by significant developments in the history of the ODDE triggered by technological advances in the society. In this sense, we consider the COVID-19 pandemic as a turning point for many dimensions of our lives including ODDE. This section, thus, provides reflections from the recent articles which probably affect the future scenarios and identify possible future waves in ODDE.

The COVID-19 pandemic was a wake-up call for all walks of life across the globe, including open, distance, and digital education. The pandemic and its consequences indicate a new future that we can call *the new normal* where radical changes and paradigm shifts are ahead of us (Bozkurt & Sharma, 2020a, 2020b; Xiao, 2021). A recent systematic review about emergency remote teaching and learning in schools during the COVID-19 pandemic reports that the studies were "heavily focused on the impact of lockdown and the COVID-19 pandemic on schools and learning, but particularly on the challenges experienced by teachers as a result of switching to online forms of teaching and learning" (Bond, 2020, p. 204). These challenges were echoed in different studies and included social, psychological, and technological aspects. For instance, Crompton, Burke, Jordan, and Wilson (2021) reported that educational practices, ranging from digital to analog and from online to offline, were mostly dependent on educational technologies. Bozkurt (2022) examined impact of the Covıd-19 pabdemic and identifed three broad themes: (1) educational crisis and higher education in the new normal: resilience, adaptability, and sustainability, (2) psychological pressures, social uncertainty, and mental well-being of learners, and (3) the rise of online distance education and blended-hybrid modes. Bozkurt (2022) further noted that the future of education is being shaped in the present time and there is a need to focus on issues such as digital pedagogies, care and empathy-oriented pedagogies, equity and social justice, and new educational roles in the new normal. In a similar study, Mishra, Sahoob, and Pandey (2021) reviewed research trends in distance and online learning during the COVID-19 pandemic using co-citation analysis and keyword analysis with 330 peer-reviewed research articles and conference papers retrieved from the Scopus database. According to Mishra et al. (2021), the articles mostly cover post-secondary education (67.9%), whereas research in the context of K-12 education (10.3%) and workplace training and lifelong learning (7.6%) is lacking. They found that the field has focused on remote teaching and learning as a new term to describe online distance education. There has been a focus on educational technologies and their capabilities to support online learners.

These studies show that the COVID-19 pandemic was a turning point and an opportunity to reimagine and redesign education, including ODDE. It is also emphasized that considering teaching and learning are "primarily about human beings, for human beings, and by human beings" (Xiao, 2021, p. 3), there is a need for care and empathy-oriented human-centered pedagogies (Bozkurt & Sharma, 2021).

Conclusions

This chapter provides a comprehensive overview of the flow and development of research in ODDE over time based on the 3 M-Framework of research areas on the macro-, meso-, and micro-level. Earlier bibliographic content analysis and systematic reviews report that ODDE has a clear focus and high research interest on interaction and communication in learning communities, learner characteristics, instructional design (micro-level), and educational technology (meso-level). These results also show which research areas we have examined sufficiently, and which research areas we should focus more on, hence offering clues for setting a future research agenda. Content analysis and text-mining studies demonstrate how the field of ODDE has been advancing and addressing emergent and diverse issues to ensure its sustainability. Through citation and journal network analysis studies, the intellectual growth of ODDE can be tracked, which in turn can guide new studies to build on previous research. In this process, systematic reviews, meta-analyses, and syntheses are conducive to identifying research gaps and priority areas and to informing evidence-based practice and interventions.

The onset of the COVID-19 pandemic in 2020 was certainly a global game-changer that has led to the application of ODDE across the globe in all education sectors. Driven by the societal transformation of digitalization, ODDE had been in the spotlight even before the COVID-19 pandemic – now ODDE has fully entered the mainstream of education. ODDE is now practiced in its different forms across all disciplines and on all educational levels from pre-school to higher education.

Even though the trigger from the COVID-19 pandemic is horrific, the future of ODDE looks bright and promising. In light of this development, it is important to build upon the theory, research, and practice in ODDE to prevent that the wheel is reinvented.

Cross-References

► Big Science and Little Science in Open and Distance Digital Education
► Classic Theories of Distance Education
► The Rise and Development of Digital Education

Appendix

Appendix A: Number of Articles Published in 26 Journals Between 2007 and 2016

No.	Journal		OA[a]	N
1	Australasian Journal of Educational Technology	AJET	yes	565
2	British Journal of Educational Technology	BJET	no	762
3	Cognition and Instruction	CI	no	134
4	Computers & Education	CAE	no	2,201
5	Distance Education	DE	no	206
6	Educational Technology and Society[b]	ETS	yes	983
7	Educational Technology Research and Development	ETRD	no	427
8	IEEE Transactions on Learning Technologies	IEEETLT	no	264
9	Instructional Science	IS	no	373
10	Interactive Learning Environments	ILE	no	392
11	Int. Journal of Computer-Supported Collaborative Learning	IJCSCL	no	194
12	Int. Review of Research in Open and Distributed Learning	IRRODL	yes	552
13	Internet and Higher Education	IHE	no	308
14	Journal of Computer Assisted Learning	JCAL	no	427
15	Journal of Computing in Higher Education	JCHE	no	125
16	Journal of Educational Computing Research	JECR	no	438
17	Journal of the Learning Sciences	JLS	no	155
18	Learning and Instruction	LI	no	516
19	Learning, Media and Technology	LMT	no	249
20	Technology, Pedagogy and Education	TPE	no	364
21	American Journal of Distance Education	AJDE	no	164
22	Contemporary Issues in Technology & Teacher Education	CITE	yes	211
23	International Journal of E-Learning and Distance Education	IJEDE	yes	120
24	International Journal of Technology and Design Education	IJTDE	no	304
25	Journal of Research on Technology in Education	JRTE	no	179
26	Journal of Technology and Teacher Education	JTATE	no	214
Total				**10,827**

[a]Open access
[b]ETS was discontinued and stopped accepting submissions in December 2016

References

Anderson, T., & Zawacki-Richter, O. (2014). Towards a research agenda. In O. Zawacki-Richter & T. Anderson (Eds.), *Online distance education: Towards a research agenda* (pp. 485–492). Edmonton, AB: Athabasca University Press.

Bernard, R. M., Abrami, P. C., Lou, Y., Borokhovski, E., Wade, A., Wozney, L., . . . Huang, B. (2004). How does distance education compare with classroom instruction? A meta-analysis of the empirical literature. *Review of Educational Research, 74*(3), 379–439. https://doi.org/10.3102/00346543074003379.

Bernard, R. M., Borokhovski, E., & Tamim, R. M. (2019). The state of research on distance, online, and blended learning: Meta-analyses and qualitative systematic reviews. In M. G. Moore & W. C. Diehl (Eds.), *Handbook of distance education* (4th ed., pp. 92–104). Routledge. https://doi.org/10.4324/9781315296135.

Blackmon, S. J., & Major, C. (2012). Student experiences in online courses: A qualitative research synthesis. *The Quarterly Review of Distance Education, 13*, 77–85. https://www.cu.edu/doc/student-experiences-online-classesqual-study.pdf.

Bond, M. (2020). Schools and emergency remote education during the COVID-19 pandemic: A living rapid systematic review. *Asian Journal of Distance Education, 15*(2), 191–247. https://doi.org/10.5281/zenodo.4425683.

Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2009). *Introduction to meta-analysis*. Chichester, UK: Wiley.

Bozkurt, A. (2019). Intellectual roots of distance education: a progressive knowledge domain analysis. *Distance Education, 40*(4), 497–514. https://doi.org/10.1080/01587919.2019.1681894.

Bozkurt, A., Akgun-Ozbek, E., Yilmazel, S., Erdogdu, E., Ucar, H., Guler, E., . . . Aydin, C. H. (2015). Trends in distance education research: A content analysis of journals 2009–2013. *The International Review of Research in Open and Distributed Learning, 16*(1). https://doi.org/10.19173/irrodl.v16i1.1953.

Bozkurt, A. (2022). Resilience, adaptability, and sustainability of higher education: A systematic mapping study on the impact of the coronavirus (COVID-19) pandemic and the transition to the new normal. *Journal of Learning for Development (JL4D), 9*(1), 1–16. https://doi.org/10.5281/zenodo.6370948

Bozkurt, A., & Sharma, R. C. (2020a). Emergency remote teaching in a time of global crisis due to CoronaVirus pandemic. *Asian Journal of Distance Education, 15*(1), i–vi. https://doi.org/10.5281/zenodo.3778083.

Bozkurt, A., & Sharma, R. C. (2020b). Education in normal, new normal, and next normal: Observations from the past, insights from the present and projections for the future. *Asian Journal of Distance Education, 15*(2), i–x. https://doi.org/10.5281/zenodo.4362664.

Bozkurt, A., & Sharma, R. C. (2021). On the verge of a new renaissance: Care and empathy oriented, human-centered pandemic pedagogy. *Asian Journal of Distance Education, 16*(1), i–vii. https://doi.org/10.5281/zenodo.5070496.

Bozkurt, A., & Zawacki-Richter, O. (2021). Trends and patterns in distance education (2014–2019): A synthesis of scholarly publications and a visualization of the intellectual landscape. *The International Review of Research in Open and Distributed Learning, 22*(2), 19–45. https://doi.org/10.19173/irrodl.v22i2.5381.

Crompton, H., Burke, D., Jordan, K., & Wilson, S. W. G. (2021). Learning with technology during emergencies: A systematic review of K- 12 education. *British Journal of Educational Technology*. https://doi.org/10.1111/bjet.13114.

Daniel, J. (1996). *Mega-universities and knowledge media – Technology strategies for higher education*. London, UK: Kogan Page.

Dowd, A., & Johnson, R. M. (2020). Why publish a systematic review: An editor's and reader's perspective. In O. Zawacki-Richter, M. Kerres, S. Bedenlier, M. Bond, & K. Buntins (Eds.), *Systematic reviews in educational research: Methodology, perspectives and application* (pp. 69–87). Wiesbaden, Germany: Springer Open.

Fisk, K., Cherney, A., Hornsey, M., & Smith, A. (2012). Using computer-aided content analysis to map a research domain: A case study of institutional legitimacy in postconflict East Timor. *SAGE Open, 2*(4). https://doi.org/10.1177/2158244012467788.

Garfield, E. (1972). Citation analysis as a tool in journal evaluation. *Science, 178*, 471–479. https://doi.org/10.1126/science.178.4060.471.

Gough, D., Oliver, S., & Thomas, J. (2017). *An introduction to systematic reviews* (2nd ed.). Los Angeles, CA: SAGE.

Hammersley, M. (2020). Reflections on the methodological approach of systematic review. In O. Zawacki-Richter, M. Kerres, S. Bedenlier, M. Bond, & K. Buntins (Eds.), *Systematic reviews in educational research: Methodology, perspectives and application*. Wiesbaden, Germany: Springer Open.

Krippendorff, K. (2013). *Content analysis: An introduction to its methodology* (3rd ed.). Los Angeles, CA: SAGE.

Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2009). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies*. Washington, DC: U.S. Department of Education, Office of Planning, Evaluation, and Policy Development Policy and Program Studies Service. https://repository.alt.ac.uk/629/1/US_DepEdu_Final_report_2009.pdf.

Mishra, S. (1998). Distance education research: A review of its structure, methodological issues and priority areas. *Indian Journal of Open Learning, 7*(3), 267–282.

Mishra, S. (2019). Early years of the Journal of Learning for Development: A combination of bibliometrics and thematic analysis. *Journal of Learning for Development, 6*(2), 160–176. https://jl4d.org/index.php/ejl4d/article/view/331.

Mishra, S., Sahoob, S., & Pandey, S. (2021). Research trends in distance and online learning during COVID-19 pandemic. *Distance Education, 42*, 494–519.

Moore, M. G., & Kearsley, G. (2005). *Distance education: A systems view.* Belmont, CA: Wadsworth.

Narin, F., Carpenter, M., & Berlt, N. C. (1972). Interrelationships of scientific journals. *Journal of the American Society for Information Science, 23*(5), 323–331. https://doi.org/10.1002/asi.4630230508.

Nordenbo, S. E. (2010). Evidence and synthesis: a new paradigm in educational research. In the Research Council of Norway (Ed.), *Rigour and relevance in educational research* (pp. 21–27). St. Hanshaugen, Norway: The Research Council of Norway.

Park, H., & Shea, P. (2020). A ten-year review of online learning research through co-citation analysis. *Online Learning, 24*(2). https://doi.org/10.24059/olj.v24i2.2001.

Perraton, H. (2000). Rethinking the research agenda. *The International Review of Research in Open and Distance Learning, 1*(1). https://doi.org/10.19173/irrodl.v1i1.5.

Peters, O. (2014). Foreword. In O. Zawacki-Richter & T. Anderson (Eds.), *Online distance education: Towards a research agenda* (pp. ix–xii). Edmonton, AB: Athabasca University Press.

Petticrew, M., & Roberts, H. (2006). *Systematic reviews in the social sciences: A practical guide*. Oxford, UK: Blackwell Publishing.

Reid, J. (1995). Managing learner support. In F. Lockwood (Ed.), *Open and distance learning today* (pp. 265–275). London, UK: Routledge.

Saba, F. (2000). Research in distance education: A status report. *International Review of Research in Open and Distance Learning, 1*(1). https://doi.org/10.19173/irrodl.v1i1.4.

Silge, J., & Robinson, D. (2016). Tidytext: Text mining and analysis using tidy data principles in R. *The Journal of Open Source Software, 1*(3), 37. https://doi.org/10.21105/joss.00037.

Tallent-Runnels, M. K., Thomas, J. A., Lan, W. Y., Cooper, S., Ahern, T. C., Shaw, S. M., & Liu, X. (2006). Teaching courses online: A review of research. *Review of Educational Research, 76*(1), 93–135. https://doi.org/10.3102/00346543076001093.

Tamim, R. M., Bernard, R. M., Borokhovski, E., Abrami, P. C., & Schmid, R. F. (2011). What forty years of research says about the impact of technology on learning: A second-order meta-analysis and validation study. *Review of Educational Research, 81*(1), 4–28. https://doi.org/10.3102/0034654310393361.

Wasserman, S., & Faust, K. (1994). *Social network analysis – Methods and applications*. Cambridge University Press.

West, R. E. (2011). About this article and new series. *Educational Technology, 51*(4), 60. http://www.jstor.org/stable/44429941.

West, R. E. (2016). Insights from the journal analysis series: What we have learned about educational technology research. *Educational Technology*, 41–47. https://www.jstor.org/stable/44430441.

Wolf, S. E., Andrzejewski, C. E., Clark, D. A., & Forney, K. N. (2020). A bibliometric exploration of the qualitative research literature in distance education using a network approach. *American Journal of Distance Education, 34*(4), 290–305. https://doi.org/10.1080/08923647.2020.1811569.

Xiao, J. (2018). On the margins or at the center? Distance education in higher education. *Distance Education, 39*(2), 259–274. https://doi.org/10.1080/01587919.2018.1429213.

Xiao, J. (2021). From equality to equity to justice: Should online education be the new normal in education? In A. Bozkurt (Ed.), *Handbook of research on emerging pedagogies for the future of education: trauma-informed, care, and pandemic pedagogy* (pp. 1–15). IGI Global. https://doi.org/10.4018/978-1-7998-7275-7.ch001.

Zawacki-Richter, O. (2009). Research areas in distance education: A Delphi study. *The International Review of Research in Open and Distributed Learning, 10*(3). https://doi.org/10.19173/irrodl.v10i3.674.

Zawacki-Richter, O., Alturki, U., & Aldraiweesh, A. (2017). Review and content analysis of the international review of research in open and distance/distributed learning (2000–2015). *The International Review of Research in Open and Distance Learning, 18*(2), 1–26. https://doi.org/10.19173/irrodl.v18i2.2806.

Zawacki-Richter, O., & Anderson, T. (Eds.). (2014). *Online distance education: Towards a research agenda*. Edmonton, AB: Athabasca University Press. http://www.aupress.ca/index.php/books/120233.

Zawacki-Richter, O., Baecker, E. M., & Vogt, S. (2009). Review of distance education research (2000 to 2008): Analysis of research areas, methods, and authorship patterns. *The International Review of Research in Open and Distributed Learning, 10*(6), 21. https://doi.org/10.19173/irrodl.v10i6.741.

Zawacki-Richter, O., Kerres, M., Bedenlier, S., Bond, M., & Buntins, K. (Eds.). (2020). *Systematic reviews in educational research: Methodology, perspectives and application*. Wiesbaden, Germany: Springer Fachmedien. https://doi.org/10.1007/978-3-658-27602-7.

Zawacki-Richter, O., & Latchem, C. (2018). Exploring four decades of research in Computers & Education. *Computers & Education, 122*, 136–152. https://doi.org/10.1016/j.compedu.2018.04.001.

Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education – Where are the educators? *International Journal of Educational Technology in Higher Education, 16*(1), 39. https://doi.org/10.1186/s41239-019-0171-0.

Zawacki-Richter, O., & Naidu, S. (2016). Mapping research trends from 35 years of publications in Distance Education. *Distance Education, 37*(3), 245–269. https://doi.org/10.1080/01587919.2016.1185079.

Zhao, Y., Lei, J., Yan, B., Lai, C., & Tan, S. (2005). What makes the difference? A practical analysis of research on the effectiveness of distance education. *Teachers College Record, 107*(8), 1836–1884. https://www.tcrecord.org/Content.asp?ContentId=12098.

Big Science and Little Science in Open and Distance Digital Education

14

Heather Kanuka

Contents

Abstract

This chapter provides a discussion of big science and little science. An overview of the definitions and uses of each is provided, as well as data collection and analysis practices, inclusive of a range of digital data analysis tools for research projects in open, distance, and digital education. A discussion is also provided on the promises, opportunities, controversies, and complications of big data and little data, as well as the possibilities of working with both forms of data collection. Insights based on the literature are highlighted, providing suggestions for practice when working with big data and/or little data. The chapter concludes with questions and suggestions for further research and implications for open, distance, and digital education that arise from the literature.

H. Kanuka (✉)
University of Alberta, Edmonton, AB, Canada
e-mail: hakanuka@ualberta.ca

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_13

Keywords

Big data · Little data · Digital tools · Open and distance digital education

Introduction

> In God we trust. All others must bring data. (W. Edwards Deming, Hanson, 2019)

Student's digital activities generate an enormous amount of data which has led to the pursuit of how to analyze these data to determine if and/or how the information can be used to enhance learning environments (Sin & Muthu, 2015). Often referred to as big science, the central aim is to draw meaningful information from a large volume of data by eliminating the noisy data which can then be used to make better, faster, and smarter decisions (Dahdouh, Dakkak, Oughdir, & Messaoudi, 2018). This information, in turn, can be used to enhance ODDE systems. For example, big data can provide information ranging from enrolment and attrition to course materials and student activities. Indeed, according to Atasoy, Bozna, Sönmez, Akkurt, Büyükköse, and Fırat (2020), big science "can solve everyday problems . . . [in] education, enable personalized learning for each learner, offer a new type of evaluation and assessment and allow continuous feedback and feedforwards" (p. 145). What big science cannot do, however, is determine if the data have any kind of impact on learner outcomes (O'Brian, 2017). As Prinsloo, Archer, Barnes, Chetty, and van Zyl (2015) note, ". . . it is clear that in order for big(ger) data to be better data, a number of issues need to be addressed" (p. 284). The issues Prinsloo et al. note revolve around the problem that big data analysis can provide patterns *about* what students do online, but the data cannot *interpret* the patterns and/or determine how the data links to learning theory (see also Maldonado-Mahauad, Pérez-Sanagustín, Kizilcec, Morale, & Munos-Gama, 2018). To address these issues, data triangulation has been suggested, which could include qualitative research methodologies – or little science, which can provide explanatory power using thick, rich data. But like big data, little data also have limitations (e.g., inability to generalize, researcher privileging, sample bias, etc.)

ODDE research that includes the breadth and depth that both big and little science offers provides a more complete set of findings than either can provide singly. ODDE researchers, for example, can use the analysis of big data patterns to gain information on what is occurring, which can then be effectively used with little data (qualitative) methods to provide insights on why. Or, alternatively, ODDE research can use the insights arising from qualitative methods to determine if the data are generalizable to a wider population.

Big Science, Big Data

Apparently, one of the hottest things anyone can become these days is a data scientist (Fruhlinger, 2019). A data scientist collects and analyses big datasets of structured and unstructured data. Most often, a data scientist will have knowledge of computer science, statistics, and mathematics. They use their knowledge and skills to find patterns, identify trends, and manage data – or, quite simply, make sense of an extremely large amount of messy data that do not easily fit into existing database software. Mills (2018) notes that big data has "captured the imagination of researchers worldwide, with a proliferation of digital media rendering extremely large datasets more rapidly searchable, analysable and shareable" (p. 591). Josh Wills (a senior director of data science at Cloudera) describes himself as ". . . a data janitor. That's the sexiest job of the twenty-first century" (Harnham Blog and News, n.d.). Dan Ariely also notes the allure of big data in a tweet (Ariely, 2013): "Big Data is like teenage sex: everyone talks about it, nobody really knows how to do it, everyone thinks everyone else is doing it, so everyone claims they are doing it." An overview of the research literature on big data indicates that, as Ariely aptly tweeted, not only does no one really know how to do it; there is little consensus on what it is, as well as how to define it.

The following section provides a synopsis of the literature on how big data are described and/or defined by researchers and practitioners, as well as their uses. As this section illustrates, one cannot assume there is a shared understanding of definitions for big data, uses, and/or how the data are collected and analyzed. When the ODDE researcher is choosing and using big data, also referred to as big science, it is essential at the onset to decide on a definition and intended use, with a clear and lucid description of how the data will be collected and analyzed.

Big Data Defined

Put simply, big data are human artifacts generated and shared through technological environments where (almost) anything can be captured digitally and collected as data, which Mayer-Schönberger and Cukier (2013) referred to as "datafication." The phrases "big data" and "big science" have been around since the 1990s, though it would appear no one is certain exactly when it emerged and/or who coined the phrases (Big Data Fundamentals, 2019). While still a relatively new construct in the research area, big data has already become a somewhat prosaic, all-encompassing phrase used to describe a variety of different purposes about enormously gigantic data sources. Big data has been used to describe everything from the collection and aggregation of large amounts of data to vast amounts of digital analysis aimed to identify patterns in human behavior for researchers and industries alike (Favaretto, Clercq, & Elger, 2020). This is in addition to uses aimed to improve science and research; optimize performance; improve health care; enhance machine and device performance, security, and law enforcement; and, most recently, provide essential information on the pandemic which has guided public health decisions. The use of big data has shown to have the potential to identify key information for improved decision-making processes, and, as such, it is easy to understand why it has also attracted the attention of ODDE researchers.

The most frequently cited definition of big data is by the National Science Foundation (NSF, 2012). The National Science Foundation states:

> The phrase "big data" in this solicitation does not refer just to the volume of data, but also to its variety and velocity. Big data includes large, diverse, complex, longitudinal, and/or distributed data sets generated from instruments, sensors, Internet transactions, email, video, click streams, and/or all other digital sources.

The problem with this definition is that, as Favaretto et al. (2020) note, it is "loaded with conceptual vagueness" (para. 1). Essentially, big data is comprised of ". . . any collection of data or datasets so complex or large that traditional data management approaches become unsuitable" (IPSOS Encyclopedia, 2016). A study conducted by Favaretto et al. investigated researchers' understanding of the big data phenomenon over the last decade. The findings of this study revealed that many of their participants were uncertain how to define big data, though there was some agreement on using the traditional "Vs" definition – though, again, there was no agreement on the number of Vs. Depending on who one reads, the Vs definition of big data includes two to seven of the following: *volume (big,* extremely big, data – or very large datasets consisting of terabytes, petabytes, zettabytes of data – or larger), variety (multiple datasets that include structured and unstructured data – such as pictures, voice recordings, tweets, etc.), veracity (trustworthiness which includes the increasingly complex data structure, anonymities, imprecision, or inconsistency in large datasets), velocity (high volume of incoming data with nonhomogeneous structure), value (extracting data that lead to the discovery of a critical causal effect that results in an important new discovery), variability (the meaning of the data are constantly changing), and visualization (presentation of data that is readable) (Sivarajah, Kamal, Irani, & Weerakkody, 2017).

In the study by Favaretto et al. (2020), most of the participants (who were big data researchers) preferred a practical definition that linked to practice such as the processes of data collection and processing. Also noted in the findings is that the participants, on the whole, had an uneasiness with respect to the use of the term big data, recognizing that this field is a "shifting and evolving cultural phenomenon. Moreover, the currently enacted use of the term as a hyped-up buzzword might further aggravate the conceptual vagueness of big data" (para. 4). As Favaretto et al. also emphasize, "big data is a term that has invaded our daily world. From commercial applications to research in multiple fields, big data holds the promise of solving some of the world's most challenging problems" (Introduction, Para. 2). Given the shifting ways big data are collected, analyzed, and used, it would seem a definition of big data needs to be linked to its use. At this point in time, researchers are using big data to "analyse and group data, create correlations, look for clusters and essentially gain insights into data, that we cannot get from standard reporting of the tools and systems creating and storing the data" (Sivarajah et al., 2017, p. 266). Given how big data are currently being used in ODDE research, it can be defined as the analysis of an extremely large group of data that generates correlations and/or clusters, providing insights otherwise unobtainable from standard collection and analysis. While there is no agreed-upon threshold for big data (upper and lower limits depend on the kind of data collected and time span of the data collected), "standard collection" of data can be understood as data created and collected that can be analyzed through traditional data management approaches (e.g., existing database management software such as Oracle, FoxPro, FileMaker Pro, Microsoft Access, etc.). Big data, then, are large amounts of data (e.g., terabytes, petabytes exabytes, and larger) created and collected overtime, and the data are analyzed using big data analytic software (e.g., Domo, Grow, Toucan Toco Data, Python, R, etc.).

How Big Is Big Data?

Quite simply, big data is very, very big. Just how big" very, very big" is is difficult to determine because the ways the data are collected, analyzed, and used are constantly changing. A report provided by Dobre and Xhafa (2014) determined that the world produces about 2.5 quintillion bytes of data. How big is quintillion byte of data? One exabyte equals one quintillion bytes, so one exabyte equals one billion. A Google search on the Internet indicates (depending on the site visited) that in 2020, we (people who use digital technologies) created about 1.7 megabytes of data every second and by the end of 2020, approximately 44 zettabytes comprised the entire digital universe. The eighth edition of Domo's "Data Never Sleeps" report estimated that we created 2.5 quintillion data bytes, daily, in 2020 (fyi: there are 18 zeros in a quintillion). Raconteur (2021) estimates there will be 483 exabytes of data generated each day by 2025. According to the World Economic Forum (2019), there are 40 times more bytes in 483 exabytes than there are observable stars in the universe.

There appears to be no end in sight on the ways big data continues to challenge our imagination with respect to limits and by association the ways in which an ODDE researcher can use big data to gain relational information about ODDE. For example, Wen, Zhang, and Shu (2019) assert that through the use of a chaos optimization and cognitive learning model they developed, it is possible to gather information about student attributes (e.g., motivation, task demands, efficacy, interaction, time on tasks, learning styles, etc.) to potentially improve the ODDE learning experience. As Wen et al. illustrate (see also Huda, Maseleno, Atmotiyoso, Siregar, Ahmad et al., 2018), it is possible to optimize the chaos, of large, incomplete, noisy, fuzzy, big data to uncover potentially useful information which can be used to not only enhance the learning experience but also assist in market strategies, risk reduction, administrative tasks (e.g., registrations), resource and infrastructure management, and policy decisions. Another example is the perennial issue of student attrition in ODDE which, as O'Brian (2017) aptly notes, is often only identified after an exam is missed or a student is no longer logging into the learning system. It is possible that big data analysis can enable early identification of students who are at risk (dropout, flunkout, time-out), providing opportunities for interventions. A study by Zhang, Gao, and Zhang (2021), for example, used clickstream data to investigate student attrition in ODDE. Their findings revealed that introductory learning resources, scaffolding, and embedded assessment can mitigate attrition. Kyritsi, Zorkadis, Stavropoulos, and Verykios (2019) also found that the use of discussion fora is correlated to higher achievements on course assignments, quizzes, and exams; this, in turn, could reduce attrition due to failure.

As these examples illustrate, the greatest contribution of big data is the ability to gather predictive data which can assist in strategic decision-making, as well as guide students through their programs and course selections. In turn, this could also improve student success and satisfaction, increase the quality of teaching resources, and lower costs (Dahdouh et al., 2018; Rienties, Cross, Marsh & Ullmann, 2017).

To assist in understanding how to use the enormous amounts of data to enhance ODDE, data scientists use data visualization tools. Data visualization tools provide a representation of data in a graph, chart, or other visual formats that illustrates relationships of the data through the use of images. The visual relationships, then, allow us to identify and interpret trends and patterns, which can provide predictive analysis. For example, as Atasoy et al. (2020) note, it is obvious that a better understanding of the student (e.g., demographics, grades, attendance, log data, interaction, time spent in online, and responses to interventions and learning designs) would benefit students and "thus the educational institution's retention and success rate" (p. 147). According to Atasoy et al., it is possible to use this information to:

> . . . predict learners' performance, identify undesirable learning behaviors and emotional states, ascertain and monitor learners at risk and provide appropriate help for learners. It can also stipulate learners with learning features that will make their learning experience more personal and engaging, encourage reflection and development and stronger descriptions of patterns . . . there will be personalized theories and philosophies that fit each learner and application of a student-centric, inquiry-based model of analytics will put the tools and premises of analytics into the hands of learners and empower them as metacognitive agents of their own learning . . . Also, the collection of large amounts of data, big data, can help educators and system makers to identify patterns which will enable tailored education for each individual. By this way, pedagogy and andragogy can break their chains; become free from "one-size-fits-all" principles. (pp. 159–160)

Data Deluge

The data deluge phenomenon refers to the tsunami of complex, unstructured, and structured data available alongside a perception that we can simply, and easily, mine whatever data we are interested in, analyze it, and voila: we have novel insights and significant findings from an unprecedented scale of large data available**.** This is a misguided assumption.

Mayer-Schönberger and Cukier (2013) describe a transition that is occurring in research practices from causal inference approaches to analyzing data to data analysis practices based on the advantages of conducting correlational analysis with extremely large datasets. There is no question, as Gejingting, Ruiqiong, Wei, Libao, and Zhenjun (2019) observe, big data are capable of providing powerful functions for correlation analysis. The strength in correlational analysis of big data is the probability meanings; hence, if the correlation coefficient is large, it can establish probability with a high degree of accuracy. However, there are well-known limitations with correlational research, including the well-known limitation that not all correlations are meaningful (e.g., just because two variables are correlated does not mean a causation relationship exists between them). It is true that big data will return results on (almost) anything the researcher asks. Unfortunately, if researchers ask the wrong question or are just "going fishing" for significant relationships, big data will return significant results – regardless of whether causation exists or not. It is also well-known that big data are prone to data breaches, there are a lot of data behind firewalls that are not available for data analysis resulting in skewed and/or an incomplete analysis of the data, and the tools used to collect big data are inexact. As Fan, Han, and Liu highlight (2014): "…the massive sample size and high dimensionality of big data introduce unique computational and statistical challenges, including scalability and storage bottleneck, noise accumulation, spurious correlation, incidental endogeneity, and measurement errors" (para. 1), leading to mistaken statistical inferences and incorrect scientific conclusions.

For reasons noted above, several ODDE researchers have cautioned about the possible perils of working with big data. Unsupported assertions with unbridled enthusiasm about big data have been challenged and continue to experience increased criticism. The following is such a quote by an enthusiastic researcher who declared that big data will end the need for theory and make scientific methods obsolete:

> … massive amounts of data and applied mathematics replace every other tool that might be brought to bear. Out with every theory of human behaviour, from linguistics to sociology. Forget taxonomy, ontology, and psychology. Who knows why people do what they do? The point is they do it, and we can track and measure it with unprecedented fidelity. With enough data, the numbers speak for themselves. (Anderson, 2008)

In response to such assertions, Crawford (n.d.) published myths about big data arguing, among other things, it is a mistaken assumption that when the numbers are large enough, the data speak for themselves. Other criticisms include discrimination, asynchronous power between social groups, and invasion of privacy (e.g., Leurs & Shepherd, 2017; Mills, 2018). Boyd and Crawford (2012) have asked critical questions about the analysis and use of big data, including the following: Are big data changing our definition of knowledge? Are big data misleading us with respect to objectivity and accuracy? Are big data better data? Are big data meaningful without context? While the data are available for collection, is it ethical? Is the use of big data creating a new digital divide? On a darker side, Leurs and Shepherd (2017) question who, exactly, benefits from the correlative analysis of big data? And who suffers? They describe the issues with "runaway data that asymmetrically order our social … institutions through hidden algorithmic practices that tend to further entrench inequality by seeking to predict risk" (p. 211).

To be clear, big data are remarkable at ubiquitously collecting a vast array of human behaviors available in a digital format. However, meaningful research is more than just a matter of getting a ticket dump and using data analytic and visualization tools. It is essential to know and understand the context, who is contributing to the data, who is not, how it is being used, and what processes it is supporting. Big data, in and of itself, is meaningless.

Little Science, Little Data

As illustrated above by Anderson (2008), there are practitioners and researchers who believe that big data will render the data arising from small-scale research (most data collected in qualitative studies would be considered small-scale research) inadequate and perhaps even become an obsolescent form of data collection. Of course, these assertions have been challenged, most often countering with the argument that complex research questions about human behavior and society require identification of patterns within contextualized data and these data are, typically, located in the minds, artifacts, and/or documents of individuals and organizations – not always available in a digital format (Mills, 2018). Access to these data relies on the willingness of individuals and organizations to share this information (e.g., opinions, perspectives, documents, etc.). Furthermore, researchers are (typically) awarded funding, and published in competitive journals, when new insights from original data are produced, providing solutions for current issues and problems (Borgman, 2015). As Mills notes:

> . . . big data has potential for optimizing and advancing the efficiency of research and scholarship, more than ever before there is the need for reason, theorization, problem-solving, originality, and social justice in determining what questions can be served by the data, and whose interests they serve. A ready supply of statistics and the vast scale of data in the digital world is not particularly useful for answering the kinds of research questions that people in the social sciences are asking. (p. 595)

By way of an example, a problem in Canada is the provision of access to ODDE opportunities in rural and remote communities who continue to have limited and/or unreliable Internet access. Big data cannot provide insights to issues where these kinds of digital black spots exist. Hence, there are contexts and environments that big data cannot capture; the need for small science will always exist.

Little Data Defined

Unlike big data, there is little controversy with respect to understanding little data. Little data, or qualitative research, is (mostly) an agreed-upon construct. While all research involves collecting, analyzing, interpreting, and writing the results of a study, qualitative research involves an inquiry process of understanding a social or human problem, based on building a complex, holistic picture, formed with words, reporting detailed views of informants and conducted in a natural setting (Creswell, 1994). Denzin and Lincoln (1994) elaborate further, describing qualitative research as a multi-method, interpretive, and naturalistic research approach. In its simplest sense, then, qualitative research seeks to understand individuals' social reality.

How Small Is Small Data?

Because qualitative researchers collect words, documents, artifacts, and/or information as their data, quantifying the data and determining statistical significance are not a concern (Onwuegbuzie & Leach, 2007). Rather, qualitative researchers are concerned about gathering enough data to achieve "conceptual power" (Constantinou, Georgiou, & Perdikogianni, 2017) which, in turn, provides detailed descriptions to ensure the findings are transferable, rather than generalizable. As such, the quality of data is more important than the quantity of data collected. Where the waters get muddy in qualitative research is just how big should the data be? And how small is too small? There is certainly no shortage of scholarly literature on this front or pedestrian opinions available on the Internet.

Qualitative data can include historical documents, observations, visual data, books, and texts – to list a few. However, by far, the most frequent data collected by qualitative researchers are the words provided by purposively selected individuals and/or group(s) of people. The issue revolving around how many individuals or groups of individuals are needed to achieve rigor, credibility, and trustworthiness is where there is less consensus. Depending on whom one reads, sample sizes involving individuals and/or groups can be as small as one person (Baker & Edwards, 2012) in, for example, biographical research. Alternatively, recommendations by Becker et al. (2002) argue that "In the case of 2-4-h interviews . . . [the] rule of thumb is that fewer than 60 interviews cannot support convincing conclusions and more than 150 produce too much material to analyse effectively and expeditiously" (p. 23), while others conclude there are no rules. Baker and Edwards conducted interviews with experts in the field, asking them "how many qualitative interviews is enough?" With few exceptions, the answers by the experts selected for this study involved explaining that it depends, concluding as one participant mused:

> But in general the old rule seems to hold that you keep asking as long as you are getting different answers, and that is a reminder that with our little samples we can't establish frequencies but we should be able to find the range of responses . . . the best answer is to report fully how it was resolved. (Bakers & Edwards, pp. 3–4)

Data Saturation

Data saturation is a term which is used for what the above participant refers to as "the old rule." According to Glaser and Strauss (1967), data are saturated when the topics or themes drawn from the researcher(s)' dataset are repeated and the data ceases to provide new information or themes relating to the research problem. There is general agreement in the research community on how data saturation is defined, as well as consensus that data saturation contributes to ensuring the data collection and analysis are robust and valid. What is rarely in the literature on data saturation, as well as in published research studies, is a description of how data saturation is achieved. It should also be noted that what is actually saturated is not the data, per se, but the categories/topics and themes. As Constantinou et al. (2017) note, words cannot be saturated because the words used will be different across participants; what researchers actually analyze are the commonalities of the words and their meanings among participants. Technically, then, it is themes saturation, not data saturation. This noted, it has been argued that thematic saturation can be attained the same way:

when there is cessation of new themes and categories. Yet, as Morse (2015) observes, how to achieve themes saturation is not always well understood by researchers, noting it is typically comprised of an abstract description, vacant of a detailed process.

Constantinou et al. (2017) reviewed the literature on different approaches for reaching saturation; they found a limited number of papers on how to conduct saturation. Depending on the processes described, this literature indicates that saturation can be achieved after 8–17 interviews (e.g., Bowen, 2008; Francis et al., 2010; Guest, Bunce, and Johnson, 2006). The processes presented for saturation were deemed in several ways as inadequate, with the biggest issue revolving around the question of interview order. Specifically, if the interviews were conducted in a different sequence (what they refer to as order-induced error), the researcher cannot be certain whether saturation would have been achieved within 8–17 interviews. Constantinou et al. offered an alternative method to achieve saturation which involves reordering the interviews multiple times. While Constantinou et al. provide a solution for the order-induced error, what continues to be unclear is as follows: How many participants are enough? It is reasonable to assume that the larger the sample size, the greater the number of topics and themes that will emerge. Hence, the issue about whether the sample size and selection are an accurate representation is not resolved with saturation, irrespective of the methods proposed. Based on the proposed methods for saturation and the literature critiquing these processes, it would appear saturation does not, de facto, contribute to the credibility or trustworthiness of qualitative research. In agreement with Wray, Markovic, and Manderson (2007), in reality, no data are ever truly saturated.

An alternative to thematic (or data) saturation is a statistical calculation for sample size proposed by Fugard and Potts (2015). While debates have been ongoing about the use of a statistical calculation for sample size in qualitative research, this may be a useful way for ODDE small data researchers to consider sample size within the context of the study before the data have been collected (a priori) rather than after the data have been collected (a posteriori). As noted previously, saturation is determined based on data analysis redundancy or cessation of new theoretical insights. As such, sample size is determined a posteriori. Fugard and Potts have proposed sample size can be determined a priori based on the contexts, similar to determining sample size in midsized quantitative research, such as survey methodology. Fugard and Potts proposed that sample sizes are comparable to those found in the literature, for example, ". . . to have 80% power to detect two instances of a theme with 10% prevalence, 29 participants are required. Increasing power, increasing the number of instances or decreasing prevalence increases the sample size needed" (p. 669).

Fugard and Potts (2015) acknowledge that the statistical calculation they have developed (and is open access; see Appendix) is not sufficient, in and of itself, for qualitative research. Rather, it is to be used in combination with other contextual considerations. As such, the statistical calculation proposed and developed by Fugard and Potts can be used as a practical tool for ODDE small data researchers to plan sample size involving thematic analysis, a priori. The tool is easy to use; the calculations are provided so qualitative researchers who are unfamiliar with statistical calculations should not have problems determining a sample size.

To be clear, Fugard and Potts (2015) do not propose that their tool will provide thematic saturation; rather, it is to be used as a useful estimate when planning for a qualitative research project (e.g., funding and ethics). Given the issues with determining saturation, using Fugard and Pott's statistical calculation is a viable tool worth considering in ODDE research. As Fugard and Potts note, it should be used with consideration of the context, and while not stated by Fugard and Potts, it could also be used alongside a saturation method, whereby sample size is estimated a priori and saturation is conducted a posteriori.

In Consideration of Big and Little Science for ODDE

Up to this point, big data and little data have been presented as separate forms of research. However, as discussed, both have possibilities and problems with respect to the kinds of insights obtained. Given the vast range of topics and practices in ODDE, ODDE researchers are well-positioned to generate meaningful research questions that can be effectively answered using both big and little datasets. ODDE researchers can use the analysis of big data patterns to gain information on what is occurring, which can be used in tandem with qualitative methods to gain better insights on why. Big data analytics, for example, can provide essential information about what ODDE students do online, where their activities are located, and what courses they are enrolling in, but it cannot explain why ODDE students leave their programs of study or why they select certain educational institutions, nor understand ODDE students' opinions and thoughts about their educational experiences. Qualitative research can gather data that provide insights into ODDE that shape how researchers can gain further understandings of ODDE. For example, if the ODDE researcher is interested in back channel text-based communication in asynchronous MOOC courses, discourse analysis (a method for studying written language in relation to its social context) would likely be the research method chosen. The analysis of discourse in a MOOC course would be difficult and time-consuming to conduct and would require substantive resources and a large research team. However, data visualization tools could be used to establish patterns and relationships, which could then be followed up with ethnographic observations and interviews to make the links with big data patterns and in-depth data from individual students or cases. Another example could be collecting big data from social network analysis (SNA) to build on distance learning theories. In particular, SNA could determine the relationships between the actors that facilitate the flow of information. Based on the relationships generated by SNA, ODDE researchers could follow up with ethnographic observations of the textual communication in distance education courses for richer understandings of relationships. As Mills (2018) notes, small datasets that use qualitative methods are useful for refining (and/or generating) theories that are used by researchers to explain the data. This is important in that what data are collected will always have "an element of arbitrariness, and data are not truth in themselves. They are simply sources of evidence that can be used to assert a certain view of reality" (Mills, 2018, p. 599). Mills also notes that the data researchers collect belongs to the subjects and are constructed in situ and must be collected accordingly.

Conclusion

This chapter provides a discussion on the possibilities and problems of little science and big science. An often-overlooked aspect by new and experienced ODDE researchers is to acknowledge we do not have shared understandings of what big data and little data are. An important aspect presented in this chapter is that when conducting research in ODDE with big and/or little data, ODDE researchers need to provide working definitions. This chapter also highlighted some of the limitations of the use of big and little datasets; however, it is certainly not an exhaustive description of all the problems and limitations. ODDE researchers who enter into research projects who are aware of the limitations are best prepared to provide either alternatives or additional research practices to compensate for the limitations, as well as to clearly and fully explain the limitations providing readers with a full understanding of the trustworthiness of the findings. All research is flawed.

Finally, the possibilities of gaining insights about ODDE through the building on and/or blending of big and little datasets are limited only by our imagination. Through the use of big and little datasets, we can gain further information and meaningful insights about persistent problems in ODDE, such as the following: Why is attrition so high in self-directed/self-regulated distance education? What distance education theories provide the greatest explanatory power for at-risk ODDE students? Are there specific characteristics of students at risk? And if so, are there strategies that can assist at-risk students? What are the characteristics of successful distance education students? What kinds of communication platforms provide the best support for ease of group communication for ODDE students? What kinds of online learning activities are effective at supporting critical, creative, and complex skills? Is a blended asynchronous and synchronous communication format more effective than a non-blended format for ODDE? Do student characteristics impact the kinds of communication effectiveness? In what ways do discipline impact communication effectiveness?

When big and little datasets are used to investigate ODDE, we have the ability to gain information about what our open and distance education students are doing and why they are doing what they are doing.

Cross-References

▶ Classic Theories of Distance Education
▶ Learning Analytics in Open, Distance, and Digital Education (ODDE)

► Managing Innovation in Teaching in ODDE
► Research Trends in Open, Distance, and Digital Education

Appendix

Big data open access tools

There are few options for ODDE researchers who wish to use open access software for big data collection and analysis. However, there are several tools that offer free use and/or free trial options. The three most commonly used tools providing these options are:

Domo (domo.com)
Grow (grow.com)
Toucan Toco Data (toucantoco.com)

Little data open source tools

Computing the sample size proposed by Fugard and Potts (2015) is provided in the appendix of their paper (pp. 483–484). The following is the example provided by Fugard and Potts:

To compute the sample size required for a power of 80% to find a theme prevalence of 0.1, and 2 instances, run:
sampSizeForQual(0.8, 0.1, 2)
This gives the answer 29.

Fugard and Potts also note that this code may be run even if R is not installed. Two sites that are open access for qualitative researchers wishing to determine sample size a priori are:

R-Fiddle (r-fiddle.org)
Ideone (ideone.com/oT4BRE)

Both are open access.

References

Anderson, C. (2008). The end of theory: The data deluge makes the scientific method obsolete. *Wired*, 23 June. Available: https://www.wired.com/2008/06/pb-theory/

Ariely, D. [@danariely]. (2013, January 6). *Big data is like teenage sex: Everyone talks about it, nobody really knows how to do it, everyone thinks everyone else is doing it, so everyone claims they are doing it* [Tweet; thumbnail link to article]. Twitter. https://twitter.com/danariely/status/287952257926971392?lang=en

Atasoy, E., Bozna, H., Sönmez, A., Akkurt, A. A., Büyükköse, G. T., & Fırat, M. (2020). Active learning analytics in mobile:Visions from PhD students. *Asian Association of Open Universities*

Journal, 15(2), 145–166. Available: https://www.emerald.com/insight/content/doi/10.1108/AAOUJ-11-2019-0055/full/html.

Baker, S. & Edwards, R. (2012). How many qualitative interviews is enough? Expert voices and early career reflections on sampling and cases in qualitative research. National Centre for Research Methods Review Paper. Available: http://eprints.ncrm.ac.uk/2273/4/how_many_interviews.pdf

Becker, H., Berger, P., Luckmann, T., Burawoy, M., Gans, H., Gerson, K. Gerson, K. Gerson, Glaser, B. Strauss, A., Horowitz, R., Horowitz, R., Inciardi, J., Horowitz, R. Pottieger, A., Lewis, O. Liebow, E., Mead, G.H., & Mills, C.W. (2002). Observation and interviewing: Options and choices in qualitative research in: Qualitative research in action. Sage Research Methods. https://doi.org/10.4135/9781849209656.n9

Big Data Fundamentals. (2019). Big data framework. Available: https://www.bigdataframework.org/short-history-of-big-data/

Borgman, C. (2015). *Big data, little data, no data. Scholarship in the networked world*. Cambridge, MA: MIT Press.

Bowen, G. A. (2008). Naturalistic inquiry and the saturation concept: A research note. *Qualitative Research, 8*(1), 137–152. https://doi.org/10.1177/1468794107085301.

boyd, d., & Crawford, K. (2012). Critical questions for big data. *Information, Communication & Society, 15*(5), 662–679. https://doi.org/10.1080/1369118X.2012.678878.

Constantinou, C. S., Georgiou, M., & Perdikogianni, M. (2017). A comparative method for themes saturation (CoMeTS)in qualitative interviews. *Qualitative Research, 17*(5), 571–588. https://doi.org/10.1177/1468794116686650.

Crawford, K. (n.d.). *Think again big data*. Available: https://foreignpolicy.com/2013/05/10/think-again-big-data/

Creswell, J. W. (1994). *Research design: Qualitative and quantitative approaches*. Thousand Oaks, CA: Sage.

Dahdouh, K., Dakkak, A., Oughdir, L., & Messaoudi, F. (2018). Big data for online learning systems. *Education and Information Technologies, 23*, 2783–2800. https://doi.org/10.1007/s10639-018-9741-3.

Denzin, N. K., & Lincoln, Y. S. (1994). *Handbook of qualitative research*. Thousand Oaks, CA: SAGE.

Dobre, C., & Xhafa, F. (2014). Intelligent services for big data science. *Future Generation Computer Systems, 37*, 267–281. https://doi.org/10.1016/j.future.2013.07.014.

Fan, J., Han, F., & Liu, H. (2014). Challenges of big data analysis. *National Science Review, 1*(2), 293–314. https://doi.org/10.1093/nsr/nwt032.

Favaretto, M., De Clercq, E., Schneble, C. O., & Elger, B. S. (2020). What is your definition of big data? Researchers' understanding of the phenomenon of the decade. *PLoS One, 15*(2), e0228987. https://doi.org/10.1371/journal.pone.0228987.

Francis, J. J., Johnston, M., Robertson, C., Glidewell, L., Entwistle, V., Eccles, M. P., & Grimshaw, J. M. (2010). What is an adequate sample size? Operationalising data saturation for theory-based interview studies. *Psychology and Health, 25*(10), 1229–1245. https://doi.org/10.1080/08870440903194015.

Fruhlinger, J. (2019). "Data Scientist" is the hottest profession of 2019 according to job-listing data. *The Business of Business*. Available: https://www.businessofbusiness.com/articles/massive-increase-in-demand-for-data-science-jobs-in-2019/

Fugard, A. J., & Potts, H. W. (2015). Supporting thinking on sample sizes for thematic analyses: A quantitative tool. *International Journal of Social Research Methodology, 18*(6), 669–684. https://doi.org/10.1080/13645579.2015.1005453.

Gejingting, X., Ruiqiong, J., Wei, W., Libao, J., & Zhenjun, Y. (2019). Correlation analysis and causal analysis in the era of big data. *Materials Science and Engineering, 563*. https://doi.org/10.1088/1757-899X/563/4/042032.

Glaser, B., & Strauss, A. (1967). *The discovery of grounded theory: Strategies for qualitative research*. New York, NY: Aldine Publishing Company. Available: http://www.sxf.uevora.pt/wp-content/uploads/2013/03/Glaser_1967.pdf.

Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? An experiment with data saturation and variability. *Field Methods, 18*(1), 59–82. https://doi.org/10.1177/1525822X05279903.

Hanson, H. L. (2019). Big data. *IBM Nordic Blog.* [online]. Available: https://www.ibm.com/blogs/nordic-msp/in-god-we-trust-all-others-must-bring-data/

Harnham Blog and News. (n.d.). Available: https://www.harnham.com/us/a-data-janitor-the-sexiest-job-of-the-21st-century

Huda, M., Maseleno, A ., Atmotiyoso, P., Siregar, M., Ahmad, R., Jasmi, K. A., . . . & Basiron, B. (2018). Big data emerging technology: Insights into innovative environment for online learning resources. *International Journal of Emerging Technologies in Learning, 13*(1), 23–36. https://doi.org/10.3991/ijet.v13i01.6990.

IPSO Encylopedia. (2016). Big Data. Available: https://www.ipsos.com/en/ipsos-encyclopedia-big-data

Kyritsi, K. H., Zorkadis, V., Stavropoulos, E. C., & Verykios, V. S. (2019). The pursuit of patterns in educational data mining as a threat to student privacy. *Journal of Interactive Media in Education, 1*(2), 1–10. https://doi.org/10.5334/jime.502.

Leurs, K., & Shepherd, T. (2017). Datafication and discrimination. In M. T. Schäfer & K. van Es (Eds.), *The datified society* (pp. 211–232). Amsterdam, Netherlands: Amsterdam University Press. https://doi.org/10.1515/9789048531011-018.

Maldonado-Mahauad, J., Pérez-Sanagustín, M., Kizilcec, R. F., Morales, N., & Munos-Gama, J. (2018). Mining theory-based patterns from Big data: Identifying self-regulated learning strategies in Massive Open Online Courses. *Journal of Computers in Human Behavior, 80*, 179–196. https://doi.org/10.1016/j.chb.2017.11.011.

Mayer-Schönberger, V., & Cukier, K. (2013). *Big data: A revolution that will transform how we live, work, and think*. New York, NY: Houghton Mifflin Harcourt.

Mills, K. A. (2018). What are the threats and potentials of big data for qualitative research? *Qualitative Research, 18*(6), 591–603. https://doi.org/10.1177/1468794117743465.

Morse, J. (2015). Data were saturated. . .. *Qualitative Health Research, 25*(5), 587–588. https://doi.org/10.1177/1049732315576699.

National Science Foundation (NSF). (2012). Core techniques and technologies for advancing big data science & engineering (BIGDATA). Available: https://www.nsf.gov/events/event_summ.jsp?cntn_id=124058&org=NSF

O'Brian, M. M. (2017). What should be done with collected online professional learning information? *The Quarterly Review of Distance Education, 17*(4), 39–48.

Onwuegbuzie, A., & Collins, K. M. T. (2007). A typology of mixed methods sampling designs in social science research. *The Qualitative Report, 12*(2), 281–316. Available: https://nsuworks.nova.edu/tqr/vol12/iss2/9/.

Prinsloo, P., Archer, E., Barnes, G., Chetty, Y., & van Zyl, D. (2015). Big(ger) data as better data in open distance learning. *The International Review of Research in Open and Distance Learning, 16*(1), 284–306. https://doi.org/10.19173/irrodl.v16i1.1948.

Ranconteur. (2021). A day in data. *Data Analytics*. Available: https://www.raconteur.net/topic/technology/data-analytics/

Rienties, B., Cross, S., Marsh, V., & Ullmann, T. (2017). Making sense of learner and learning big data: Reviewing five years of data wrangling at the Open University UK, open learning. *The Journal of Open, Distance and e-Learning, 32*(3), 279–293. https://doi.org/10.1080/02680513.2017.1348291.

Sin, K., & Muthu, L. (2015). Application of big data in education data mining and learning analytics – A literature review. *ICTACT Journal on Soft Computing, 05*(04), 1035–1049. https://doi.org/10.21917/IJSC.2015.0145.

Sivarajah, U., Kamal, M. M., Irani, Z., & Weerakkody, V. (2017). Critical analysis of big data challenges and analytical methods. *Journal of Business research, 70,* 263–286. [online]. Available: https://www.sciencedirect.com/science/article/pii/S014829631630488X
Wen, J., Zhang, W., & Shu, W. (2019). A cognitive learning model in distance education of higher education institutions based on chaos optimization in big data environment. *Journal of Supercomputing, 75*, 719–731. https://doi.org/10.1007/s11227-018-2256-2.
World Economic Forum. (2019). *How Much Data is Generated Each Day?* see https://www.weforum.org/agenda/2019/04/how-much-data-is-generated-each-day-cf4bddf29f/
Wray, N., Markovic, M., & Manderson, L. (2007). Researcher saturation: The impact of data triangulation and intensive-research practices on the researcher and qualitative research process. *Qualitative Health Research, 17*, 1392–1402. https://doi.org/10.1177/1049732307308308.
Zhang, J., Gao, M., & Zhang, J. (2021). The learning behaviours of dropouts in MOOCs: A collective attention network perspective. *Computers & Education, 167*. https://doi.org/10.1016/j.compedu.2021.104189.

Part III

Global Perspectives and Internationalization

Introduction to Global Perspectives and Internationalization in ODDE

15

Svenja Bedenlier

Contents

Abstract

This introductory chapter delves into global perspectives and internationalization surrounding around the field of ODDE by distinguishing and exploring the concepts of global perspectives *on* ODDE and the globalization and internationalization *within* ODDE. This introduction outlines the setup of the section, connects the individual chapters, and develops the section per content areas covered. Following this portrayal, implications for ODDE theory, practice, and research in global perspective are then drawn from the contributions in this section. In sum, the chapters call for continuous engagement of researchers and

S. Bedenlier (✉)
Friedrich-Alexander-Universität Erlangen-Nürnberg, Fürth, Germany
e-mail: svenja.bedenlier@ili.fau.de

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_85

practitioners in the field to facilitate a broad and multifaceted scientific discussion on the practice of ODDE that is mindful of the entanglement of culture, voice, policy, and economics in a global view.

Keywords

ODDE · Global perspectives · Internationalization

Background

Under the term of Open, Distance, and Digital Education (ODDE), several concepts are subsumed that on first sight easily align with ideas of internationalization and global perspectives in education as the term seems to hint at overcoming temporal, spatial, and even institutional boundaries. However, the entanglement of ODDE with internationalization and global perspectives is more complex and even partially contradictory (e.g., Gunawardena, 2014).

In his study on research areas in distance education, Zawacki-Richter (2009) identified "Globalization of education and cross-cultural aspects" (p. 7) to be a neglected research area at the macrolevel of distance education systems and theories. Globalization is delineated to encompass "[a]spects that refer to the global external environment and drivers, the development of the global distance education market, teaching and learning in mediated global environments and its implications for professional development" (p. 7). As indicated in the labeling of this research area and its description, focal points are aspects related to culture at different levels as well as globalization in education as opposed to internationalization (Altbach & Knight, 2007). However, during the years that have followed this systematization, linkages between globalization and culture and others – such as access, equity, ethics, and educational technology (Zawacki-Richter, 2009) – have become more apparent and pressing (e.g., Tait & O'Rourke, 2014).

To connect with the overarching topic of this section of the handbook, the main distinction to be drawn is between the global perspective *on* ODDE and the globalization and internationalization *within* ODDE. While the majority of the chapters in this section can be read in pursuit of offering or contributing to a global perspective *on* ODDE (e.g., ► Chaps. 16, "Assessing the Digital Transformation of Education Systems," ► 17, "The Impact of International Organizations on the Field of Open, Distance, and Digital Education," ► 18, "Online Infrastructures for Open Educational Resources," and ► 20, "Challenges and Opportunities for Open, Distance, and Digital Education in the Global South," by Qayyum, Orr, Mays, Marín and Villar-Onrubia), several chapters also emphasize processes *within* ODDE (e.g., ► Chaps. 25, "International Partnerships and Curriculum Design," by Reiffenrath and Thielsch, and ► 24, "International Students in Open, Distance, and Digital Higher Education," by Mittelmeier). In the following, these two differing views are considered and substantiated with examples to illustrate how they have played out in research and practice so far.

Global Perspectives *on* ODDE

In this section, global perspectives *on* ODDE is understood to be more encompassing than a national, regional, or merely institutional view and serves to sketch out the broader picture of ODDE as it unfolds across the globe. The perspective *on* ODDE aims to provide an overarching view by following the idea of cultural clusters across the globe (Ronen & Shenkar, 2013), comparisons of ODDE systems in an international perspective (Qayyum & Zawacki-Richter, 2018; Zawacki-Richter & Qayyum, 2019), and the focus on groups of countries (Latchem, 2018).

(Economic) globalization "involves a stretching of social relations across time and space such that day-to-day activities are increasingly influenced by events happening on the other side of the globe and the practices and decisions of highly localized groups and institutions can have significant global reverberations" (Goldblatt, Held, McGrew & Perraton, 1997, p. 271). In recognition of this entanglement on various levels, the United Nation's Sustainable Development Goals (SDGs) argue that a *global* effort is needed to "achieve a better and more sustainable future for all" (United Nations, n.d.). This conclusion also applies to the broader field of education. The Covid-19 pandemic and its effects on education around the globe (Bond, 2020; Bond, Bedenlier, Marín, & Händel, 2021; Marinoni, van't Land & Jensen, 2020) serve as one example of how education systems across the world have suddenly faced similar challenges and now need to adapt to changing realities. For ODDE, this global entails viewing developments in a comparative manner (e.g., Qayyum & Zawacki-Richter, 2018) to frame perspectives and conceptualize the broader landscape in research and practice.

Globalization and Internationalization *Within* ODDE

Globalization and internationalization *within* ODDE relates to developments that contribute to an internationalized or globalized stance within ODDE. Drawing on an established definition in the realm of higher education, internationalization "is defined as the process of integrating an international, intercultural, or global dimension into the purpose, functions or delivery of postsecondary education" (Knight, 2003, p. 2). In contrast, globalization is understood "as the economic, political, and societal forces pushing 21st century higher education toward greater international involvement" (Altbach & Knight, 2007, p. 290). Jointly, they relate to questions of culture (Gunawardena, 2014), the nature of globalization as a primarily economically driven meta-process (Carnoy & Castells, 2001), and the intersections of internationalization and globalization within education (see e.g., Altbach & Knight, 2007, for higher education).

A central topic permeating developments within ODDE has been that of culture (e.g., Al-Harthi, 2006) and specifically the role of hegemony of pedagogical values and theories in educational technology (e.g., McLoughlin, 2001; Lauzon, 1999). Tait and O'Rourke (2014) sum up the problem: "Transplanting any technology along with its ideological roots brings the risk of imposing an inappropriate set of assumptions and values on the users, thus detracting from, rather than supporting, intended goals" (p. 45).

However, approaches to navigating this situation have been scarce so far. These questions and challenges for research and practice constitute one aspect located within the broader realm of internationalization and globalization within ODDE, and another is rooted in the institutional structures that characterize open (higher) education.

From an institutional focus, open education, as exemplified via the plethora of open universities that were founded in the twentieth century in numerous countries (Zawacki-Richter, von Prümmer & Stöter, 2015), has operated so far with a focus on the national education context (Tait, 2018). This is reflected in the institutions' names, such as Open University of China, Indira Gandhi National Open University (IGNOU), or University of South Africa (UNISA). While open universities, such as the Turkish Anadolu University, also make efforts to internationalize through branch offices in other countries (Kondakci, Bedenlier, & Aydin, 2019), they continue to cater mainly to a nationally spread student body. This focus is also partly due to the language of the respective study programs. With open universities operating mainly at a distance, the uptake of increasingly digital formats in teaching, learning, and administration has led, in principle, to an even easier and faster dissemination of learning materials, accessibility of instructors and institutional information, and potentially easing the way to a global orientation. However, established notions of internationalization within higher education (Knight, 1994), or globalization (Altbach & Knight, 2007), largely work from the perspective of brick and mortar education institutions. Only recently have concepts such as virtual internationalization (Bruhn-Zass, 2020) or internationalization at a distance (Mittelmeier, Rienties, Rogaten, Gunter, & Raghuram, 2019) emerged that focus on the interplay of different institutional structures and the role of ODDE therein. Despite earlier arguments in favor of internationalized ODDE (Msweli, 2012), only recently has research engaged in this area and the specific topics therein, for example, the use of Open Educational Resources to foster internationalization (Nascimbeni, Burgos, Spina, & Simonette, 2021) or skills of learners in open virtual mobility contexts (Rajagopal et al., 2020).

Structure of the Section

This section collates a comparatively broad array of chapters that each addresses specific aspects of the global perspective *on* and international dimension *within* ODDE. While the section largely revolves around the macrolevel of distance education systems and theories (Zawacki-Richter, 2009), it also includes several chapters that align with the mesolevel of the institutions and the microlevel of teaching and learning within ODDE. As readers delve into the different chapters, it is suggested they do so with the idea that each chapter can be compared to a mosaic stone – showing the different facets of global and international perspectives and forming a whole when pieced together.

The section begins with Adnan Qayyum's comparative assessment of the digital transformation of education systems, as it unfolds around the variables of digital assets, digital use, digital labor, and digital outcomes that are specific to each country and its education system. The author also stresses that the pandemic lays open shortcomings associated with these variables; for example, the lack of preparation of educators for completely remote education. Following this assessment, Dominic Orr delineates the role that international organizations such as UNESCO and OECD play as proponents of ODDE via the concepts of ideation, digital infrastructure projects, and multistakeholder networks. Another common thread of the chapter is the interrelatedness of international organizations and ODDE institutions in mediating expertise in the endeavor to develop accessible learning opportunities for all. Access to (informal) learning opportunities cannot be realized without infrastructure. Thus, Victoria Marín and Daniel Villar-Onrubia focus on infrastructures that enable the sharing of digital pedagogical resources – on a global and cross-border scale as well as national and regional. They illustrate the existing plethora and diversity of platforms, repositories, and initiatives while also highlighting associated challenges pertaining to quality assurance, sustainability, and the dominance of the Global North. In the following chapter, Sanjaya Mishra and Pradeep K. Misra view ODDE through the lens of nonformal education in developing countries and stress that ODDE can and does serve as an important means to foster educational opportunities in addition to formal education. However, they also call for locally anchored research into this nexus and highlight the need for attention in educational policy making. On the other side of the spectrum, Jill Borgos, Kevin Kinser, and Lindsey Kline focus on the borderless market that has revolved around ODDE, stressing the value that this educational segment has for public and private stakeholders and shedding light on intertwined issues such as privatization of education and questions of privacy and security.

The following chapters revolve around the specific education segment of higher education, shedding light on the fact that traditional internationalization within higher education and ODDE find increasingly common ground in their concepts and practices. Readers are nevertheless also encouraged to consider crucial aspects of these chapters in relation to other formal education settings. Elisa Bruhn-Zass elaborates on the concept of virtual internationalization as a new layer that can potentially permeate all dimensions of the comprehensive internationalization that brick and mortar higher education institutions (HEIs) strive to achieve. In this context, forms of ODDE are perceived as a means to realize different and new forms of HE internationalization. Correspondingly, the chapter by Tanja Reiffenrath and Angelika Thielsch focuses on the ways in which higher education institutions can foster their partnerships in international digital teaching and learning settings. They emphasize the importance of curriculum design as the "backbone" (Reiffenrath & Thielsch, 2022, p. 6) for international online courses, while also highlighting the role of virtual mobility and virtual exchange for current policy developments within the European Higher Education Area. Revisiting established notions of internationalization – and more specifically of international students – is also the focus of the contribution by Jenna Mittelmeier. She stresses that previously held assumptions about this group require reconsideration in the context of ODDE, including questions as to how define international students in ODDE, understand their specific experiences, and establish a broader knowledge base to inform further research and practice. Amir Hedayati-Mehdiabadi and Charlotte N. Gunawardena's chapter on ethics and culture concludes this subsection by aligning course design for heterogenous learners in higher and adult education. They delineate the topics of community and language as crucial for the design of inclusive learning environments in ODDE and emphasize the role of the educator shaping the learning environment.

ODDE and its affordances to flexibly overcome time and space may lead to a global perspective that takes an equalizing stance. However, several of the chapters in this section critique such a perspective by voicing the need for specific consideration and focus. The remaining chapters in this section make this explicit and target topics that argue for a "global" and "international" perspective that is mindful of both the obvious differences between regions and countries and the subtle differences regarding voice and distribution of power in a seemingly all-accessible context. Tony Mays lays out the context of ODDE in the Global South and points to the fact that despite the perceived education potential of ODDE and existing projects and initiatives, challenges such as technical infrastructures continue to impede expanded implementation of ODDE. These and other aspects are mirrored in the contribution by Laura Czerniewicz and Lucila Carvalho, who discuss issues of equity within a global perspective of ODDE. Their chapter directs the reader to consider the intertwining dimensions relating to equity and ODDE, such as datafication, the precondition of an unequal postdigital society, and the effects on individuals and societies at large. The final chapter in this section resonates with the idea of stepping back to discern the different discourses revolving around ODDE in a global perspective. Jean-Paul Restoule and Kathy Snow focus on the situation of Indigenous ODDE students in Canadian higher education. Taking a personal stance, they argue that attention to the individual and social environment of a learner or group of learners remains crucial in order to see and address their needs appropriately and allowing for a broader range of voices in the discourse on ODDE.

Conclusions and Implications for Theory, Practice, and Research

The chapters in this section illustrate the array of topics that can be considered mosaic pieces under the heading of global perspectives and internationalization in ODDE. In sum, they provide a picture of a field that is still in the process of becoming – leaving ample space for further engagement in theory, practice, and research. As it stands, these three fields are not to be seen as separate grounds but rather interwoven and mutually dependent.

Theory

Revisiting Theory

Given the dispersed nature of the chapters, the wish for simply "more" theory would be short-sighted as the state of theoretical advancements is potentially rooted in different disciplines and should be considered individually for each topic. What can be concluded from some chapters – for example, Bruhn-Zass, Mittelmeier, Restoule and Snow, Czerniewicz and Carvalho, and Hedayati-Mehdiabadi and Gunawardena – is that existing assumptions and theoretical concepts are not sufficient to account for the entanglement of global perspectives and ODDE. Rather, as the authors of these chapters show, existing concepts leave room to be developed further and conceptualized into more encompassing concepts. This task also includes challenging existing understandings, for example, of what constitutes an international student, or disentangle facets of equity to understand how it relates to current changes in society and education. Furthermore, the revisiting of existing concepts and theories also necessitates asking: whose voice is being heard in the creation and dissemination of theory, which aligns closely with questions relating to the conduct and dissemination of research.

Practice

Reconciliation of Stakeholder Perspectives

The practice of ODDE in relation to global perspectives and internationalization is complex: A plethora of stakeholders with diverging and partly opposing intentions (e.g., international organizations, (education) enterprises, public and private education institutions, platform providers as well as individual instructors and learners) need to be cognizant of, and even reconcile, their interests and do so in a cross-border manner. Thus, despite the focus being primarily located on the macrolevel, the content of these chapters ultimately affects the level of individual courses and learners' experience in ODDE, as well as their personal life situation beyond ODDE. It seems therefore advisable for any practitioner involved in ODDE to consider these intersections and (diverging) interests, especially on the continuum of the ideas of "open" on the one hand and the global market perspective on the other (see ▶ Chap. 22, "The Borderless Market for Open, Distance, and Digital Education," by Borgos, Kinser, and Kline).

Questioning Educational and Technological Hegemony

Several chapters in this section also highlight the fact that specific cultural values are inscribed into educational technology and current practices and views on pedagogies. Therefore, ODDE cannot afford to take a "one size fits all" approach if it is to be applied and put to use in favor of cultural plurality, specific geographic and institutional preconditions, and be true to its often proclaimed character as an enabler for the provision of education *for all.* Again, while the chapters in this section emphasize on several levels, enacting this in and through practice remains an issue to tackle proactively in ODDE.

Research

Interdisciplinarity

The collection of chapters in this section is not confined to mere pedagogical considerations and research, but rather assumes an interdisciplinary stance, by also drawing on sociology, economics and business, cultural studies, and political science. Such an interdisciplinary stance is important when globalization is considered as an economically driven phenomenon (Carnoy & Castells, 2001). To disentangle the different disciplinary lenses that can be used to scrutinize the global perspective on and within ODDE, it seems advisable to be mindful of the interdependencies that exist between them – and put them to use for holistic research into specific topics.

Comprehensive Data

While researchers on this topic operate with concepts such as culture, values, or hegemony that are comparatively difficult to grasp and reflect upon (Olaniran & Agnello, 2008), there exists a perceived need to substantiate any research into these dimensions with data to go beyond theoretical and conceptual discussion. The likewise perceived lack of comprehensive and accessible data (e.g., on international distance education students or virtual exchange activities) makes it currently difficult to advance specific subfields empirically. Generating data of this scale seems almost impossible on an individual level, suggesting that international organizations, associations, and entities would need to play an important role in enabling research that goes beyond case studies and small-scale qualitative inquiry.

Locally Bound Research

Mishra and Misra's suggestion to conduct research through actively involving local communities and Restoule and Snow's anecdotal evidence show the importance of how, and by whom, research is conducted, specifically when questions of culture, local and regional feasibility, and impact are concerned. Going beyond simply conducting research, this perspective also implies an opportunity to revisit publication outlets for research on ODDE – a large majority of which operate in the English language and are hosted in Anglo-Saxon countries. Linguistic plurality and recognition of Non-English language discourse also play into this discussion (e.g., Beigel, 2021).

References

Al-Harthi, A. S. (2006). Distance higher education experiences of Arab gulf students in the United States: A cultural perspective. *The International Review of Research in Open and Distributed Learning, 6*(3), 10.19173/irrodl.v6i3.263.

Altbach, P. G., & Knight, J. (2007). The internationalization of higher education: Motivations and realities. *Journal of Studies in International Education, 11*(3–4), 290–305. https://doi.org/10.1177/1028315307303542.

Beigel, F. (2021). A multi-scale perspective for assessing publishing circuits in non-hegemonic countries. *Tapuya: Latin American Science, Technology and Society, 4*(1), 1845923. https://doi.org/10.1080/25729861.2020.1845923.

Bond, M. (2020). Schools and emergency remote education during the COVID-19 pandemic: A living rapid systematic review. *Asian Journal of Distance Education, 15*(2), 191–247.

Bond, M., Bedenlier, S., Marín, V. I., & Händel, M. (2021). Emergency remote teaching in higher education: Mapping the first global online semester. *International Journal of Educational Technology in Higher Education, 18*(1), 50. https://doi.org/10.1186/s41239-021-00282-x.

Bruhn, E. (2020). *Virtual internationalization in higher education*. wbv Media. https://doi.org/10.3278/6004797w

Carnoy, M., & Castells, M. (2001). Globalization, the knowledge society, and the network state: Poulantzas at the millennium. *Global Networks, 1*(1), 1–18. https://doi.org/10.1111/1471-0374.00002.

Goldblatt, D., Held, D., McGrew, A., & Perraton, J. (1997). Economic globalization and the nation-state: Shifting balances of power. *Alternatives: Global, Local, Political, 22*(3), 269–285. https://doi.org/10.1177/030437549702200301.

Gunawardena, C. N. (2014). Globalization, culture, and online distance learning. In O. Zawacki-Richter & T. Anderson (Eds.), *Online distance education. Towards a research agenda* (pp. 75–107). Athabasca University Press.

Knight, J. (1994). Internationalization: Elements and checkpoints (Nr. 7; CBIE Research). Canadian Bureau for International Education. https://files.eric.ed.gov/fulltext/ED549823.pdf

Knight, J. (2003). Updated definition of internationalization. *International Higher Education, 33*. https://doi.org/10.6017/ihe.2003.33.7391.

Kondakci, Y., Bedenlier, S., & Aydin, C. H. (2019). Turkey. In A. Qayyum & O. Zawacki-Richter (Eds.), *Open and distance education in Asia, Africa and the Middle East: National Perspectives in a digital age* (pp. 105–119). Springer.

Latchem, C. (2018). *Open and distance non-formal education in developing countries*. Springer. https://doi.org/10.1007/978-981-10-6741-9

Lauzon, A. C. (1999). Situating cognition and crossing borders: Resisting the hegemony of mediated education. *British Journal of Educational Technology, 30*(3), 261–276. https://doi.org/10.1111/1467-8535.00115.

Marinoni, G., van't Land, H., & Jensen, T. (2020). *The impact of Covid-19 on higher education around the world*. IAU Global Survey Report.

McLoughlin, C. (2001). Inclusivity and alignment: Principles of pedagogy, task and assessment design for effective cross-cultural online learning. *Distance Education, 22*(1), 7–29. https://doi.org/10.1080/0158791010220102.

Mittelmeier, J., Rienties, B., Rogaten, J., Gunter, A., & Raghuram, P. (2019). Internationalisation at a distance and at home: Academic and social adjustment in a south African distance learning context. *International Journal of Intercultural Relations, 72*, 1–12. https://doi.org/10.1016/j.ijintrel.2019.06.001.

Msweli, P. (2012). Mapping the interplay between open distance learning and internationalisation principles. *The International Review of Research in Open and Distributed Learning, 13*(3), 97–116. https://doi.org/10.19173/irrodl.v13i3.1182.

Nascimbeni, F., Burgos, D., Spina, E., & Simonette, M. J. (2021). Patterns for higher education international cooperation fostered by open educational resources. *Innovations in Education and Teaching International, 58*(3), 361–371. https://doi.org/10.1080/14703297.2020.1733045.

Olaniran, B. A., & Agnello, M. F. (2008). Globalization, educational hegemony, and higher education. *Multicultural Education & Technology Journal, 2*(2), 68–86. https://doi.org/10.1108/17504970810883351.

Qayyum, A., & Zawacki-Richter, O. (Eds.). (2018). *Open and distance education in Australia, Europe and the Americas: National perspectives in a digital age*. Springer. https://doi.org/10.1007/978-981-13-0298-5.

Rajagopal, K., Firssova, O., de Beeck, I. O., Van der Stappen, E., Stoyanov, S., Henderikx, P., & Buchem, I. (2020). Learner skills in open virtual mobility. *Research in Learning Technology, 28*, 1–18. https://doi.org/10.25304/rlt.v28.2254.

Reiffenrath, T., & Thielsch, A. (2022). International partnerships and curriculum design. In *Handbook of open, distance and digital education* (pp. 1–18). Springer Nature Singapore. https://doi.org/10.1007/978-981-19-0351-9_90-1.

Ronen, S., & Shenkar, O. (2013). Mapping world cultures: Cluster formation, sources and implications. *Journal of International Business Studies, 44*(9), 867–897. http://www.jstor.org/stable/43653701.

Tait, A. (2018). Open universities: The next phase. *Asian Association of Open Universities Journal, 13*(1), 13–23. https://doi.org/10.1108/AAOUJ-12-2017-0040.

Tait, A., & O'Rourke, J. (2014). Internationalization and concepts of social justice: What is to be done? In O. Zawacki-Richter & T. Anderson (Eds.), *Online distance education. Towards a research agenda* (pp. 39–73). AU Press.

United Nations. (n.d.). *Take action for the Sustainable Development Goals*. Retrieved July 25, 2022 from https://www.un.org/sustainabledevelopment/sustainable-development-goals/

Zawacki-Richter, O. (2009). Research areas in distance education: A Delphi study. *The international review of research in open and distributed. Learning, 10*(3), 10.19173/irrodl.v10i3.674.

Zawacki-Richter, O., & Qayyum, A. (Eds.). (2019). *Open and distance education in Asia, Africa and the Middle East: National perspectives in a digital age*. Springer. https://doi.org/10.1007/978-981-13-5787-9.

Zawacki-Richter, O., von Prümmer, C., & Stöter, J. (2015). Open Universities: Offener Zugang zur Hochschule in nationaler und internationaler Perspektive. *Beiträge zur Hochschulforschung, 31*(1), 8–25.

Assessing the Digital Transformation of Education Systems

16

An International Comparison

Adnan Qayyum

Contents

Abstract

The digital transformation of education has been underway for decades at differing paces across the world. In this chapter, an education digitization index is proposed in order to assess the extent of digital transformation in various countries. The education digitization index is composed for four variables: digital assets, digital use, digital labor, and digital outcomes. While a lot of research and practice in education has been on digital use – applying particular digital educational technologies – countries with substantial digital assets and a commitment to digital labor are able to transform education systems more readily. Digital assets and digital labor have become more important during the pandemic.

A. Qayyum (✉)
Athabasca University, Edmonton, AB, Canada
e-mail: aqayyum@athabascau.ca

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_14

Keywords

Digitization index · Digital readiness · Education policy · Evaluation · Online education

Introduction

Digital transformation is the degree to which digital technologies are being used within educational systems. All education consists of groups of people, organizations, and processes configured to help individuals learn in an organized setting. Digital transformation is the extent to which digital technologies are used by people and organizations in the processes and goals of learning in an organized setting. Common examples of digital transformation include institutions offering courses partly or fully online, digital open educational resources (OER), students or teachers using digital platforms to collaborate, and curriculum designed to foster digital skills and competencies as learning goals.

There are several key issues about the digital transformation of education systems including:

- What is the digital transformation?
- How can the extent of digital transformation be assessed?
- How extensive is digital transformation of education systems in various countries?
- How has the pandemic affected digital transformation?

This chapter focuses on what digital transformation is and how education systems in various countries are. The countries discussed have seen documented substantial recent changes in their educational systems (Qayyum & Zawacki-Richter, 2018). An educational digitization index is proposed to assess and compare the extent of digital transformation in countries, an index that can also be used to assess countries' digital readiness for emergency situations like pandemics or climate threats. In doing so, major research will be reviewed on the topic of digital transformation of education systems. The references in this chapter highlight important research about digitization of education in numerous countries, beyond the important comparative work done by international organizations like the Commonwealth of Learning, the Organization for Economic Cooperation and Development (OECD), the World Bank, and UNESCO.

Education Systems

From an educational systems perspective, inputs and processes combine to create educational and social outcomes. Inputs in education are financial resources (e.g., public and private funding), physical resources (e.g., buildings, infrastructure, materials), and human resources (e.g., teachers, administrators). Inputs also include education policy and legislation required to allow educational processes to occur (OECD, 2019). Processes are the activities (e.g., teaching, design, learning) and institutions (e.g., school boards, schools, and classes) that are commonly associated with education. Outcomes include the educational goals for learners (e.g., skills and competencies of individuals) and economic and social goals for society (e.g., developing human capital, fostering citizenship, social sorting).

Formal education dominates the education system in all countries, and, indeed, is often synonymous with the term education system in many countries. Formal education in all countries requires or offer participation and progression through structured learning environments at the primary, secondary, and tertiary levels. Countries also have nonformal education – education which is not necessarily for accreditation and is often short term. Nonformal education is sometimes articulated with formal education. In countries like Indonesia and Turkey, it is relatively easy to transfer from nonformal education to formal education. In Indonesia recognition of prior learning is well-established within the education system (OECD, 2020). Turkey has long recognized and supported nonformal education alongside the formal system (Kondakci, Bedenlier, & Aydin, 2019, p. 106).

Formal education differs among countries in the starting and ending age of compulsory education, number of years for primary and secondary education, routes for progress through formal education, recognized exit points, options for vocational and higher education, and types of certification (OECD, 2020). Countries also differ in the amount of government regulation and active involvement in education, the extent of public and private education provision, and options for access and participation in education. Participation is at least partly affected by financial, administrative, and physical barriers to education. At the primary, secondary, and tertiary levels of formal education, the classroom is the most common type of physical setting, but this can vary in countries from a room with walls to an outdoor space under a tree. Digital technologies can challenge the physical access barriers to education participation, financial costs, policies, public and private provision, the relationship between formal and nonformal education, as well as pedagogy, teaching, design, and quality.

Digital Transformation

The digital transformation of education systems is not the same as the growing use of educational technologies. Educational technologies have been around for over a century, since before Edison’s use of film in classrooms. Print, radio, and television are technologies used for education that predate the first digital technologies (see Fig. 1). In India some of these are referred to as on-air, as opposed to online, educational technologies (India Ministry of Human Resource Development, 2020, p. 6). During the pandemic, on-air technologies have become crucial to deliver educational content in many countries that sought to ensure “no learners were left behind” (Bozkurt et al., 2020, p. 10).

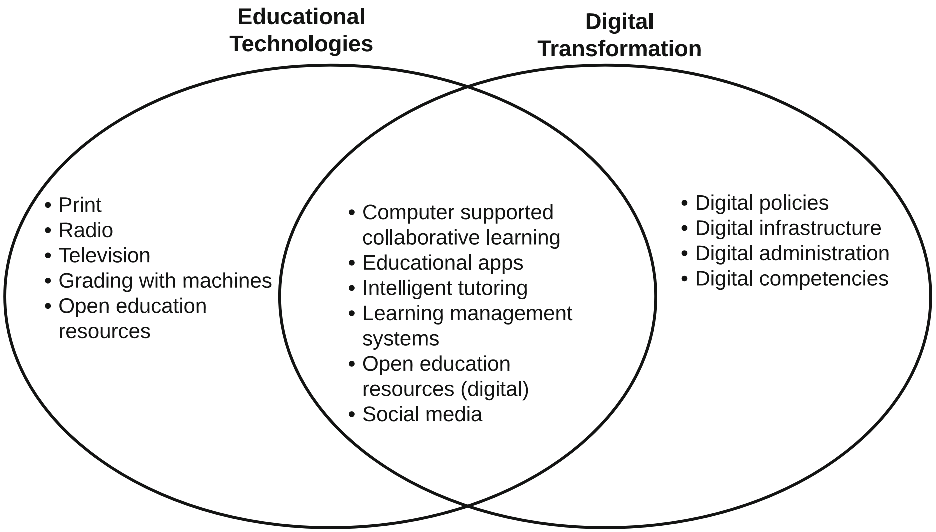


Fig. 1 Examples of educational technologies and digital transformation

Certainly, educational technologies are a part of digital transformation of education systems. These are important tools for teachers, designers, and learners. However, the digital transformation of education systems is broader than educational technologies because education systems are about more than teaching and learning processes. Educational technologies are an important but not exhaustive part of the digital transformation of education systems. Digital transformation involves both digital educational technologies and non-technology initiatives.

Inputs and outcomes, as well as processes, are part of the digital transformation of education systems: inputs include policies and physical and human resources; processes include recruitment, providing access and flexibility to students, and retention, as well as all curriculum, teaching, and learning with digital interaction and content; outcomes include providing learners with digital skills and competencies. For examining digital transformation, these other dimensions of education systems are important. Not including these dimensions can substantially limit digital use that occurs in the "classroom" for teaching, learning, assessment, and other core functions of education.

Another useful way to think about the dimensions of the digital transformation is categories developed by Baker and Smith (2019) for the field of artificial intelligence for education: learner-facing, teacher-facing, and system-facing perspectives. In artificial intelligence for education, learner-facing perspectives focus on tools that students use: to receive information, content, and feedback, to collaborate with students, and to improve their learning. Teacher-facing tools help teachers "to reduce their workload, gain insights about students and innovate in their classroom" (Baker & Smith, 2019, p. 12). This can include insights about student progress, organizing students, methods of teaching, and automating assessment, feedback, and administration. System-facing tools often require sharing data to administrators, managers, and policymakers for insights about enrollment, progression, retention, and attrition (e.g., via learning analytics). Identifying system-facing tools, policies, and initiatives requires acknowledging a broader perspective for assessing digitization beyond digital educational technologies.

Education Digitization Index

Digital transformation is a topic of importance not just for education systems but also for nearly every sector of society. In fields like health care, government, and business organizations, there is ongoing research and discussion about the extent to which digitization has been and should be undertaken. These fields have developed ways to measure the extent of digital transformation. Gandhi, Khanna, and Ramaswamy (2016) created a digitization index of 27 indicators organized into three groups: digital assets, digital usage, and digital labor. Digital assets refer to physical resources and infrastructure like computers, mobile devices, networks, software, and IT services. Digital usage is how much digital engagement there is in processes such as transactions, interactions, organizational dynamics, and outreach (e.g., marketing using social media). Digital labor measures how digitized work is, including how many jobs are digital occupations, and how much is spent supporting workers' digital skills and capacity.

A digitization index can be helpful for assessing and comparing the extent of digital transformation in various countries. However, for the field of education, some of the digitization indices used in other sectors are useful and some are not. Digital assets are certainly crucial. Digitization is not plausible or perhaps even desirable if there are more accessible and viable non-digital options for education systems. Digitization can be costly both for initial and ongoing investment of money and people. In many countries, digitization initiatives redirect efforts and resources from more accessible and affordable options for creating structured learning, so digital asset is a necessary but not sufficient major index for analyzing the extent of digital transformation.

Digital labor is certainly relevant to education. For example, while the field of instructional design existed before digitization, it has emerged as a mainstream educational occupation in many countries in the past 25 years. Instructional design (or learning design) is digital labor that is necessary for digitization in education. There is an unfortunate and long history in the field of education where the use of educational technology has been encouraged and undertaken without recognizing the importance of training and support of educators. Cuban is perhaps most renowned researcher about how teachers have not always accepted the use of machines for teaching (Cuban, 1986), and digital technologies are oversold and underused because of the lack of support and buy-in by educators (Cuban, 2001). Educational technologies often do not gain traction because there is not enough teacher-facing support for education workers to become digital workers who can develop their knowledge, skills, and capacity to use these technologies.

Digital use is heavily researched in education. The use of digital tools for education, especially for teaching and learning in western countries, is well-enumerated and forecasted. (See websites about the most used digital technologies for learning such as www.toptools4learning.com and Educause's *Horizon Report* of tech trends.) Digital use of learner-facing technologies has been extensively researched. (For example, Tamim, Bernard, Borokhovski, Abrami, and Schmid (2011) have written a second order meta-analysis of all the meta-analyses about the effectiveness of using learning technologies.) There is an immense amount of research about the effectiveness of digital technology A used in educational setting B to achieve learning outcome C. However, even here, much of this digital use research about learning effectiveness is not connected to assessments about digital assets, digital labor, and digital outcomes. In the language of evaluation, the research is about the merits of digital use but not the worth.

Finally, the digitization index for other sectors misses an important category which is perhaps unique to education: outcomes. Education is not as transactional as many other sorts of services or products in society. All formal and much of nonformal education involves middle to long-term relationships among participants (e.g., teachers and learners; learners with each other) in order to foster the learning and economic goals of education (e.g., knowledge, skills, citizenship, human capital). Introducing digitization into educational relationships and processes can change the learning, economic, and social goals of education. The outcomes and goals of education usually fall into three categories, sometimes called the iron triangle: access, quality, and cost (Porto, 2013). While digitization can be interesting to try, it must eventually have some larger purpose if it is to move beyond experimentation toward efforts to change education systems. Does digitization help change access and participation barriers? Does it increase the quality of learning and teaching, by improving or changing the learning experience or outcomes in positive and meaningful ways? Is digitization worth the usually heavy cost investment, especially compared to other sorts of ways to support and improve education systems? If digitization does not address one or more of these three sets of goals, then the merit and worth of digital initiatives will rightly be questioned.

A more useful set of digitization indices in education should account for the unique outcomes, as well as the inputs and processes of education systems. Based on existing work, the following indices can be useful for assessing the extent of digital transformation in education systems: digital assets and infrastructure, digital labor, digital use, and digital outcomes. To fairly compare countries with some rigor, there needs to be a point of reference or common denominator. Raivola (1985, p. 363) calls this point of reference a *tertium comparationis* or third comparison. The education digitization index can serve as the tertium comparationis to compare countries with common variables.

Digital Transformation in Education Systems

Digital Assets and Infrastructure

Certainly, Altbach, Reisberg, and Rumbley (2009) were correct that, to varying degrees, all countries are encountering digitization. Countries differ in how much of their education system (i.e., inputs, processes, outcomes) has encountered digitization. Digital assets are recurringly the biggest concern in many countries. Limited digital assets and infrastructure is an access barrier that precludes digitization outside of developed and developing countries with established or emerging digital policies and infrastructure. The International Telecommunications Union profiles over 180 countries for access and use of computers and mobile phones, broadband availability, bandwidth use, and Internet use. Globally, over 55% of households have Internet access at home (ITU, 2021a, p. 13). In developed countries, 80% of people are online, while in developing countries, 45% of people use the Internet. However, in the 47 Least Developed Countries, “four out of five individuals (80%) are not yet using the Internet” (ITU, 2018, p. 2).

None of the UN-classified 47 Least Developed Countries have the physical digital infrastructure for substantial digital transformation of their education systems. Certainly, there are important individual digital initiatives in less developed countries. For example, the African Virtual University has been operating for over 20 years, initially as a World Bank project and now as an intergovernmental organization involving 15 African countries. Nafukho and Machuma (2013) claim that the e-learning activity from the African Virtual University has led to a growth of interest in e-learning and even growth in telecommunications infrastructure in sub-Saharan Africa. In other words, educational digital use has helped expand digital assets. It has also led to increased interest in digital initiatives among less developed countries like Uganda, for example, which recently saw the launch of Royal Open University, a fully online institution. There are also digital initiatives in and for less developed countries by educational institutions, governments, businesses, and international development organizations. (See, for example, the Commonwealth of Learning's video on demand MOOCs for low bandwidth regions, including less developed countries, www.col.org/news-type/mooc/.) While there are a lot of digitization initiatives, they are not the necessary digital assets and infrastructure for substantive digital transformation of education systems in most Least Developed Countries. In these countries, there tends to be more focus on non-digital initiatives often using analog and on-air technologies. Unfortunately, then, most discussions about digital transformation of education systems are conversations about developing and developed countries. Before the pandemic, discussions on digital transformation of education systems in Least Developed Countries were likely imprudent and impractical.

For purposes of brevity and sampling, comparisons will focus on a handful of developed and developing countries. Most developed countries have the necessary physical digital infrastructure for transformative educational digitization. There is substantial Internet access in countries like the United Kingdom (92.9% of households), Germany (90.8%) (ITU, 2021c, p. 9), and Canada (89%) (ITU, 2021a, p. 15). However, even in some of these countries, there is an important rural-urban access divide (ITU, 2021a, p. 1). So, nearly all developed countries have formal policies and funding at the national or regional levels for digital infrastructure initiatives. These are usually not initiatives solely for education but for digital connectivity more broadly.

A forward-looking example for digital assets is South Korea. Nearly all households (99.7%) have access to the Internet, and nearly all people there (96.2%) were regularly using it as of 2020 (ITU, 2021b, p. 18). South Korea has extensive physical digital infrastructure based on a combination of government policies and a strong telecommunications sector. Government policies like Cyber Korea in 1999, e-Korea in 2002, u-Korea in 2005, and a "Master Plan in Preparation for the Intelligent Information Society" more recently (Korea MSIP, 2016) have promoted strong links between government, businesses, and research communities to foster a sophisticated and responsive digital infrastructure. The government has initiated several systems-facing policies that have created assets needed for transformation of the education system. At the tertiary level, the Korean National Open University has been operating since 1972 as an open and distance education institution. A national education TV channel, EBS – Education Broadcasting System – was launched in 1980 to promote lifelong learning for adults but also to supplement school education (Jung, 2019, p. 101). The South Korean government also allowed for private institutions to be certified to provide e-learning when online classes began to emerge in the 2000s (Lim, Lee, & Choi, 2019, p. 93). At the same time, the government established plans to support campus-based universities to offer distance and blended learning. Digital and educational policies and funding created strong digital assets and infrastructure in South Korea.

In developing countries (UN DESA, 2020, p. 166), household Internet access ranges from a high of 88.3% in Turkey to 67% for Brazil and around 60% for South Africa and China to 23.8% in India (ITU, 2021b). Importantly, in developed and especially developing countries, there is far more Internet access via mobile phones than computers. This is revealed in data showing more people use the Internet than have access at home (e.g., Brazil has 70% Internet use with 67% Internet access at home (ITU, 2021a, p. 15).

Digital assets include policies that recognize there is no universal digital access and use. For example, the Chinese Ministry of Education created policy documents in 2018 like the Education Informatization 2.0 Action Plan (in Yan & Yang, 2021). Informatization refers to the use of all information technologies (Xiao, 2019, p. 516). It includes digital technology initiatives like supporting the "steady development of online distance education" (China Ministry of Education in Yan & Yang, 2021, p. 412). However, informatization can also consist of non-digital technologies like radio for education. Non-digital options are included and continue to be important in the education system such as the development of the broadly defined "information literacy" (Yan & Yang, 2021, p. 420). The need for and use of digital technologies is a subset of the larger initiative of "informatization." As digital technologies are not universally accessible, there is an acknowledgment of working with current assets, while initiating strategies like "Internet Plus" to expand digital access (Zhang, 2019, p. 24).

Digital Use

Digitization has permeated all stages of education systems in some countries. This digitization involves technologies and non-technologies outside the "classroom." In tertiary education in most western countries like Australia or Germany, most functions are deeply digitized beyond teaching and learning, including administration (i.e., marketing and recruitment for universities, registering, enrolling, and managing students, etc.), libraries (i.e., online journals and books), research (i.e., data gathering, storage and analysis, writing and publishing reports and articles), and, of course, communication among students, instructors, administrators, and researchers (Selwyn, 2014).

For teaching and learning, online and hybrid course delivery (including MOOCs), learning management systems, digital OER, e-portfolios, digital badges, web resources for videos and podcasts, digital gaming, personalized learning content via learning analytics, artificial intelligence for auto-grading and personal tutoring, and thousands of educational apps are all digital educational technologies that have grown in the past 25 years since the web became a part of education. It is important to identify which digital technologies are used and how. For example, in India, digital tools used in primary and secondary education included e-books (used in

31 out of 36 states and territories), e-content repositories (30 states), interactive resources online (in 29 states), digital classrooms (live synchronous education broadcast via television) (in 26 states), and e-learning portals (26 states) (India MHRD, 2020, p. 25). In Germany, constant digital connection and use has changed the teaching and learning experience in physical classrooms. University students revealed that during class they used mobile phones to access course learning management systems (78% did this), send emails to teachers (74%), send mail to fellow students(73%), search the Internet during lessons (74%), research exam papers and presentations (69%), and review grades (69%), among many other digital uses. They also disclosed that they use their mobiles during studies to use instant messaging (88%) and take photos (78%) (Zawacki-Richter, 2020, p. 5).

While such digital use data is important and insightful, to assess digital transformation, what matters is not the specific digital tools but the type of digital use. As Xiao points out, digitization can mean using digital technologies in the classroom without necessarily changing access or quality. He contends that China's 5-year plans for digital transformation show "scanty evidence of open, flexible, distributed, and disaggregated learning encouraged in these plans" (Xiao, 2019, p. 515). For substantive digital transformation, why digital technologies are used matters more than the specific digital technologies used. Using social media in ways that may change quality, access, or cost matters more than whether educators in countries are using WeChat or Facebook.

Online education mainstreams distance education. Among the most transformative digital uses has been online and hybrid education commonly used to deliver education at the tertiary level. Online education has not been transformative for primary and secondary education, as there is little evidence of substantial enrollments before the pandemic. Historically, distance education, especially the open university movement, had important goals for access to higher education. However, distance education was tolerated as *apart from* mainstream education. With online education, distance education became *a part of* mainstream education. Before the pandemic, in countries like Australia, Brazil, Canada, and the United States, nearly 20% or more students were enrolled in an online course (Qayyum & Zawacki-Richter, 2018, p. 130). Historically, distance education was offered by open universities – often mega universities with massive enrollments – and some campus-based universities, as part of their continuing education and extension divisions. With the advent of online education, many conventional onsite universities started to offer distance education online. The practice continued to grow in developed countries and has increased in developing countries. In 2002, 25 institutions were allowed to offer distance education in Brazil. As online education started to grow by 2012, 150 institutions were given permission to offer online education. By 2016, 331 institutions were allowed to offer distance education online (Litto, 2018, p. 31). Online education was offered by many established mainstream educational institutions, even before the pandemic.

Parity of online education. Acceptance of online education by educators and employers has been transformative in many countries. In developed countries, there is usually not less legitimacy to a degree done via distance online. Employers recognize online education often as much as other educational formats. This has broken barriers of legitimacy that education systems in countries like Spain and the United Kingdom historically had against distance education. However, not all places have accepted online education, particularly in developing countries. In India, education from onsite schools and universities is given more esteem than online education and other forms of distance education (Panda & Garg, 2019, p. 39). In Turkey, most employers still prefer education from residential programs over online programs (Kondakci et al., 2019).

Nonformal education growth and acceptance. The growth of online education has also occurred in nonformal education. In particular, the rise of MOOCs has been important for growing and changing educational provision. While many MOOC offerings are by established educational institutions, they are often offered as nonformal education. Nonformal education seems to have more interest from education systems when offered in digital formats like MOOCs and other online education offerings. In Russia the growing use of MOOCs has led to policies that articulate nonformal MOOCs into formal education (Zawacki-Richter, Kulikov, Püplichhuysen, & Khanolainen, 2019, p. 58). The South Korean government has a goal of creating an "intelligent information society" (MSIP, 2016). Part of this plan is to "have universities grant students credits for K-MOOCs they complete" (p. 51). Nonformal education via K-MOOCs is changing part of the formal education system by harnessing Prior Learning Assessment that has existed for decades. Digitized nonformal education allows for more self-directed learning by learners, partly changing the role of students and institutions in education systems.

Online education brings new educational providers. Online education is offered not only by public institutions but by private companies. Brazil in particular stands out for a huge growth in private online education, as nearly 90% of online education enrollments are from companies (Litto, 2018). For example, Anhanguera Educacional owns Cogna Educação (formerly Kroton), the largest education provider in the world. Anhanguera, along with UNOPAR, Estácio, and Universidade Paulista, has nearly 60% of all online enrollments in Brazil. The large number of enrollments from private companies suggests that there is an educational demand and access issue that public education is not addressing. New private online providers have joined the formal education system.

Learning management systems "platforming" education. Learning management systems are commonly used both for online and onsite education. The extensive use of learning management systems has created the "platformization" of education, particularly tertiary education. Platformization is the penetration of digital platforms to the point where the practices of a sector become reorganized around the platform (Poell, Nieborg, & van Dijck, 2019, p. 6). Platforms complement or replace teaching at schools and campuses depending on if they are part of onsite, online, or blended education. Whether it is Moodle, Google Classroom, Coursera's platform, Yuanfudao in China, or DIKSHA in India, platforms as integrated online services for learners or teachers have become the norm in many countries. This did not exist 25 years ago before the growth of the digitization of education.

Open Educational Resources changing costs and practices. OER have existed before digital education. However, since digitization OER have had substantial impact in education systems, nearly every developed and developing country has or uses OER. Institutions in Australia, Canada, and the United States have been pioneers in OER and have actively built repositories. Countries like Germany have started to build extensive digital infrastructure to allow for OER use. One of the eight actions in China's Education Informatization 2.0 Action Plan is to build "a national public service system for educational resources" (Yan & Yang, 2021, p. 417). India has a National Repository of Open Educational Resources. In South Korea, the Korea Education Research and Information Service (KERIS) organizes and makes accessible OER. OER have reduced costs for students and learners to use learning materials. They have also changed the discussion about public and private access to knowledge and information to the point where high-profile organizations like the Gates Foundation and the World Bank support OERs at primary, secondary, and tertiary levels of education provision. As many governments decline their investment in education, OER have become more important for education systems.

Digital Labor

Increasingly in most developed and developing countries, teaching is digital work, both for onsite and online education at primary, secondary, and tertiary levels. However, few countries seem to provide adequate training, development, and support for teachers and faculty. Despite large and varied use of digital technologies for learning, there is still surprisingly little support for teachers and faculty. Most of the focus with digital technology initiatives seems to be on the learner-facing dimension with a huge gap in supporting teachers and faculty.

The lack of pre-service and in-service teacher training for using digital technologies is well-chronicled. Bond, Zawacki-Richter, and Nichols (2019) found that "issues of educator professional development with technology has been a particularly recurring theme across the past five decades, with institutions at all levels struggling to find the resources to release educators, or to implement sufficient preservice teacher education with technology" (Bond et al., 2019, pp. 39–40). It is not just a lack of training. They found "a lack of institutional support to provide the space and time" (Bond et al., 2019, p. 12) for technology integration. A similar concern exists for the tertiary level educators. Bates lamented that in Canada most faculty and instructors are unprepared to teach students using digital technologies and to develop "knowledge and skills for a digital society" (Bates, 2020, p. 60).

Many countries have acknowledged this gap. India has created DIKSHA (Digital Infrastructure for Knowledge Sharing), a digital repository for content and courses targeted at teachers and others. The repository has learning materials from experts, including teaching videos, explanation videos, lesson plans, and experiential learning videos among other resources. Given India's diversity, the resources are available in over 30 languages and can be used offline. The European Union has created a digital competence framework for educators (DigCompEdu). It allows educators to assess their digital competencies, recognize their knowledge and skills needs, and take appropriate training (Redecker, 2017). These are teacher-facing initiatives that became more important since the pandemic.

Digital Outcomes

Digital outcomes are educational goals and outputs that also reflect the extent of digitization in an education system. Educational outcomes are digital outcomes when access, quality, or cost are changed or aspired to via the use of digital technologies. Not all educational outcomes are digital outcomes. Improving learning effectiveness is not an outcome specific to digitization. It can be improved in multiple ways unrelated to digitization (e.g., changing pedagogy). Offering large-scale courses are also not a digital outcome. Broadcast-based courses have reached thousands of students at a time for decades. However, it would be a digital outcome – a measure of the extent of digitization – if personalized learning and feedback was being provided system-wide at scale to thousands of MOOC students via digital use (e.g., artificial intelligence and learning analytics) and digital labor (i.e., personnel to develop and administer digital tools). It is a digital outcome when there is a notable increase in digital competencies among students in an education system. Increasing students' digital knowledge, skills, and abilities requires using and supporting digital technologies and appropriately trained educators. Another digital outcome is creating and accepting new credential options like digital badges and nonformal education certificates. It is a digital outcome when digitization is used to enlarge private provision of education in response to reduced public funding for education (Qayyum & Zawacki-Richter, 2018, p. 129).

Digital outcomes can also include plans to foster digital outcomes in a country's education system. Even before the pandemic, there was an accelerating interest in institutional and government policies in digital outcomes in many countries. China's informatization plan states the importance of fostering digital skills, computational thinking, personalized learning, and autonomous learning (Yan & Yang, 2021, p. 424). European Union policy documents regularly indicate that digital competencies are an important goal to meet the needs of a digitally transforming European economy and society (EU, 2020). In South Korea, the motto "digital education for all" is found throughout government education branches (Korea MSIP, 2016, p. 51). Whether or not this is realized, it shows aspiration to specific digital outcomes.

Digital Transformation After the Pandemic

The pandemic was a black swan – an improbable and unpredicted event – that left most countries scurrying to make emergency provisions in order to keep education systems functioning. However, the pandemic has shown which dimensions are most important for digitization of education if the world or countries encounter gray rhinos – high impact and likely threats that should not be ignored – like climate disaster or future pandemics.

It is already well-documented and researched how most countries made changes to provide educational access at all levels during the pandemic (Bozkurt et al., 2020; UNESCO, 2020). The limited or closed access to the physical spaces of education immediately tested the digital assets and infrastructure of all countries affected. Covid-19 is a revealer and its biggest revelation has been inequity (El-Erian & Spence, 2020). It has exposed inequities in health care most obviously but also in education. The pandemic exposed inequities in the digital assets of countries' education systems. Digital assets became a sine qua non for education. Developing countries like China, India, and Turkey had moderate levels of digital assets (e.g., Internet access). So, governments in these countries combined digital technologies with on-air technologies to provide education. Developed countries that had digital assets and infrastructure pivoted to "remote teaching," and later to online, hybrid, and "HyFlex," as their main source of education provision. To keep formal education open, schools and universities spent a lot of money and time on digital assets to ensure students at all levels had the physical devices and network connectivity.

However, even in developed countries, many people did not have digital assets such as access to devices and connectivity. In the United States in 2021, nearly one-third of students stated they had unreliable computers, and over 20% said they had glitchy or no Internet access among 1300 higher education institutions that moved to online education (Schnieders & Moore, 2021, p. 4).

There has been no shortage of digital use - digital engagement with the processes of education – as much of the world tried to go online for everything. Synchronous tools became especially common for educational provision, often in attempts to replicate onsite classrooms for better or for worse. Remote education became the norm. In many developed countries like Australia, Canada, and Germany, the digitization of education was growing before the pandemic. Digitization accelerated during the pandemic as the future was pulled forward. Countries that were still mulling digitizing education have been forced to move toward digitization quickly. For example, if there was hesitation in India about online education, there is now commitment to grow digital use for education (India, MHRD, 2020).

Digital labor assesses how digitized work is and how much support there is for workers' digital capacity. Where "work from home" has grown, nearly all work that can be digitized has been. However, teachers and faculty have been unprepared and under-supported for fully remote education. Lack of teacher and faculty training and support is a concern that has heightened during the pandemic (Bates, 2020). Additionally, a key new group of education digital workers has emerged during the pandemic: parents as "proxy educators" (Davis, Grooms, Ortega, Rubalcaba, & Vargas, 2021, p. 61). They too have been under-supported.

Lack of support during the initial emergency of March 2020 is understandable. The lack of middle term planning for training and support of educators and parents is more concerning.

Expectations during the pandemic shrunk for the outcomes of education generally and the digital transformation of education specifically. Digital outcomes quickly lessened to subsistence aspirations. Required to carry the weight of entire education systems, digital provision has had mixed success.

Conclusion and Recommendations for Future Research

Digital transformation as a subject is an understudied area with many topics that are yet to be researched. A few topics are priorities:

- Which education digitization indices are important for particular countries?
- What are best practices for addressing digital labor challenges of digitization?
- What problems in an education system does digitization address?
- What is the impact of digitization on existing open and distance education institutions?

Which education digitization indices are priorities for a given country? The pandemic stress-tested the digital index. Of the four indices, it seems that for many countries digital assets and digital labor have made the crucial difference in keeping education systems afloat. This should give pause to educators and decision-makers about the immense money and resources used to create, implement, and research digital use.

This is a major practice and research issue about digitization. There is no shortage of digital tools and resources for learning. There has been a shortage of resources for digital assets and digital labor. This suggests researchers must focus more on teacher-facing challenges and issues for digitization (e.g., what are best practices for faculty development; is outsourced instructional design a fair opportunity?). If digitization is to address access, cost, and quality inequities revealed during the pandemic, education researchers and practitioners will need focus on digital access and digital labor and not just digital use.

The digital transformation is often portrayed as the future of education and is certainly well underway in many countries. At the very least, the pandemic has evinced that digitization is important during times of emergencies. It may no longer be constructive to ask, “should education systems digitize?” A more meaningful research question is “to borrow from Postman (1993), what is the problem for a country’s education system to which digitization is the solution?” This needs to be an ongoing research topic. Finally, as digital transformation continues, what will be the impact on existing open and distance education institutions. What is the value proposition of open and distance education institutions? This is an existential issue.

References

Altbach, P. G., Reisberg, L., & Rumbley, L. E. (2009). *Trends in global higher education: Tracking an academic revolution*. Chestnut Hill: Boston College.

Baker, T., & Smith, L. (2019). Educ-AI-tion rebooted? Exploring the future of artificial intelligence in schools and colleges. Retrieved from https://media.nesta.org.uk/documents/Future_of_AI_and_education_v5_WEB.pdf

Bates, T. (2020, November 5). 10 Lessons for a post-pandemic world from Covid-19 for Canadian universities and colleges [Blog post]. Retrieved from https://www.tonybates.ca/2020/11/05/10-lessons-for-a-post-pandemic-world-from-covid-19-for-canadian-universities-and-colleges/

Bond, M., Zawacki-Richter, O., & Nichols, M. (2019). Revisiting five decades of educational technology research: A content and authorship analysis of the "British Journal of Educational Technology". *British Journal of Educational Technology, 50*(1), 12–63.

Bozkurt, A., Jung, I., Xiao, J., Vladimirschi, V., Schuwer, R, Egorov, G., ... Paskevicius, M. (2020). A global outlook to the interruption of education due to COVID-19 pandemic: Navigating in a time of uncertainty and crisis. *Asian Journal of Distance Education*, *15*(1), 1–126. http://www.asianjde.com/ojs/index.php/AsianJDE/article/view/462/307

Cuban, L. (1986). *Teachers and machines*. New York: Teachers College Press.

Cuban, L. (2001). *Oversold and underused: Computers in the classroom*. Cambridge, MA: Harvard University Press.

Davis, C., Grooms, J., Ortega, A., Rubalcaba, J., & Vargas, E. (2021). Distance learning and parental mental health during COVID-19. *Educational Researcher, 50*(1), 61–64. https://doi.org/10.3102/0013189X20978806.

El-Erian, M. A., & Spence, M. (2020). The great unequalizer: The pandemic is compounding disparities in income, wealth, and opportunity. *Foreign Affairs*. https://www.foreignaffairs.com/articles/united-states/2020-06-01/great-unequalizer

European Union (2020). *Rethinking education in a digital age*. Report by European Parliamentary Research Service. Brussels, Belgium. https://www.europarl.europa.eu/thinktank/en/document/EPRS_STU(2020)641528

Gandhi, P., Khanna, S., & Ramaswamy, S. (2016). Which industries are the most digital (and why)?. *Harvard Business Review*. https://hbr.org/2016/04/a-chart-that-shows-which-industries-are-the-most-digital-and-why

India Ministry of Human Resource Development. (2020). *India report: Digital education*. New Delhi: Department of School Education and Literacy. https://www.education.gov.in/sites/upload_files/mhrd/files/India_Report_Digital_Education_0.pdf

International Telecommunication Union. (2018). Measuring the information society report: Executive summary. https://www.itu.int/en/ITU-D/Statistics/Documents/publications/misr2018/MISR2018-ES-PDF-E.pdf

International Telecommunication Union. (2021a). Digital trends in the Americas region 2021. https://www.itu.int/pub/D-IND-DIG_TRENDS_AMS.01-2021

International Telecommunication Union. (2021b). Digital trends in Asia and the Pacific 2021. https://www.itu.int/pub/D-IND-DIG_TRENDS_ASP.01-2021

International Telecommunication Union. (2021c). Digital trends in Europe 2021. https://www.itu.int/pub/D-IND-DIG_TRENDS_EUR.01-2021

Jung, I. (2019). South Korea –Commentary. In O. Zawacki-Richter & A. Qayyum (Eds.), *Open and distance education in Asia, Africa and the Middle East*. Singapore: Springer. https://doi.org/10.1007/978-981-13-5787-9_11.

Kondakci, Y., Bedenlier, S., & Aydin, C. K. (2019). Turkey. In O. Zawacki-Richter & A. Qayyum (Eds.), *Open and distance education in Asia, Africa and the Middle East*. Singapore: Springer. https://doi.org/10.1007/978-981-13-5787-9_14.

Korea MSIP – Minister of Science, ICT and Future Planning. (2016). Mid- to long-term master plan in preparation for the intelligent information society. https://k-erc.eu/wp-content/uploads/2017/12/Master-Plan-for-the-intelligent-information-society.pdf

Lim, C., Lee, J., & Choi, H. (2019). South Korea. In O. Zawacki-Richter & A. Qayyum (Eds.), *Open and distance education in Asia, Africa and the Middle East*. Singapore: Springer.

Litto, F. (2018). Brazil. In A. Qayyum & O. Zawacki-Richter (Eds.), *Open and distance education in Australia, Europe and the Americas*. Singapore: Springer. https://doi.org/10.1007/978-981-13-0298-5_4.

Nafukho, F. M., & Machuma, H. M. (2013). The World Bank's Africa Virtual University project: A revisit. *European Journal of Training and Development, 37*(7), 646–661.

OECD. (2019). *Education at a glance 2019 – OECD indicators*. Paris: OECD. https://www.oecd-ilibrary.org/education/education-at-a-glance-2019_f8d7880d-en

OECD. (2020). *Education GPS – Indonesia*. Paris: OECD. https://gpseducation.oecd.org/Content/MapOfEducationSystem/IDN/IDN_2011_EN.pdf

Panda, S., & Garg, S. (2019). India. In O. Zawacki-Richter & A. Qayyum (Eds.), *Open and distance education in Asia, Africa and the Middle East*. Singapore: Springer. https://doi.org/10.1007/978-981-13-5787-9_4.

Poell, T., Nieborg, D., & van Dijck, J. (2019). Platformisation. *Internet Policy Review, 8*(4), 1–13. https://doi.org/10.14763/2019.4.1425.

Porto, S. (2013). Cost, access and quality: Breaking the iron triangle through disruptive technology-based innovations. In K. Shattuck (Ed.), *Assuring quality in online education: Practices and processes at teaching, resource, and program levels* (pp. 18–39). Sterling: Stylus Books.

Postman, N. (1993). *Technopoly: The surrender of culture to technology*. New York: Vintage.

Qayyum, A., & Zawacki-Richter, O. (2018). The state of open and distance. In O. Zawacki-Richter & A. Qayyum (Eds.), *Open and distance education in Asia, Africa and the Middle East*. Singapore: Springer. https://doi.org/10.1007/978-981-13-5787-9_14.

Raivola, R. (1985). What is comparison? Methodological and philosophical considerations. *Comparative Education Review, 29*(3), 362–374.

Redecker, C. (2017). In Y. Punie (Ed), *European framework for the digital competence of educators: DigCompEdu*. Luxembourg: Publications Office of the European Union. https://doi.org/10.2760/159770. https://publications.jrc.ec.europa.eu/repository/handle/JRC107466

Schnieders, J., & Moore, R. (2021). *First-year college students online learning experiences during the pandemic*. Iowa City: ACT – American College Testing.

Selwyn, N. (2014). *Digital technology and the contemporary university: Degrees of digitization*. London: Routledge.

Tamim, R., Bernard, R., Borokhovski, E., Abrami, P., & Schmid, R. (2011). What forty years of research says about the impact of technology on learning: A second-order meta-analysis and validation study. *Review of Educational Research, 81*(1), 4–28. https://doi.org/10.3102/0034654310393361.

UNESCO. (2020). *Education in a post-COVID world: Nine ideas for public action*. Paris: UNESCO International Commission on the Futures of Education. https://unesdoc.unesco.org/ark:/48223/pf0000373717/PDF/373717eng.pdf.multi

United Nations DESA. (2020). *World economic situation and prospects*. New York: UN Department of Economic and Social Affairs. https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/WESP2020_Annex.pdf

Xiao, J. (2019). Digital transformation in higher education: Critiquing the five-year development plans (2016–2020) of 75 Chinese universities. *Distance Education, 40*(4), 515–533. https://doi.org/10.1080/01587919.2019.1680272.

Yan, S., & Yang, Y. (2021). Education Informatization 2.0 in China: Motivation, framework, and vision. *NU Review of Education, 4*(2), 410–428. https://doi.org/10.1177/2096531120944929.

Zawacki-Richter, O. (2020). The current state and impact of Covid-19 on digital higher education in Germany. *Human Behavior and Emerging Technologies, 3*(1), 1–9. https://doi.org/10.1002/hbe2.238.

Zawacki-Richter, O., Kulikov, S. B., Püplichhuysen, D., & Khanolainen, D. (2019). Russia. In O. Zawacki-Richter & A. Qayyum (Eds.), *Open and distance education in Asia, Africa and the Middle East*. Singapore: Springer. https://doi.org/10.1007/978-981-13-5787-9_14.

Zhang, J. (2019). China -commentary. In O. Zawacki-Richter & A. Qayyum (Eds.), *Open and distance education in Asia, Africa and the Middle East*. Singapore: Springer. https://doi.org/10.1007/978-981-13-5787-9_11.

The Impact of International Organizations on the Field of Open, Distance, and Digital Education

17

Dominic Orr

Contents

Abstract

This chapter argues that international organizations (IOs) are struggling to fulfill their mandate for change and improvement of society across the globe, and that they have been increasingly turning to open, distance, and digital education (ODDE) as part of their portfolio. Harnessing ODDE could be described as a "light-footed solution" for IOs and discussing and ideating around ODDE can be achieved without directly coming into conflict with the political and regulatory framework conditions of a specific country or region that formal educational systems and their institutions are usually entrenched in. This creates a situation in which there is a common discourse among IOs around the challenges that online and distance education should be tackling and an expectation that digital solutions can contribute to them. It is, however, also important to note that IOs focus on setting agendas and norms, but do not implement practices. This leaves a huge gap for ODDE that should be filled by research on what is implemented and "what really works," but also why certain configurations around ODDE work in certain settings. This may require a more inclusive research framework with a focus on non-formal learning environments. Linking ODDE research to more expansive ideas of "learning in the wild," that is, also outside of formal settings,

D. Orr (✉)
Nova Gorica University and GIZ, Nova Gorica, Slovenia

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_15

will better reflect both the reality of learners in today's digital world, and provide a foundation for contributing to better IO policies and supporting practices.

Keywords

International organizations · Global policy · Digital learning · Non-formal learning

Introduction

This chapter will look at the link between international organizations (IOs) and developments in the field of open, distance, and digital education (ODDE). Certainly, IOs such as UNESCO or the World Bank are key actors in our globalized world. But they are also struggling to remain relevant. As a recent book diagnosed, IOs were created in a world dominated by administrative processes and political protocols. Bjola and Zaiotti (2020, p. 33) explain: "IOs were designed and tuned by their political masters to respond to the exigencies of the industrial age that worked like a CLOCK – Complicated, Logical, Ordered, Closed, and Kinetic. They have struggled to adapt to the digital reality, which is Complex, Large, Open, Unpredictable, and Dynamic (CLOUD)" (p. 33). They propose that IOs should focus on "a networked redesign, an innovative outreach, interoperable processes, and value-creating visibility" (p. 35). For experts and organizations from the field of ODDE, this provides opportunities to harness and utilize the insights from IOs to improve the quality of discussions and implemented practice concerning open, distance, and digital education.

As Parag Khanna wrote in his manifesto for "mega-diplomacy," the only appropriate response to our interconnected world is ". . . global governance. . . a bricolage of movements, governance arrangements, networks, soft law codes, and other systems at the local, regional and global level" (Khanna, 2011, p. 2) – and this is certainly the purpose of IOs. In today's interconnected world, many countries, regions, institutions, and individuals are dealing with the same challenges and finding solutions, as interconnectedness has led in part to a similarity of environmental conditions. Indeed, it is this assumption that the United Nations 17 sustainable development goals (SDG) are built on, and we see these goals being applied globally, regionally, and institutionally in the public and the private sectors as a reference framework. Moreover, the SDG framework is a good example of the mandate and legitimacy of IOs – they fulfill their mandate, when they bring together multiple actors for collaborative discussion and exchange, and foster solutions on how to collectively solve some of the world's greatest problems.

It follows that Abbott, Genschel, Snidal, and Zangl describe IOs as "orchestrators of change" (2015). They co-design responses and common activities by providing stakeholders with ideational and material support. That is to say that they are acting carefully and diplomatically, but ultimately as the "entrepreneurs" of policy change – this is the concept of ideation as a strategy (Swinkels, 2020). From a legitimacy perspective, this also means, however, that while they encourage preferential solutions to particular policy problems, they usually lack the mandate to enact them. In this way they work indirectly, as they are dependent on intermediaries to implement these solutions, and using a form of soft governance, as they are unable to force compliance.

So what type of impact might IOs have on education and in particular ODDE? There has been a long tradition of IOs both promoting digital learning as solution (we term this "ideation"), but also in setting up coalitions for implementing international collaborative operations around these ideas (in the broadest sense, we might call these "technologies"). In both cases, this has been based on a set of assumptions about distance solutions in education. The problems ODDE is expected to address and the technology solutions proposed will be elaborated in this chapter.

But first, it is necessary to start out with a brief definition of distance education and a brief description of its scope, as already expressed in the term "open distance and digital education." In his analysis of common definitions, Saykılı (2018) proposes the following to encapsulate the main elements of distance education as it is viewed today:

> Distance education is a form of education which brings together the physically-distant learner(s) and the facilitator(s) of the learning activity around planned and structured learning experiences via various two or multi-way mediated media channels that allow interactions between/among learners, facilitators as well as between learners and educational resources. (p. 5)

This definition already highlights some of the main aspects of distance education that make it attractive to international organizations and multilateral actors:

- providing learning opportunities irrespective of physical distance,
- learning is supported through "facilitators" and through interactions between learners, between learners and facilitators, and between learners and learning content.

In this way, education can be offered in a more flexible format, as it is not dependent on physical nearness. In the past much of this learning was provided through paper correspondence that was sent by post to the learner. However, the internet and digital connectivity has supercharged flexibility of delivery, so that digital and more interactive media enable access and learning opportunity delivery very quickly (depending on the connectivity limitations of the learners). This is also one meaning of "open" within the term "open distance and digital education" – that is, access to provision is not dependent on specific "opening times."

Furthermore, ODDE is not dependent on teachers to drive and manage the interaction in the learning space. This is why the definition talks of "facilitators" and includes various facilitators of learning including teachers, but also other learners and also interactive content – very much following the Miyazoe and Anderson's "interaction equivalency theorem" (Miyazoe & Anderson, 2010, 2013) which argues that a good quality learning arrangement is dependent on the strength of two of these interactions – between teachers and learners, between learners, and between learners and content. Not all three. This is a second meaning of "open," as a more open framework is expected to enable more inclusive learning environments.

Finally, the definition speaks of "learning" and not "education" thereby emphasizing the trend in distance education to encompass learning formats outside of the formal education system, again in the hope of becoming more inclusive to different learning formats and to different interests of learners. Indeed, to be more learner-focused.

What the definition does not mention (but this is dealt with in the cited article from Saykılı) is the importance of the concept of "open educational resources" (OER) to ODDE. This is perhaps because OER describe instead a characteristic of the content used in the learning arrangement, not the learning arrangement itself. The term "open" in OER refers to openly licensing learning content to facilitate adaptation of learning content developed for one specific context to better fit the objectives and purpose of a new context (Orr, Rimini, & van Damme, 2015). In a digital setting, where good content is key to a good learning environment, easing the preconditions of adaptation to a new context is both efficient (under the slogan: re-use first) and effective (as it can be adapted to better fit the needs of a new learner group).

It is clear that all these elements will be attractive to international and multilateral organizations keen to facilitate the improvement of learning opportunities in countries or regions. Harnessing ODDE could be described as a "light-footed solution" and discussing and ideating around ODDE can be achieved without directly coming into conflict with the political and regulatory framework conditions of a specific country or region that formal educational systems and their institutions are usually entrenched in. Of course, this does not guarantee final implementation of solutions or indeed implementation in the way initially conceived. But seen from a legitimacy perspective, one would anyway expect global blueprints for ODDE to be implemented with specificity in their final context.

Current Challenges En Route to a Learning Society

Even before our highly interconnected digital society, there were strong arguments to view educational practice as an international playing field, where practices and norms are being discussed and renegotiated in a global setting. This argument was put most prominently in the "world polity" theory initiated by John W. Meyer, who saw the emergence of a kind of standard model for schooling, for universities and even for the organization of science (Boli, Ramirez, & Meyer, 1985). Rather fittingly, this theory itself has also been criticized for not being so much a "disinterested theory," but indeed promoting norms and ways of thinking about education as a set of norms and values, which perhaps accounts for its popularity within the field of IOs (Carney, Rappleye, & Silova, 2012). This process of isomorphism, but also of more direct agenda setting, has certainly been promoted through the influence of IOs and international publications like the OECD's annual publication "Education at a Glance" (OECD, 2020) and UNESCO's "Global Education Monitoring Report" (UNESCO, 2020b).

A common focus of this global debate has been how to help countries and regions become a learning society, when access to formal education is a scarcity and often only accessible to a person during an initial period of their life. So, the two main discourses around this are access for all (which is a challenge in low-income countries with low capacity in formal education and growing youth populations, but also in other countries where access is still determined by socioeconomic characteristics), and huge changes in the labor market or in our societies (e.g., in the context of digital transformation). In both cases, there tends to be agreement on these challenges whether argued from an economic or social justice position.

It is about helping people attain their highest potential, gain better lives, and contribute to their local communities. Nevertheless, this formulation does not remain uncontested: in a critique of this stance as expressed in documents on lifelong learning from the OECD, Walker (2009) criticizes what she calls "inclusive liberalism," which she aligned to the OECD goals focusing on a liberal market view and aiming to produce the "worthy citizen," capable of contributing to economic prosperity. But at the latest by 2018, the OECD was also talking about transforming education and learning for "growth and well-being" (OECD, 2018).

This broad concept has been elaborated on by UNESCO as follows:

> Lifelong education should be seen, today, as one of the preconditions for development conceived as an ability for adaptation and autonomy, as well as a means for ensuring the sharing and flow of knowledge worldwide. Lifelong education can provide a response to the growing job volatility that most forecasters predict. Increasingly, people will be changing jobs several times in a lifetime, and education can no longer be limited to offering a single specialization, but must develop each person's ability to change course during his or her lifetime, and to cope with economic and social change. (. . .) Lifelong learning is a process that should ideally be meaningful at three levels (. . .): personal and cultural development – the meaning a person gives to his or her life; social development – one's place in a community, citizenship, political participation and living together in society; and, lastly, professional development – stable quality employment and its links with production, job satisfaction and material well-being. (Bindé, 2005, pp. 77–78)

This expectation for a learning society can be linked to the objectives of the UN Sustainable development Goal 4: "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all." Still, in the recent UN progress reports (2019, 2020 – see https://sdgs.un.org/goals/goal4 for all data referenced below), the authors state very clearly that the goal of SDG 4 will not be reached by 2030, unless innovative solutions are sought. And a juxtaposition of the education data (SDG4) with the innovation data (SDG 9) spells out the challenge – limitations in educational provision, on the one hand, and demands for higher skill levels for career development, on the other:

Referring to SDG4 – Education:

- In 2018, some 773 million adults, two-thirds of them women, remained illiterate in terms of reading and writing skills. The global adult literacy rate, for the population 15 years of age and older, was 86% in 2018, while the youth literacy rate, for the population 15–24 years of age, was 92%. Southern Asia is home to

nearly half of the global illiterate population, and sub-Saharan Africa is home to a further quarter. Globally, if more adults are literate today than they were, it is mostly because more adults went to school when they were young rather than because adults who did not go to school had a second chance to learn.
- Based on data from 129 countries, the percentage of primary school teachers receiving the minimum pedagogical training according to national standards throughout the world has stagnated at 85% since 2015. The percentage is lowest in sub-Saharan Africa (64%) and Southern Asia (72%).

Referring to SDG9 – Industry, innovation, and infrastructure:

- In 2016, medium-high and high-tech sectors accounted for 48%of the global manufacturing value added. Medium-high and high-tech products continued to dominate manufacturing production in Northern America and Europe, reaching 47% of the manufacturing value added in 2016 compared with 10% in least developed countries.
- Almost all people around the world now live within range of a mobile-cellular network signal, with 90% living within range of a 3G-quality or higher network. This evolution of the mobile network, however, is growing more rapidly than the percentage of the population using the Internet.

These issues are not at all specific to low-income countries nor to the United Nation's reporting, and similar reports can be found from the World Bank and from the OECD. The difference in middle- to high-income countries is that the challenges are not felt by the majority of a population as in low-income countries, but by those from the lower socioeconomic groups in society.

This main narrative of IOs can be linked to an assumption that digital technologies (or – as often described in UN documents – "Information and Communication Technologies") can make a significant impact on the achievement of these goals. In 2015, the Qingdao Declaration from UNESCO, entitled "Leveraging Information and Communication Technologies to Achieve the Post-2015 Education Goal" was signed at the close of an international conference attended by over 500 people from 100 countries, including both public and private sector representatives. It picked up the topic of inclusion and lifelong learning, attesting a high potential to online and distance learning technologies (UNESCO, 2015, p. 5):

> Inclusive and relevant lifelong learning: On this theme, participants reached the consensus that skills development and lifelong learning are among the post-2015 education priorities, and that the omnipresent digital devices and online content are powerful levers to: (1) expand access to both formal and non-formal learning opportunities in order to reach out to more learners; (2) multiply learning pathways and diversify learning approaches through various platforms and resources to attend to different teaching and learning needs; and (3) enable blended learning and learning in changing environments.

This commitment was echoed in the Qingdao Statement from 2017 (UNESCO, 2017). Although neither distance education nor online learning was mentioned explicitly as terms, "fostering digital innovations for education" was.

A new dynamic was given to this discussion and to the expectation of digital learning by the Covid-19 pandemic. In this case, online learning was really seen as the only game in town. Organizations in public and private sectors alike switched where possible to online delivery of services and thereby accelerated any debates on the use of digital technologies. This was equally the case in education and learning and was seen as a way to fast-track digital technologies as part of the "new normal" for learning delivery. In the rush for solutions, however, it was noted in various reports that it was important for the public sector to play a key role in service delivery and the formation of digital learning as a public good, and not only leave this up to private players in the market (UNESCO, 2020a).

In sum, this short review has aimed to show that there is a common discourse among IOs around the challenges that online and distance education should be taking on and an expectation that digital solutions can contribute to addressing these challenges. Against this backdrop, various multilateral and individual initiatives from IOs have been launched. Their common shape and purpose will be reviewed in the following section. It should be noted already, however, that IOs work on setting agendas and norms. This leaves a huge gap that should be filled by research, which really does look into "what works," but also why certain configurations around ODDE work in certain settings. We will return to this situation later in the chapter.

A Review of the Shape of IO Activities and Their Significance for the Field of ODDE

So, while IOs promote the idea of using digital learning in white papers and policy blueprints, how can they hope to achieve an impact in practice? This chapter presents some key examples of measures that have been undertaken by IOs. For ease of recognition, they have been structured around these methods of influence:

1. **Ideation**: IOs aim to stimulate national or regional initiatives through ideation and policy exchange.
2. **Digital infrastructure projects**: IOs contribute to the development of digital solutions, which are by their nature global, but can be harnessed in a local setting.
3. **Multi-stakeholder networks**: IOs orchestrate a mixture between local and global solutions through international partnerships, while encouraging local adaptations.

Ideation Through Guidelines and Consultancy Work

In the first instance, the ultimate expectation is a sort of "flat world" approach, that is, the assumption that there is a good solution to a problem and it can be implemented within any national or regional settings through providing enough information about these solutions and supporting implementation (Friedman, 2007). Ideation work includes giving examples, recommendations and consulting on national or regional policy papers or master plans. This is a common approach for IOs, especially in connection with in-situ consultancy, where a consultant or a group of consultants is asked to review the context in a particular country or region and make recommendations on possible reform steps. One illustration of the type of key document used is the UNESCO "Guidelines for Open Education Resources Policies" published in 2019 in collaboration with the Commonwealth of Learning (Miao, Mishra, Orr, & Janssen, 2019). This publication is a typical example of an IO promoting ideation around a particular idea for educational reform. This publication presents a seven-step process to policy development with a focus on OER and while it does not specifically promote ODDE, it does argue for digital learning provision to be a key element to any OER policy: "OER should be used to provide new educational content to learners in a digital online format that can be accessed online. Additionally, it will also be important to consider how learning acquired in a non-formal or informal setting through OER materials can be accredited and recognised for future formal learning pathways" (Miao et al., 2019, p. 23).

The purpose of this publication is to make a link between general global policy work promoted by UNESCO, for example, with its recommendation on OER and the associated action plan, and the specific work of UNESCO and NGOs in countries to support policy work, which includes OER as part of the solution to educational reform. As stated in the introduction by Assistant Director-General for Education UNESCO, Ms. Stefani Giannini:

> UNESCO and the Commonwealth of Learning have been working directly with governmental agencies and institutions to support the development of national and institutional OER policies. This publication, Guidelines on the Development of Open Educational Resources Policies, is the culmination of this. It is meant to be referenced as a hands-on plan to develop subject-matter knowledge for policy makers on OER and a framework to provoke critical thinking on how OER should be leveraged to address challenges in achieving the targets of Sustainable Development Goal 4 (SDG 4) in different local contexts. More specifically, it can be used as a literal step-by-step guidebook on how to develop an OER policy from conception to implementation. (Miao et al., 2019, p. 4)

The first chapter describes this link, while the subsequent chapters delineate an idealized policy development process and end in each case with questions that could stimulate the formulation of an OER policy appropriate to the specific context. It has been published in English, French, and Spanish and is itself openly licensed – all of this motivated by the wish for it to be as accessible a resource as possible.

The weakness of such an initiative from the IO perspective is that this can only provide a framework for implementation. The implementation remains with the actors within countries and regions, who have the mandate and the resources to implement them. Naturally, if used by teams of external consultants from an IO like UNESCO, who are charged with supporting policymaking processes in a specific country or region, this can help to ensure that OER policies become part of new educational practices.

Digital Infrastructure Projects

A more direct version of influence in the field of ODDE is implementation of a solution in a new setting, based on the knowledge that it has worked in other settings. Two examples will be presented for illustration here:

- The African Virtual University, established in 1997 through a world bank grant and newly re-formed and launched as the Pan-Africa Virtual and E-University in December 2019 (Sawahel, 2020).
- The atingi digital learning platform, established by the German Federal Ministry for Economic Cooperation and Development in December 2019 (*full disclosure: the author is part of the management team of atingi*).

The African Virtual University

The original idea of the African Virtual University (AVU) was to confront the problems of access to high quality learning in higher education through harnessing new technologies of learning design and delivery (Prakash, 2003). The AVU project was built on the use of information and communication technologies, initially enabling students in six African countries to take courses and seminars taught by professors from universities outside of Africa (AVU, 2015; Missen, 2001; Munene, 2007; Nafukho & Muyia, 2013).

In the initial stages, instructors delivered their lectures in front of television cameras in their own classrooms, and the video was routed to an uplink in Washington, DC, which then beamed it via satellite to centers of learning in Africa. Over time, more interactive technologies were utilized. However, the basic premise remained: students of AVU would be supported in their development through access to high quality learning from scholars in the USA and other "developed" countries. The AVU was coordinated from Washington in the first phase, but in 2002 it was re-established as an NGO in Kenya. Despite this, the initiative has struggled to become the distance learning institution for Africans from Africa through most of its lifecycle. There have been various analyses of the AVU which generally criticize the "foreignness" of the initiative, which was not built in Africa as a partnership, but as a shell-solution implanted in a new context.

In the most recent publicly available strategic plan, AVU confronts some of these problems head on. It states that it now has a stronger focus on content from partners in the region and on regional needs: "The AVU has phased out its academic programs (certificate, diploma and degree) brokered from foreign universities. AVU is now collaborating with a wide number of partners, including governments, universities, development partners and the private sector to offer new programs and courses designed to respond to the demand of the African labour market" (AVU, 2015, p. 15).

And the most recent development has been the merger of AVU with the Pan-African University (another donor country initiative, which was indeed lacking a digital learning arm) as part of the African Union’s strategy 2063 in 2019 (Sawahel, 2020). The newly formed Pan African Virtual and E-University (PAVEU) now hopes to truly become the distance learning institution for Africans from Africa, and has a fitting vision and mission to express this (see http://paveu.africa-union.org/about-us/):

- Vision: “To be a leading centre of excellence in providing open access to online higher education and research for the advancement of Africa.”
- Mission: “To provide world class inclusive quality-assured and relevant education to Africans anytime and anywhere and to conduct innovative research to catalyse the African Union’s Agenda 2063.”

This impulse from the IO World Bank can certainly be criticized for its naivety and lack of local embeddedness. In the meantime, the AVU has cut itself free from the baggage of “foreignness“in the original inception and from the pure focus on university processes, which severely limited the attractiveness of its offer for target groups other than existing students in Africa. The sustainability remains an open question, but a stronger focus on creating a network of partners could help here, as the new AVU will then no longer be competing, but collaborating with other providers.

Atingi Digital Learning Platform

Digital learning platforms are proliferating among IOs. Examples of United Nations initiatives are the International Telecommunications Academy (ITU Academy), the Learning and Knowledge Development Facility of the United Nations Industrial Development Organisation (UNIDO), and indeed the United Nations System Staff College (UNSSC), which is beginning to open up its courses to the general public. The main example from the World Bank is the Open Learning Campus (OLC).

In each of these cases, the IOs are using their digital learning platforms to reach more people and to better fulfill their objective of encouraging change and improvement through knowledge proliferation and knowledge exchange. The example to be elaborated on below is not in fact from an IO, but from a national ministry, but it is fully based on partnering with IOs and national and local partners.

The atingi digital learning platform was initiated by the German Federal Ministry for Economic Cooperation and Development in December 2019 with the goal of facilitating access to knowledge and exchange through digital and blended learning across the globe (Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung, 2021, p. 120). This is expressed in the mission of atingi: “Our vision is a world in which digital learning is inclusive, accessible, relevant, safe and secure for all” (see www.atingi.org). This goal is coupled with very ambitious quantitative goals for the platform, which in its current – inception – phase reached well over 400,000 registered learners and 120,000 completed learning units by December 2021. Currently it has a focus on Africa and around two-thirds of learners come from the African continent.

Similar to the United Nations initiatives and the World Bank platform, atingi is also explicitly following two additional internal goals for the platform which serve to help the German government reach its own goals:

- to fully integrate digital learning into the international capacity development work of the German government, and,
- to showcase how scaling of international development work can be facilitated through digital solutions.

This means that atingi is not simply a learning platform launched into the world in the hope that it might solve the problems of scarcity of learning opportunities in general, but it is specifically being used within the context of German development work and to support the over one hundred new capacity-building projects across the world being implemented by the Ministry and its operational agency, the GIZ, annually. This should ensure that it is an initiative fully integrated into the work of German development across the world. It certainly presents a qualitative difference to the way that AVU was launched by the World Bank, as an external solution "for" Africa.

There are two big differences between AVU and atingi at their inception points, although the current discussions concerning AVU suggest that their positions are nearing:

- atingi has always been focused on nonformal learning first; this is largely to do with the fact that the German development work which it should be amplifying and strengthening is usually about capacity-building as part of societal and economic transformation processes, and is not simply focused on formal education provision. Nevertheless, this leaves atingi with the challenge of how to ensure learning on the platform is recognized by third parties (e.g., employers) and is therefore ultimately "valuable" and even "transactional" for the learner.
- atingi is being developed at a time where digital technology is more focused on open source solutions and international technical standards, which facilitate links between platforms and help avoid the so-called "walled garden approach," where a learner's activity on one platform cannot be transferred to another platform (think: what you do on LinkedIn, Facebook, or TripAdvisor can only be viewed on these platforms). However, this leaves atingi with the challenge of how to be both a member of greater ecosystems and retain its own identity and coherence.

In both cases, atingi and any other initiatives following similar strategies will have to work against the common "isomorphisms" or "world polity"of educational provision, which assumes the norms of formal education to be the ultimate reference, and the norms of market competition to be the ultimate markers of success. These are issues the AVU has struggled with (as well documented in the respective literature – see above) and are key points of contention for ODDE as a whole.

Multi-stakeholder Networks

A third way in which IOs can impact on ODDE is through creating multi-stakeholder networks for certain topic areas. This is a way of bringing together both the ideation component of work by IOs with the chance to offer solutions, which can be used or replicated in different settings. Perhaps most important is that IOs can really harness their "orchestration" characteristics by bringing these components together in a manner not normally possible within a national or regional setting.

In some cases, these networks are set up by IOs, in others they are set up by international membership organizations, but with patronage from IOs such as UNESCO.

UN-Based Networks and Coalitions

A first example is around digital capacities needed to support digital transformation across the world. The initiative for digital capacity set up by the United Nations Secretary General's Envoy on Technology, along with the United Nations Development Programme (UNDP) and the International Telecommunication Union (ITU), has set up a multi-stakeholder network to forge a concerted effort at scaling up digital capacity building solutions. It has a website, which went live in April 2021. It was initiated on the back of recognition that:

> ...a large part of digital capacity-building has been supply-driven as opposed to needs-based. Insufficient investment also remains a significant limiting factor. Moreover, digital capacity-building has to be tailored to individual and national circumstances. Given variances within and among countries and regions, there is no one-size-fits-all approach, and better evidence is therefore needed of which capacity-building approaches are most effective, considering political, economic and social contexts. To overcome these challenges, two aspects are central: greater coherence and coordination in capacity-building efforts; and a concerted effort at scaling up solutions. (United Nations, 2020)

The initiative is working with external partners and NGOs to build a database of existing digital skills training, to support the matching of demand for these trainings to suppliers of them, and to convene a multi-stakeholder network promoting an more holistic and inclusive approach to digital capacity development. This means in terms of ODDE, the website will be an aggregator platform, linking out to relevant learning materials and learning opportunities on partners' websites.

A similar example is the Global Skills Academy, set up by UNESCO in 2020 as part of its Covid-19 response under the umbrella initiative entitled "Global Education Coalition" (UNESCO, 2021). This initiative also aims to curate and link out to learning resources, but with a focus on technical and vocational training and employment-ready skills for recovery. Again, it brings together partners from different United Nations agencies, the private sector and NGOs. Through harnessing huge network structures and partnerships, the Global Skills Academy is able to follow ambitious goals. It plans to "help one million young people build skills for employability and resilience between 2020 and 2021" (see website: https://globaleducationcoalition.unesco.org/global-skills-academy), and furthermore aims to foster common innovations in education between the partnering organizations, such as common digital credentials.

This means that such initiatives can galvanize concerted efforts to support global goals, and even to promote common innovations through building on common interests. However, in contrast to the initiatives of AVU and atingi, described above, what they cannot do is fully develop the actual solution being implemented.

International Networks Endorsed by IOs

As mentioned above, a further form of interaction of IOs is when these endorse or support networks from independent organizations. There are many such networks familiar to the ODDE scene. Examples are the International Council for Open and Distance Education (ICDE) and Open Education Global (OE Global), both with endorsements from UNESCO.

Such efforts are particularly interesting from an IO perspective in the sense of what Carayaniss and Weiss call the "Third UN" with reference to United Nations structures (Carayannis & Weiss, 2021). This concept recognizes the limitations of what IOs can actually do and what they tend to think, as they are constrained by rules, regulations, and common reference points. Their structures can bring governments together and forge alliances (the authors call this the "First UN"), their staff can bring prepare white papers and analyses (the staff are called the "Second UN"), but for this work to remain relevant and to keep in touch with real challenges, they need links to the outside word, to real practice, and to discussions in the field. Thus, Carayaniss and Weiss refer to intellectuals, scholars, consultants, think tanks, NGOs, the for-profit private sector, and the media as the "Third UN":

> The Third UN's roles include research, policy analysis, idea mongering, advocacy, and public education. Its various components put forward new information and ideas, push for alternative policies, and mobilize public opinion around UN deliberations and projects. (ibid).

This gives multilateral organizations that are not governmental bodies (e.g., ICDE, OE Global) a very important role in the field of ODDE. They have the chance, but also the obligation to shape the ideation of IOs, by bringing in new ideas and exchanging critical knowledge on what works in practice. They can do this through joining larger multi-stakeholder initiatives such as the Global Education Coalition or through introducing IOs to their own working groups and events.

Conclusion: Suggestions for ODDE and IOs

This chapter has highlighted the fact that key narratives of IOs in education give ODDE a major role in providing appropriate solutions to the problems of access to high quality learning opportunities and skills development for decent work, well-being, and community development. It has also argued that IOs are themselves confronted with the challenge of having an impact on solving these problems, and if they do not manage this well, they will lose relevance and legitimacy (Bjola & Zaiotti, 2020).

The chapter shows that there is a productive dependency between IOs and experts, specialists, and institutions from the ODDE field in the following ways.

Representatives of the ODDE field can make reference to IOs' major narratives to strengthen arguments for the key role which ODDE can play in today's education systems. Certainly, this is a strategy that would be suggested by the policy theory of John Kingdon – who sees such actions as creating productive "policy windows" (Kingdon, 1993). This helps representatives of the ODDE field to gain support for their work in national and regional settings, where debates and developments might be more determined through national politics than through meeting today's grand challenges.

Furthermore, representatives of the ODDE field can make use of policy frameworks or discussion forums set up by IOs to learn from other cases around the world. This helps to ensure that individual practices of ODDE are informed and stimulated through lessons learned and encourages review of current strategies and practice. Here there also appears to be a stronger mandate for ODDE research than is reflected in some of the recent research reviews (Zawacki-Richter et al., 2020; Zawacki-Richter & Anderson, 2014), where there is a preference for discussing ODDE in the context of higher education (even when it is discussed in the framework of "opening up" higher education). Non-formal learning is no longer simply learning that needs policy to become recognized as formal learning, but it is an opportunity to strengthen, enrich, and extend learning pathways (Latchem, 2018). All of which are relevant to IOs. Linking ODDE research to previous ideas of "learning in the wild," that is, also outside of formal settings ("Learning in the wild," 2010), will better reflect both the reality of learners in today's digital world, and provide a better foundation for contributing to better IO policies and practices.

For their part, IOs need to be closely linked to representatives of the ODDE field, in order to avoid naive solutionism, such as planting solutions in a new context without due respect to local conditions, systems, and networks. There is a particularly strong tendency for this with digital solutions, where the whole debate about "appropriate technology" that started in the 1970s is experiencing new interest – see the recently translated book on "low tech" from the French author Philippe Bihouix (2020). This role – which requires new and directed contributions from ODDE researchers – was argued above under the rubric of the "Third UN." Such a tight linkage can help IOs remain relevant and help to maintain the legitimacy of their expertise for ideation processes. We already see evidence of IOs creating inclusive processes through multi-stakeholder networks to bring together expertise from consultants, think tanks and NGOs, but it is important that research can inform such debates beyond norms and agenda – and beyond what Zawacki-Richter et al. (2020) call "lip-service." So, it is of great benefit to the ODDE field to get involved and indeed will help progress in the field. Digital formats for communication can be used by IOs to ensure that participation is not solely dependent on the ability to travel to physical meetings and to widen the group of stakeholders participating in such processes.

Achieving a positive impact of IOs on ODDE is therefore dependent on both sides opening up channels for discussion and change, and depends on ODDE taking up the research challenges facing IOs in their work to set agendas and frameworks and to launch specific initiatives. The circumstances are ripe for such interaction and this chapter recommends fully exploiting these opportunities to ensure ODDE is an integral part of the solution to make learning opportunities accessible and valuable for all.

References

Abbott, K. W., Genschel, P., Snidal, D., & Zangl, B. (Eds.). (2015). *International organizations as orchestrators*. Oxford, UK: Oxford University Press.

AVU. (2015). *The African Virtual University business plan 2014–2019*. Available via African Virtual University website: https://thesearchives.files.wordpress.com/2017/09/avu-business-plan-2014-2019-final.pdf. Accessed 16 Jan 2022.

Bihouix, P. (2020). *The age of low tech: Towards a technologically sustainable civilization* (1st ed.). https://doi.org/10.1332/policypress/9781529213263.001.0001

Bindé, J. (Ed.). (2005). Towards knowledge societies: UNESCO world report. Available via https://unesdoc.unesco.org/ark:/48223/pf0000141843

Bjola, C., & Zaiotti, R. (2020). *Digital diplomacy and international organisations: Autonomy, legitimacy and contestation*. Abingdon, UK: Routledge.

Boli, J., Ramirez, F. O., & Meyer, J. W. (1985). Explaining the origins and expansion of mass education. *Comparative Education Review, 29*(2), 145–170.

Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung. (2021). *BMZ Toolkit – Digitale Bildung [Toolkit - Digital education]*. Bonn, Germany: BMZ.

Carayannis, T., & Weiss, T. G. (2021). The "Third" UN: Imagining post-COVID-19 multilateralism. *Global Policy, 12*(1), 5–14. https://doi.org/10.1111/1758-5899.12919.

Carney, S., Rappleye, J., & Silova, I. (2012). Between faith and science: World culture theory and comparative education. *Comparative Education Review, 56*(3), 366–393. https://doi.org/10.1086/665708.

Friedman, T. L. (2007). *The world is flat: A brief history of the twenty-first century*. New York, NY: Picador.

Khanna, P. (2011). *How to run the world: Charting a course to the next renaissance*. New York, NY: Random House.

Kingdon, J. (1993). How do issues get on public policy agendas? In W. J. Wilson (Ed.), *Sociology and the Public Agenda* (pp. 40–50). https://doi.org/10.4135/9781483325484

Latchem, C. (2018). Open and distance non-formal education. In C. Latchem (Ed.), *Open and distance non-formal education in developing countries* (pp. 11–17). https://doi.org/10.1007/978-981-10-6741-9_2

Learning in the wild. (2010). *Nature*, *464*(7290), 813–814. https://doi.org/10.1038/464813b

Miao, F., Mishra, S., Orr, D., & Janssen, B. (2019). Guidelines on the development of open educational resources policies. Available via https://unesdoc.unesco.org/ark:/48223/pf0000371129

Missen, C. (2001). A review of the African Virtual University. Available via widernet website: https://www.widernet.org/sites/default/files/ReviewAVU.pdf. Accessed 16 Jan 2022.

Miyazoe, T., & Anderson, T. (2010). The interaction equivalency theorem. *European Journal of Open, Distance and E-Learning, 9*(2), 94–104.

Miyazoe, T., & Anderson, T. (2013). Interaction equivalency in an OER, MOOCS and informal learning era. *Journal of Interactive Media in Education, 2012*, 1–15. https://doi.org/10.5334/2013-09.

Munene, I. I. (2007). Experimenting in distance education: The African virtual university (AVU) and the paradox of the World Bank in Kenya – A rejoinder. *International Journal of Educational Development, 27*(1), 77–85. https://doi.org/10.1016/j.ijedudev.2006.05.002.

Nafukho, F. M., & Muyia, M. H. (2013). The World Bank's Africa Virtual University project: A revisit. *European Journal of Training and Development, 37*(7). https://doi.org/10.1108/EJTD-02-2013-0020.

OECD. (2018). *Going digital in a multilateral world*. Paris, France: OECD Publishing.

OECD. (2020). *Education at a glance*. Paris, France: OECD Publishing.

Orr, D., Rimini, M., & van Damme, D. (2015). Open educational resources – A catalyst for innovation. https://doi.org/10.1787/9789264247543-en

Prakash, S. (2003). *The African virtual university and growth in Africa* (No. 223). Available via World Bank website: https://openknowledge.worldbank.org/bitstream/handle/10986/9741/310450ENGLISH0find223.pdf?sequence=1&isAllowed=y. Accessed 16 Jan 2022.

Sawahel, W. (2020). Pan African University launches e-learning arm. Available via University World News website: https://www.universityworldnews.com/post.php?story=20200106085015604. Accessed 16 Jan 2022.

Swinkels, M. (2020). How ideas matter in public policy: A review of concepts, mechanisms, and methods. *International Review of Public Policy, 2*(3), 281–316. https://doi.org/10.4000/irpp.1343.

UNESCO. (2015). Qingdao declaration (2015) – Seize digital opportunities, lead education transformation. Available via http://unesdoc.unesco.org/images/0023/002333/233352m.pdf

UNESCO. (2017). Qingdao statement: Strategies for leveraging ICT to achieve Education 2030. Available via https://unesdoc.unesco.org/ark:/48223/pf0000253061

UNESCO. (2020a). Extraordinary session of the global education meeting, Education post-COVID-19: 2020 global education meeting declaration. Available via https://unesdoc.unesco.org/ark:/48223/pf0000374704

UNESCO. (2020b). *Global education monitoring report, 2020: Inclusion and education: All means all*. Available via https://unesdoc.unesco.org/ark:/48223/pf0000373718

UNESCO. (2021). *The global skills academy: Partners' meeting* (No. ED/PLS/YLS/2021/02). Available via UNESCO website: https://unesdoc.unesco.org/ark:/48223/pf0000377256

United Nations. (2020). *Road map for digital cooperation: Implementation of the recommendations of the High-level Panel on Digital Cooperation Report of the Secretary-General* (No. A/74/821). Available via United Nations website: https://www.un.org/en/content/digital-cooperation-roadmap/. Accessed 16 Jan 2022.

Zawacki-Richter, O., & Anderson, T. (Eds.). (2014). Online distance education: Towards a research agenda. https://doi.org/10.15215/aupress/9781927356623.01

Zawacki-Richter, O., Conrad, D., Bozkurt, A., Aydin, C. H., Bedenlier, S., Jung, I., . . . Xiao, J. (2020). Elements of open education: An invitation to future research. *The International Review of Research in Open and Distance Learning, 21*(3), 319–334. Available via http://www.irrodl.org/index.php/irrodl/article/view/4659/5346.

Online Infrastructures for Open Educational Resources

18

Victoria I. Marín and Daniel Villar-Onrubia

Contents

Abstract

Open educational resources (OER) have generated a considerable amount of attention in recent years in the field of open, distance, and digital education (ODDE). Digital knowledge infrastructures of different kinds have enabled the creation, storage, management, sharing, and adoption of these resources across educational sectors, levels, and geographies. This chapter presents a general overview of these infrastructures, the underpinning models of OER provision, main characteristics, and key insights from research. It draws on the literature and discusses examples purposively selected to illustrate the diversity of scope,

V. I. Marín (✉)
University of Lleida, Lleida, Spain
e-mail: victoria.marin@udl.cat

D. Villar-Onrubia
Coventry University, Coventry, UK
e-mail: daniel.villaronrubia@coventry.ac.uk

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_18

educational stages, and types of online OER infrastructures established on a global, national, regional, or institutional scale. Key challenges are also discussed, including licensing issues, concerns about quality assurance, metadata problems, the sustainability of the initiatives, and sociocultural aspects, among others. In addition to revisiting the conception and adoption of OER in different cultures, important topics to be further addressed by future ODDE research are presented.

Keywords

Open educational resources (OER) · Online infrastructures · Repositories · Massive open online courses (MOOC) · Wikis · Open textbooks · OpenCourseWare (OCW)

Introduction

The term OER was first proposed in 2002, at a UNESCO forum. While other concepts (e.g., "open content") had already tried to bring to education the principles underpinning the free software and open source movements (Wiley and Gurrell 2009), the new term helped galvanize a global community into action. Over the last two decades, a wide range of actors – including policymakers, institutional leaders, educators, students, philanthropists, and governments – have engaged in the promotion of (open) educational practices that involve the creation and release of learning resources as OER.

In 2019, UNESCO's General Conference adopted the Recommendation on Open Educational Resources, according to which OER are "learning, teaching and research materials in any format and medium that reside in the public domain or are under copyright that have been released under an open license, that permit no-cost access, re-use, re-purpose, adaptation and redistribution by others" (UNESCO 2019).

The definition, agreed after a consultation with diverse stakeholders, is compatible with licenses that prevent certain kinds of reuse (e.g., commercial), a stance contrary to certain views within the OER community advocating to avoid restrictive conditions for reuse.

This chapter focuses on digital knowledge infrastructures devoted to the creation, storage, management, and sharing of OER across diverse educational levels and geographies. While the word "infrastructure" is often associated just with technology, we adopt a broader socio-technical perspective and therefore approach knowledge infrastructures as ecologies or complex adaptive systems that "consist of numerous systems, each with unique origins and goals, which are made to interoperate by means of standards, socket layers, social practices, norms, and individual behaviors that smooth out the connections among them" (Edwards et al. 2013, p. 5). OER and MOOCs are examples of such knowledge infrastructures and are key to understanding the work of the digital in the enactments of open education (Edwards 2015). In particular, we use the term "OER infrastructures" to talk about knowledge infrastructures articulated around the goal of providing access to educational resources that are either in the public domain or available under an open license.

The chapter reviews several OER initiatives with the aim of illustrating relevant types of experiences with different scopes and ambitions rather than offering an exhaustive catalogue. Educational levels are represented with acronyms, except from pre-K12, K-12, and schools: higher education (HE), continuing education (CE), lifelong learning (LL), and vocational education (VE).

Typology of Online OER Infrastructures

The idea that sharing educational content as freely and openly as possible on the World Wide Web may democratize learning opportunities is one of the key principles underpinning much of the discourse and practice on technology-mediated education, although its limitations have been increasingly recognized in the literature (Bayne et al. 2015) and the focus has increasingly shifted from the content to how communities engage with it.

The redefinition of open education through the rise of OER and the emergence of other open educational practices (OEP) cannot be understood without the Web as the basis for a global knowledge infrastructure, where technology and social dynamics have coevolved to form complex information ecologies.

Figure 1 shows various types of digital knowledge infrastructures, some of which are regarded as OER infrastructures. It is worth noting that it includes two types of infrastructures that may, or may not, operate as OER infrastructures. In the case of MOOCs, while they are key to understanding current trends in OEP, many of these courses are content-based that cannot be regarded as OER. In this regard, educators involved in the creation of MOOCs often do not intend to create OER or perceive it as important (Hodgkinson-Williams and Arinto 2017), despite being concerned with other aspects of OEP. In the case of open-access repositories, they are represented as entities that can work as OER infrastructures, especially when they contain collections specifically dedicated to providing access to educational resources. Even though UNESCO's definition of OER explicitly includes "research materials," in this chapter we primarily focus on initiatives devoted to sharing resources that have been specifically created for pedagogical purposes.

Therefore, this section provides an overview of different models – not necessarily associated with specific technologies – for the creation and sharing of OER, drawing on major theoretical and empirical insights from research, historical trajectory, and controversies on the topic.

OER Repositories

An online repository is a special type of website created to store large collections of artifacts in a highly structured way, thanks to the use of detailed metadata. DSpace is, for example, a widely used software package chosen by HE institutions from all over the world to run their repositories. While they are most often dedicated to storing research publications, they might also include collections of teaching and learning

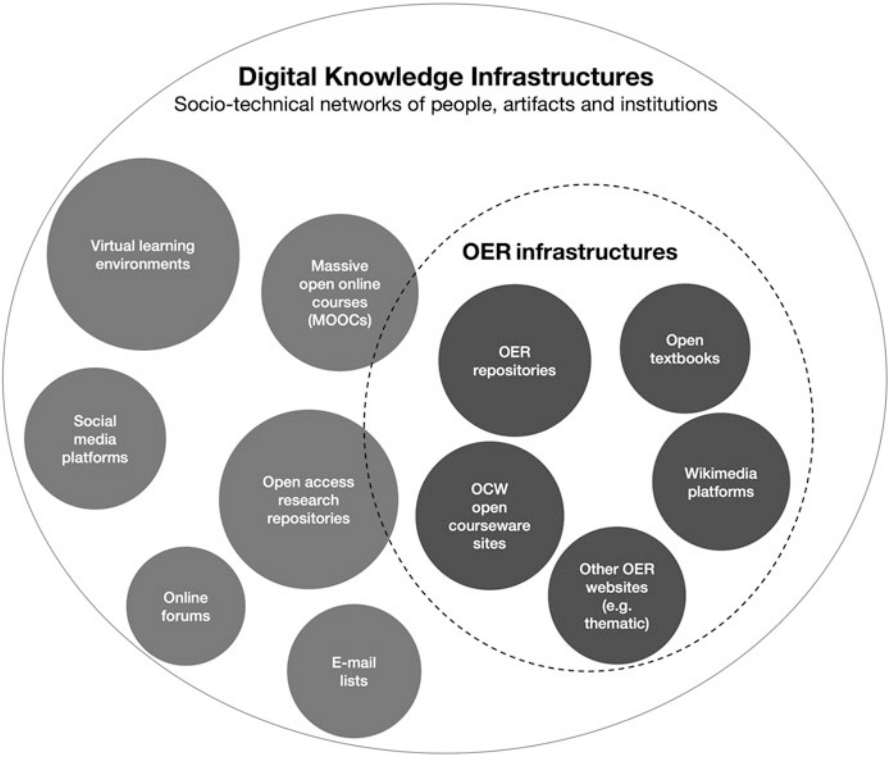


Fig. 1 Relations between digital knowledge infrastructures and OER infrastructures

resources, and there are also repositories entirely focused on educational content and, more specifically, OER.

The history of OER repositories (ROER) dates back to the first steps of learning objects in 2000 in the context of distance education and were hence called learning object repositories: central databases containing a broad range of individual learning objects. Repositories are the most widespread type of OER infrastructure, providing permanent access and enhancing visibility while enabling the search and retrieval via metadata, which are key elements to represent and organize OER (Mouriño-García et al. 2018).

ROER can be classified depending on the type of content they store (McGreal 2008): (a) online collections of archived content, (b) portals that mainly store links and metadata to materials from others (i.e., referatories), and (c) repositories that combine the role as a content provider and portal. Another type of classification is based on the nature of the content or the provider (Clements et al. 2015): (a) thematic repositories that include resources from a certain topic, (b) national repositories that relate to nationwide portals that include contents for all topics, and (c) federated repositories (aggregators) that harvest metadata from other repositories.

There are some review studies on OER repositories but focused almost exclusively on HE. For instance, the review by Santos-Hermosa et al. (2017) of 110 ROER in HE found out that more than 75% were institutional repositories (the rest were national repositories), and most of the ROER examined have been created in Europe (over 70%) and North America (over 15%). Also, findings from three HE qualitative studies described in a systematic review (Rodes-Paragarino et al. 2016) highlight (a) that the implementation of local repositories increases the use and reuse of OER; (b) the importance of considering technological, cultural, and pedagogical aspects when integrating ROER in an institution; and (c) the preference for a subject-based repository.

OpenCourseWare

OpenCourseWare (OCW) is a model for the provision of OER that was originally conceived, and first implemented, at the Massachusetts Institute of Technology (MIT) as the result of a "study aimed at defining and evaluating MIT's options in the changing educational environment of the Internet" (Abelson 2008, p. 165). In the Spring of 2001, MIT launched OCW as a way of offering access to high-quality learning resources and ultimately pursuing the idea of education as an universal right (Caswell et al. 2008). Following a highly structured approach and with generous media production support, it involved the creation of a comprehensive collection of high-quality educational resources by MIT academics (Abelson et al. 2021). The use of an open license (CC-BY-NC-SA) enables not only learners all over the world to take advantage of those resources as the basis for self-regulated learning but also educators and curriculum developers to reuse and adapt to their own contexts and communities. The OCW model focuses on the provision of content for self-directed learning and self-assessment resources, but it does not offer any opportunities for interaction with either educators or other learners.

While it was predated by other initiatives with similar goals, OCW managed to build a critical mass of attention around this type of OEP, leading to the coinage of the term OER and resulting in a considerable number of university leaders all over the world becoming interested in replicating the model (Carson and Forward 2010).

MOOCs

Massive open online courses (MOOCs) are online, open-access, and free courses that allow the enrolment of an unlimited number of students. While they are often considered under the umbrella of OER, this has been questioned (Stracke et al. 2019) as relatively few of them are fully free or carry an open license.

MOOCs were preceded by both open online courses and the OER movement but started as such with the open online course "Connectivism and Connective Knowledge" (CCK08) organized by George Siemens and Stephen Downes (Canada) in

2008. This first MOOC focused on network formation, defining the connectivist approach (cMOOC), whereas in 2011 the content-focused MOOC emerged (xMOOCs), as proposed by Norvig and Thrun (USA) (Stracke et al. 2019).

MOOCs have attracted broad attention in research in open, distance, and digital education in the last years. Some of the most salient topics are quality assurance, which is also shared by ROER, their instructional design or pedagogical model, and learning analytics (Rasheed et al. 2019; Zawacki-Richter et al. 2018).

Open Textbooks

Open textbooks can be regarded as a specific type of OER. They have gained ground in certain contexts where the price of textbooks is particularly high, such as the USA or Canada, operating as an important barrier to access to education. Indeed, there are cases of HE institutions offering zero-textbook-cost degrees, for example, in California, where all required readings are available as open textbooks or other types of OER. This has also generated particular interest in Australia.

Wikimedia Platforms

Wikipedia is not only the biggest and most popular OER of all times, consistently ranked among the most visited websites worldwide, but also one of the most successful examples of commons-based peer-production (Benkler 2006). Wikimedia, the US-based nonprofit organization behind Wikipedia, maintains a wider range of OER infrastructures, including Wikidata, Wikimedia Commons, Wikivoyage, and Wikibooks. All of them are wikis, a type of website that users can edit directly on their web browser, enabling them to quickly revise content and add hyperlinks. Wikimedia also maintains MediaWiki, the open-source content management system underpinning all these platforms, as well as other wiki-based OER initiatives, such as the WikiEducator community [https://wikieducator.org/].

Global, Cross-Border, National, and Regional Infrastructures

OER infrastructures tend to be hosted at an institutional level, taking, for instance, the form of repositories, OCW sites, or open textbook collections. However, there are also joint initiatives in which several institutions and organizations within the same countries or internationally come together to launch an OER infrastructure. In some cases, initiatives that started locally reached a global scope eventually.

In this section, a non-exhaustive list of OER infrastructures has been purposely selected to illustrate the OER scene across the globe, including examples of both live and discontinued initiatives at different educational levels in the six continents. The emphasis is made on global, national, and regional infrastructures, although in some cases institutional or thematic infrastructures are also highlighted.

Global Actors and Infrastructures

Intergovernmental entities such as UNESCO, the European Union, or the Commonwealth of Learning have played an important role in promoting OER, though instead of establishing their own OER infrastructures they have tended to support other organizations in doing so. Likewise, private organizations like the Hewlett Foundation have funded OER initiatives of different kinds globally, such as the OER World Map [https://oerworldmap.org/] or the Global OER Graduate Network [http://go-gn.net/].

The OER infrastructures discussed in this section are the result of international collaborations that involve partner institutions across the globe (i.e., in two or more continents).

OER Repositories

One of the most global, well-known ROER is the Multimedia Educational Resource for Learning and Online Teaching (**MERLOT)** [https://merlot.org/], which was developed by the California State University (US) in 1997 as the university's open library of free learning resources, derived from a 1994 nationally funded project (Hanley 2015). Nowadays, the MERLOT consortium is a global initiative constituted by over 40 HE systems, individual institutions of HE, consortia, professional academic organizations, digital libraries, education industries, and over 125,000 individuals (also beyond the USA) and forms a case study of sustainability for OER projects (with a high presence of HE OER), moving from an institutional initiative to a community-sustained project (Okewole and Knokh 2016).

OER Commons [https://www.oercommons.org/] is a digital public library and collaboration platform launched by the global nonprofit US-based Institute for the Study of Knowledge Management in Education in 2007, supported in part by the William and Flora Hewlett Foundation, as part of the foundation's worldwide OER initiative. It counts with contributors from all over the world, covering all education levels.

OpenCourseWare

Due to the large number of organizations seeking advice from MIT on how to establish their own OCW initiatives, the OCW Consortium was launched in 2006 with the aim of facilitating and promoting the adoption of the OCW model. In addition, several regional associate consortiums were established with the aim of promoting the OCW model within specific geographies, for example, the Universia-OCW Consortium in the Iberoamerican region (Latin American countries, Portugal, and Spain) and the Japan OCW Consortium, the Korea OCW Consortium, the Taiwan OpenCourseWare Consortium, or the Turkish OpenCourseWare Consortium.

After a few years, the OCW model proved to be difficult to sustain for many institutions, and its popularity declined, reflected on the rebranding of the OCW Consortium as the Open Education Consortium. Likewise, the associate consortiums either disappeared or rebranded themselves to address open education more generally too.

OCW initiatives do not rely on a centralized OER infrastructure or even use the same technologies. However, some OER infrastructures attempted to make it easier to find content across OCW sites around the world or within regions (e.g., Serendipity [http://serendipity.utpl.edu.ec], an OCW search engine). Likewise, associated consortiums like OCW-Universia implemented their own platforms to aggregate resources published by their members on their respective OCW sites.

MOOCs

Most MOOC platforms follow the xMOOC model, focus on HE and CE, and were established in the USA but soon started to offer courses provided by educational institutions across the world.

Coursera [https://www.coursera.org/] was created by professors at Stanford University (USA) in 2012, as an independent for-profit technology, and currently has over 200 HE institutions and companies as partners all over the world. MIT and Harvard launched the MOOC platform **edX** [https://www.edx.org] for HE in 2012, through the incorporation of their MITx platform (USA). In 2013, the platform was released as open-source software.

Also in the English-speaking realm, **FutureLearn** [https://www.futurelearn.com/] was launched by the UK's Open University in 2013 with a clear focus on British universities, but nowadays includes partner institutions around the world. Apart from CE courses, several universities also offer full degrees, both undergraduate and postgraduate, on this platform. A distinctive feature of FutureLearn is that all courses are based on a social learning approach, designed according to the principles of visible learning – as inspired by the work of John Hattie – and a community support model that comes from Diana Laurillard's conversational framework.

Established in Spain in 2013 as a joint initiative between Telefonica Educación Digital and Universia, **MiriadaX** [https://miriadax.net/] is the first Iberoamerican MOOC platform. Now it has over 100 educational partners from Latin America, Portugal, and Spain.

The **OERu** [https://oeru.org/] – coordinated by the OER Foundation from New Zealand and with partners in Africa, Asia, Europe, Middle East, North America, and Oceania – is an independent and not-for-profit network of universities, which provide online courses that can be taken either for self-directed interest (for free) or as learning for credit (on a fee-for-service basis).

Building on MOOC platforms, and other free online courses from around the Web, the **P2P University** [https://www.p2pu.org/] provides an OER infrastructure that does not focus on the delivery of content, but enables learners based in the same cities, all over the world, to form learning communities and take together, as a kind of local cohort, the online free courses offered by third-party platforms (many of them MOOC platforms). Based on peer and community learning from an equity approach, it is closer to the cMOOC approaches than to the xMOOC ones, despite building primarily on the latter.

Open Textbooks

Apart from websites offering or listing individual textbooks by subject and level (e.g., the Open Textbook Library [https://open.umn.edu/opentextbooks/]), it is worth mentioning the existence of platforms specifically designed to support the authoring, release, remix, and creation of derivative versions of open textbooks and, more generally, open books.

Pressbooks [https://pressbooks.org] and **Manifold** [https://manifoldapp.org] are two examples of platforms specifically designed to author, enrich with multimedia content, and share textbooks (open or otherwise), which can be read online and exported in multiple formats. Despite being initiated in North America, and with institutions making use of both platforms primarily in Canada and the USA, universities from other continents have started to work with these platforms.

Wikimedia

Launched in 2001, **Wikipedia** has now more than six million articles in English and many over 300 different languages. While it cannot be treated as a scholarly or even a reliable resource, as an OER infrastructure it has enormous value for active learning and outreach in HE (Petrucco and Ferranti 2020; Poulter and Sheppard 2020). While the infrastructure of Wikipedia and its sibling platforms is maintained by the Wikimedia Foundation, they rely on a global community of volunteers, and there are Wikimedia chapters established as independent charitable organizations in many countries.

National, Regional, and Institutional Actors and Infrastructures

Africa

Several regional and national OER infrastructures have been established over the last decades in Africa, especially in the sub-Saharan area. It is worth noting the international dimension of various initiatives that pool together contributions from different countries, most notably OER Africa [https://oerafrica.org/] and the African Virtual University [https://oer.avu.org/] in HE (both have been affiliated with the OCW Consortium) and Teacher Education in Sub-Saharan Africa (TESSA) [https://www.tessafrica.net] in relation to schools.

The three initiatives include ROER with a regional scope that include partner institutions in multiple African countries and count with the support from different organizations: the William and Flora Hewlett Foundation (USA) in the case of OER Africa (initiated in 2008), The Open University (UK) for the TESSA project (launched in 2010), and the African Development Bank for the African Virtual University (initiated in 2011). Likewise, there are some examples of sizable institutional initiatives for HE in that area, such as the National Open University of Nigeria's OCW site (launched in 2010, but no longer active) or the OpenUCT of University of Cape Town in South Africa.

Regarding the north of Africa, it is worth mentioning the case of Morocco, where a national OER Declaration was launched in 2016 and some institutions have established their own institutional initiatives aimed at sharing educational resources and offering MOOCs (Zaatri et al. 2020). There is also a recent national initiative in Morocco, launched in 2019 with French support, known as Maroc Université Numérique [https://www.mun.ma/] that offers MOOCs provided by various Moroccan universities for HE.

Asia

In Asia, most of the national or regional OER infrastructures are developed, maintained, and funded by governmental sources, except from Japan.

National MOOC platforms are especially popular in the eastern region of Asia (China, Japan, South Korea) (Marín et al. 2020a). In China, MOOCs are the most prominent OER format ("top- or high-quality open courses" or "state-benchmarking open courses") (Yijun et al. 2020), many as academia-industry collaborations. Two examples of MOOC platforms are the China Open Resources for Education (CORE, launched in 2003, discontinued) and the Chinese MOOC platform Chinese University MOOC (CUM) [https://www.icourse163.com/] (launched in 2013). In South Korea, the KOCW [http://www.kocw.net/home/index.do] (launched in 2009) and the K-MOOC platform [http://www.kmooc.kr/] (launched in 2015) are the national platforms for OpenCourseWare and MOOCs, respectively. Similarly, Japan has its national OpenCourseWare (Japan OCW, launched in 2003, discontinued) and MOOC platform (JMOOC [https://www.jmooc.jp/], launched in 2013) but are maintained by a membership-based consortium of HE institutions (and businesses, in the case of the JMOOC), instead of governmental organizations, which is the case for China and South Korea. All these platforms focus especially on HE, CE, and LL. On the other hand, ROER seem to be well represented in India for HE and schools (Dhanarajan and Porter 2013; Ganapathi 2018). Concretely, eGyanKosh [http://www.egyankosh.ac.in/] was developed in 2005 by the Indira Gandhi National Open University for HE, and the National Repository of OER [https://nroer.gov.in] was developed in 2013 by the Indian government for schools.

Middle East

Edraak [https://www.edraak.org/] is a nonprofit MOOC platform launched in 2013 based in Jordan but targeted at the whole Arab-speaking world for schools and CE (Wimpenny et al. 2016). Several institutional MOOC platforms in Turkey (e.g., AKADEMA by Anadolu University or Atademix by Erzurum Ataturk University) (Marín et al. 2020a) and the discontinued Turkish HE ROER initiative, which started in 2007 "National Open Course Materials" (Tisoglu et al. 2020), are relevant examples too. The YOK Dersleri Platform [https://yokdersleri.yok.gov.tr] stands out for being created as a reaction to the COVID-19 emergency in 2020 by the HE Council to offer HE courses and materials.

Europe

Europe has been one of the most important players in promoting OER worldwide. The EU has created a framework to support HE institution in opening up education (dos Santos et al. 2016), and several countries have developed a full range of initiatives, some of which have been discontinued revealing sustainability issues (e.g., Jorum, Open Education Europe) (see Fig. 2). This is a key challenge affecting OER infrastructures, common to other continents, that will be discussed later.

Many of the ROER from Europe are institutional, especially based on HE institutions. Also, it is characteristic that some countries include province- or state-based infrastructures; this is the case for Germany (Marín et al. 2020b). Some national infrastructures have expanded their influence within and even beyond Europe. For instance, MiriadaX was launched in Spain but quickly became a quick infrastructure in Iberoamerican countries. Likewise, FutureLearn started in

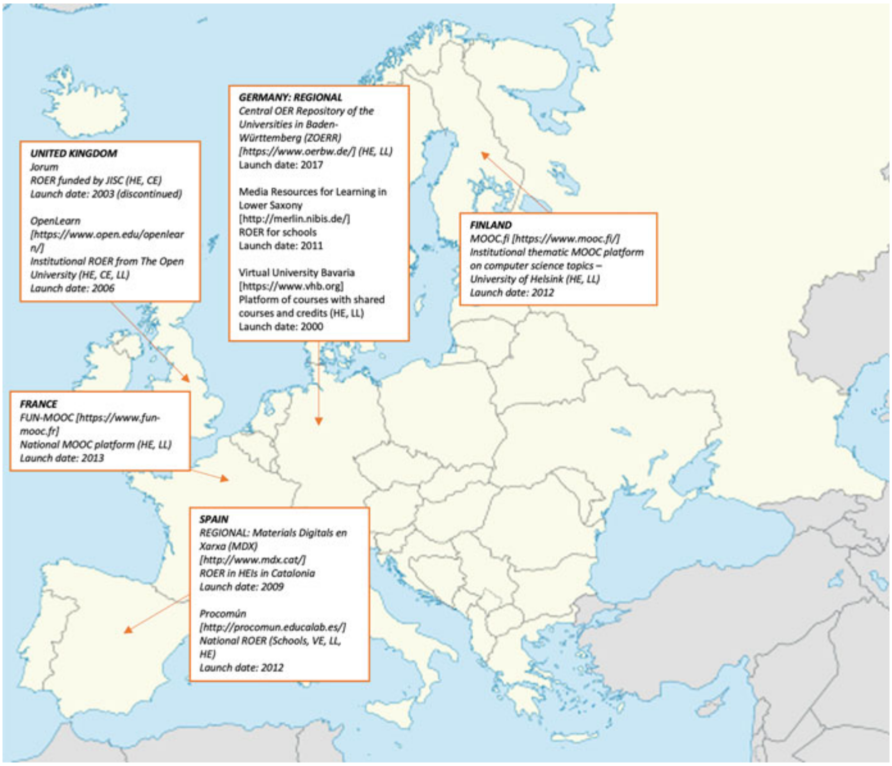


Fig. 2 Examples of national and regional digital infrastructures in Europe. (Note: The original figure of the Europe map was created by Commons user Alexrk2, CC BY-SA 3.0, shared via Wikimedia Commons). To see the figure in high resolution, see https://doi.org/10.5281/zenodo.6352308

the UK but is currently used in many other countries to offer their own MOOCs, such as HE institutions from Australia or the Netherlands.

North America

North America has played a central role in the rise and expansion of the OER movement, with many pioneering initiatives and funding bodies concerned with OER in that region, most notably in the USA and Canada. The MIT sparked a global wave of interest on OER through OCW (with the OCW MIT [www.ocw.mit.edu], created in 2001), and then various US-based platforms put xMOOCs under the spotlight (e.g., Udemy since 2010: [https://www.udemy.com] or Udacity since 2011 [https://www.udacity.com], both with a focus on vocational courses), while Canada-based initiatives promoted more cMOOCs.

Despite its global reach, the largest OER, Wikipedia, extensively relies on the US-based Wikimedia Foundation. The USA has also led the way in terms of OER-based credit-bearing courses recognized across colleges, through initiatives such as the Saylor Academy [https://Saylor.org] (created in 2008), and in promoting the creation and adoption of open textbooks, through initiatives such as OpenStax [https://openstax.org/] (launched in 2012) and LibreTexts.

Although most efforts have been focused on HE, initiatives such as Khan Academy [https://www.khanacademy.org/] (created in 2008) cover the pre-K12 and K12 curriculum.

Education in Canada is governed at a provincial or territorial level, and there are various provincial open education initiatives. BC Campus OpenEd [https://open.bccampus.ca/] in British Columbia is one of the best known among those initiatives since 2011 in HE and LL, with a special focus recently on open textbooks. In addition, as mentioned before in global infrastructures, the first MOOC was organized at Manitoba University in 2008 and resulted in the definition of the model of connectivist MOOCs that has been then adapted by many other institutions worldwide.

Sometimes the USA and Canada are approached as a single region, such as in the case of WikiEducation [https://wikiedu.org/], which supports the adoption of Wikipedia for teaching and learning in HE with a special focus on these two countries, established as spin-off of Wikimedia 2013.

In the case of Mexico, a few institutions joined the OCW Consortium, and some launched their own OCW sites, namely, the Universidad de Monterrey and the Tecnológico de Monterrey. However, neither of the two websites are currently online. A current Mexican MOOC platform is the Plataforma Abierta de Innovación edX [https://www.aprendoencasa.plai.mx/edx] developed by the State Government of Jalisco in 2019 that provides access to a selection of international edX courses with the possibility of certification (CE, LL).

South America

According to Hodgkinson-Williams and Arinto (2017), with the exception of Brazil, open education is still in its infancy in South America, and the debate around the adoption of OER is incipient, especially in countries like Chile or Guatemala.

However, the open education community in the continent is active and counts with several organizations that promote OER in the region, such as: OE LATAM [https://www.oelatam.org/], a regional node of the open education consortium OE GLOBAL; the Mercosur network for accessibility and collaborative generation of OER (REMAR); or EDUTEKA, Colombian initiative for schools and lifelong learning developed by the Foundation Gabriel Piedrahita Uribe and the School of Educational Sciences of the University of Icesi [https://eduteka.icesi.edu.co/].

Some countries have specific national and institutional policies related to open education in the context of HE (e.g., Colombia, Uruguay). There are a few institutional ROER in HE (e.g., Universidad Nacional de Costa Rica), while some OER initiatives have now been discontinued (e.g., Universidad Técnica Particular de Loja's OCW for HE in Ecuador or the Center for Distance HE of the State of Rio de Janeiro, a consortium of the six public universities of Rio de Janeiro funded by the state government of the city) (dos Santos et al. 2012).

The Universidad de la República (Uruguay) is one of the most important players in the continent in promoting OER. Apart from having a program of virtual learning environments (ProEVA) that promotes OER and OEP and a research and innovation strand on accessible OER (Núcleo REAA), it has also engaged in different EU-funded OER projects in this field (Hodgkinson-Williams and Arinto 2017).

It is worth highlighting that the interest of OER infrastructures in this area is remarkably stronger in schools than other educational stages, which is in contrast with other continents and reflects the need to provide educational opportunities to every child, also in rural areas (see Fig. 3).

Oceania

Most of the activity in the field of OER is linked to the OER Foundation and Otago Polytechnic, which hosts a UNESCO-ICDE Chair in OER and is behind the National Centre for Open Education Practice [https://coep.nz/]. This center was established by Otago Polytechnic and the Ara Institute of Canterbury in 2019 to provide leadership, networking, and support on OER and OEP adoption to HE institutions and practitioners in New Zealand. The OER Foundation – established in New Zealand but reaching global scope through OERu and WikiEducator – has channelled much of the activity in relation to OER infrastructures in this region.

In the case of Australia, various universities have now launched institutional OER initiatives, mainly MOOCs and ROER, despite the lack of support from the federal government in terms of funding or policy aimed at fostering OER infrastructures and practice (Stagg et al. 2018). For instance, the University of Tasmania has a MOOC thematic platform on dementia [https://mooc.utas.edu.au/], and the Swinburne University of Technology has its ROER for digital media and also hosts the Swinburne History and Art Collections [https://commons.swinburne.edu.au/]. There is also some interuniversity collaboration in this field, as shown by the Open Textbook Initiative for HE established in 2018 by five Australian HEIs [https://emedia.rmit.edu.au/oer/], and the funding of the National Centre for Student Equity in HE is providing for Australian Open Textbooks as Social Justice Project by Deakin University.

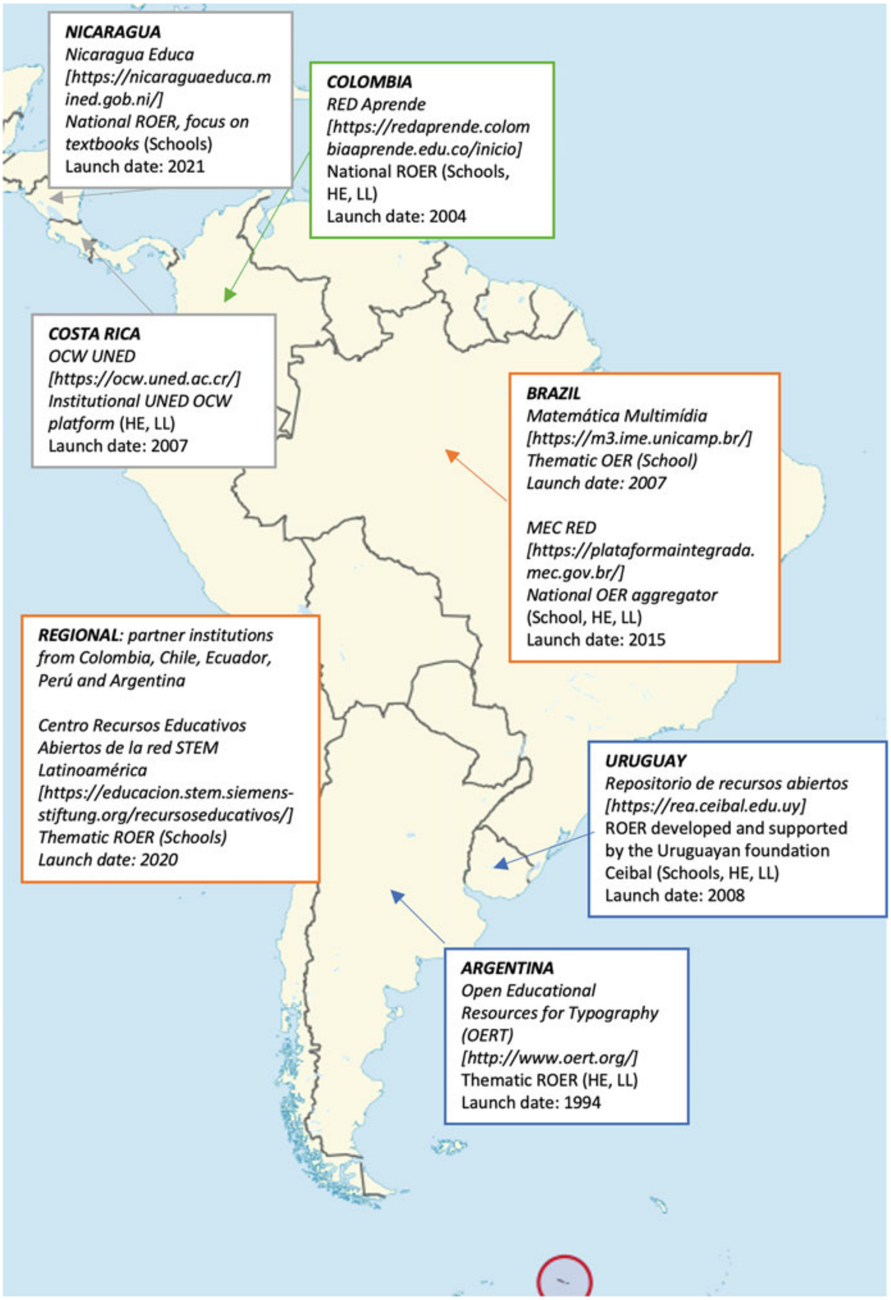


Fig. 3 Examples of national and regional digital infrastructures in South America. (Note: The original figure of the South America map was created by TUBS, CC BY-SA 3.0, shared via Wikimedia Commons). To see the figure in high resolution, see https://doi.org/10.5281/zenodo.6352308

Challenges and Future Research

The OER infrastructure scene offers many challenges and open questions, which also point towards directions for future research.

One of the most common challenges is the lack of awareness, including knowing that OER infrastructures exist and understanding the concept and its purpose, which has been identified – along with the lack of incentives – as a major barrier to engagement with OER (Baas et al. 2019; Bates et al. 2007).

The absence or non-systematic use of metadata and inaccurate labelling, especially regarding pedagogical/educational metadata, is one of the problems that makes searchability and findability of OER difficult, especially in the case of repositories (de Deus and Barbosa 2020; Rodes-Paragarino et al. 2016; Santos-Hermosa et al. 2017).

More generally, quality assurance has always been a major issue in OER infrastructures, a topic addressed by several authors (Atenas and Havemann 2014; Bates et al. 2007; Camilleri et al. 2014; Clements et al. 2015). Users' concerns about quality of content stored in OER infrastructures is a common aspect across the literature related to the topic too (Bates et al. 2007).

The sociotechnical, pedagogical, and cultural aspects of OER infrastructures and their adoption in different contexts are also an important topic, as suggested by both the examples presented here and the literature (Rodes-Paragarino et al. 2016). Cultural differences and preference for locally produced courses underline the importance of developing localized content and having situated OER initiatives (Cachia et al. 2020; Hatakka 2009; Rodes-Paragarino et al. 2016; Ruipérez-Valiente et al. 2020).

While OER infrastructures generally aspire to achieve a global reach, Global North perspectives and content produced in English are dominating the scene and creating considerable cultural biases and imbalances. That is the case even for truly global initiatives where contributions from anyone are welcome, such as Wikipedia. Despite this, Wikimedia editors, as in other OER communities happens, are largely skewed towards white, male, Western populations, which has resulted in a number of biases affecting the topics and perspectives included in Wikipedia and the rest of the projects (Konieczny and Klein 2018).

Related to this geographical issue, most of the OER research so far and many infrastructures have been developed in Europe and North America, by and for HE (Santos-Hermosa et al. 2017); hence, there is also room for improvement in this sense. Scarce research and infrastructures could be found for schools (with exception from South America) and even none specific for VE. Future research should include more voices from the Global South and cover other educational stages different from HE.

Licensing choices is also a contentious topic, with some purist voices claiming that any resources that do not comply with the 5-Rs principle should not be regarded as OER, while others – including the most recent definition recognized by UNESCO – consider that licenses preventing commercial uses or derivative works are equally valid for the release of OER. This creates situations such as the one presented by the platform TED Talks, which publishes their videos under the Creative Commons BY-NC-ND license for personal use for free, but other types of use within an organization (e.g., for training) require a license for a fee (TED Conferences, LLC n.d.). At the same time, the OER status of some MOOCs platforms such as Coursera or Udacity has been questioned due to not using open licenses (Stracke et al. 2019).

Finally, the sustainability of OER and their infrastructures is a clear challenge to the continuity of initiatives (Orr et al. 2015) – as shown by some of the national, regional, and institutional cases discussed here – and there is not a single business model that may work in every context. For example, the decision to not continue the UKOER program (2009–2012) and the subsequent retirement of the UK OER national repository (Jorum) implied a shift from funding and responsibility at national level to individual institutions, favoring a devolved model where institutions have to find their own resources and meant optimizing resources by, for instance, including OER collections into open-access research repositories (Risquez et al. 2020).

Future research in the context of OER infrastructures should follow different directions, in addition to the ones already previously mentioned. Some research points towards learning analytics' practices to measure users' interactions with OER and interoperability between OER infrastructures (Yassine et al. 2016). Also, some authors have advocated for going a step further in establishing OER infrastructures and embracing OEP as the basis for a deeper pedagogical turn (Atenas and Havemann 2014).

Conclusion

In this chapter an overview of the main OER infrastructures worldwide, and key challenges, has been provided. The landscape of OER infrastructures shows that there is still room for improvement through research in terms of sustainability, interoperability, users' awareness, quality assurance, licensing issues, and their socio-technical, pedagogical, and cultural aspects.

The Web gave rise to the emergence of e-learning as an academic field devoted to exploring and researching its use for teaching and learning, followed by a range of theories and approaches with their own flavors and terms, such as online learning, networked learning, and connected learning, while also forcing to redefine other established and more general concepts and fields such as distance learning, open education, or educational technology. The value of the Web in reconfiguring the way we share and access educational content has been demonstrated through successful OER infrastructures for some time now, but further research is needed to fully understand how to maximize its potential in different institutional, cultural, and social contexts.

Although technical issues related to the OER infrastructures are important for further developments, it is key to recognize that neither the use of digital resources for teaching and learning are uniform within or across countries nor are OER's conceptions and perceptions the same in every context, and these aspects decisively influence the development and sustainability of OER infrastructures.

Cross-References

► Quality Assurance of Open Educational Resources

Acknowledgments Grant RYC2019-028398-I funded by MCIN/AEI/ 10.13039/501100011033 and FSE "El FSE invierte en tu futuro"

References

Abelson, H. (2008). The creation of OpenCourseWare at MIT. *Journal of Science Education and Technology, 17*(2), 164–174. https://doi.org/10.1007/s10956-007-9060-8.

Abelson, H., Miyagawa, S., & Yue, D. K. P. (2021, May 24). On the 20th anniversary of OpenCourseWare: How it began. *MIT Faculty Newsletter*, *XXXIII(5),* May/June 2021. Retrieved from https://perma.cc/SK5K-8XP3

Atenas, J., & Havemann, L. (2014). Questions of quality in repositories of open educational resources: A literature review. *Research in Learning Technology, 22*. https://doi.org/10.3402/rlt.v22.20889.

Baas, M., Admiraal, W., & van den Berg, E. (2019). Teachers' adoption of open educational resources in higher education. *Journal of Interactive Media in Education, 2019*(1), 9. https://doi.org/10.5334/jime.510.

Bates, M., Loddington, S., Manuel, S., & Oppenheim, C. (2007). Attitudes to the rights and rewards for author contributions to repositories for teaching and learning. *ALT-J, 15*(1), 67–82. https://doi.org/10.1080/09687760600837066.

Bayne, S., Knox, J., & Ross, J. (2015). Open education: The need for a critical approach. *Learning, Media and Technology, 40*(3), 247–250. https://doi.org/10.1080/17439884.2015.1065272.

Benkler, Y. (2006). *The wealth of networks: How social production transforms markets and freedom*. New Haven: Yale University Press.

Cachia, R., Aldaoud, M., Eldeib, A., Hiari, O., Tweissi, A., Villar-Onrubia, D., . . . Maya, I. (2020). Cultural diversity in the adoption of open education in the Mediterranean basin: Collectivist values and power distance in the universities of the Middle East. *Araucaria. Revista Iberoamericana de Filosofía, Política, Humanidades y Relaciones Internacionales*, *22*(44), 53–82. https://doi.org/10.12795/araucaria.2020.i44.03.

Camilleri, A. F., Ehlers, U. D., & Pawlowski, J. (2014). *State of the art review of quality issues related to open educational resources (OER)*. Luxembourg: Publications Office of the European Union. Retrieved from https://data.europa.eu/doi/10.2791/80171.

Carson, S., & Forward, M. L. (2010). Development of the OCW Consortium. *2010 IEEE Education Engineering (EDUCON)*, 1657–1660. IEEE. https://doi.org/10.1109/EDUCON.2010.5492401.

Caswell, T., Henson, S., Jensen, M., & Wiley, D. (2008). Open content and open educational resources: Enabling universal education. *The International Review of Research in Open and Distributed Learning, 9*(1). https://doi.org/10.19173/irrodl.v9i1.469.

Clements, K., Pawlowski, J., & Manouselis, N. (2015). Open educational resources repositories literature review – Towards a comprehensive quality approaches framework. *Computers in Human Behavior, 51*, 1098–1106. https://doi.org/10.1016/j.chb.2015.03.026.

de Deus, W. S., & Barbosa, E. F. (2020). The use of metadata in open educational resources repositories: An exploratory study. *2020 IEEE 44th Annual Computers, Software, and*

Applications Conference (COMPSAC), 123–132. https://doi.org/10.1109/COMPSAC48688.2020.00025.

Dhanarajan, G., & Porter, D. (Eds.). (2013). *Open educational resources an Asian perspective*. Vancouver: Commonwealth of Learning and OER Asia. Retrieved from https://perma.cc/254R-T89N.

dos Santos, A. I., Cobo, C., & Costa, C. (Eds.). (2012). *Compendium open educational resources; cases from Latin America and Europe in higher education*. Niterói: CEAD-UFF. Retrieved from https://ssrn.com/abstract=2193109.

dos Santos, A. I., Castaño Muñoz, J., & Punie, Y. (2016). *Opening up education: Support framework for higher education institutions*. Luxembourg: Publications Office of the European Union. Retrieved from https://data.europa.eu/doi/10.2791/293408.

Edwards, R. (2015). Knowledge infrastructures and the inscrutability of openness in education. *Learning, Media and Technology, 40*(3), 251–264. https://doi.org/10.1080/17439884.2015.1006131.

Edwards, P., Jackson, S., Chalmers, M., Bowker, G., Borgman, D., Ribes, D., . . . Calvert, S. (2013). *Knowledge infrastructures: Intellectual frameworks and research challenges*. Ann Abor: Deep Blue.

Ganapathi, J. (2018). *The role of open educational resources (OERs) in primary education in developing nations: A case study of India*. PhD thesis, Queensland University of Technology. https://doi.org/10.5204/thesis.eprints.115759.

Hanley, G. L. (2015). MOOCs, MERLOT, and open educational services. In C. J. Bonk, M. M. Lee, T. C. Reeves, & T. H. Reynolds (Eds.), *MOOCs and open education around the world* (1st ed., pp. 33–40). New York: Routledge. Retrieved from https://doi.org/10.4324/9781315751108.

Hatakka, M. (2009). Build it and they will come? – Inhibiting factors for reuse of open content in developing countries. *The Electronic Journal of Information Systems in Developing Countries, 37*. https://doi.org/10.1002/j.1681-4835.2009.tb00260.x.

Hodgkinson-Williams, C., & Arinto, P. (2017). *Adoption and impact of OER in the global south*. Cape Town/Ottawa: African Minds, International Development Research Centre & Research on Open Educational Resources. https://doi.org/10.5281/ZENODO.1005330.

Konieczny, P., & Klein, M. (2018). Gender gap through time and space: A journey through Wikipedia biographies via the Wikidata Human Gender Indicator. *New Media & Society, 20*(12), 4608–4633. https://doi.org/10.1177/1461444818779080.

Marín, V. I., Bond, M., Zawacki-Richter, O., Aydin, C. H., Bedenlier, S., Bozkurt, A., . . . Xiao, J. (2020a). A comparative study of National infrastructures for digital (open) educational resources in higher education. *Open Praxis*, *12*(2), 241. https://doi.org/10.5944/openpraxis.12.2.1071.

Marín, V. I., Zawacki-Richter, O., & Bedenlier, S. (2020b). Open educational resources in German higher education – An international perspective. *EDEN Conference Proceedings, 1*, 85–94. https://doi.org/10.38069/edenconf-2020-rw-0010.

McGreal, R. (2008). A typology of learning object repositories. In H. H. Adelsberger, J. M. P. Kinshuk, & D. G. Sampson (Eds.), *Handbook on information technologies for education and training* (pp. 5–28). Berlin/Heidelberg: Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-540-74155-8_1.

Mouriño-García, M., Pérez-Rodríguez, R., Anido-Rifón, L., Fernández-Iglesias, M. J., & Darriba-Bilbao, V. M. (2018). Cross-repository aggregation of educational resources. *Computers & Education, 117*, 31–49. https://doi.org/10.1016/j.compedu.2017.09.014.

Okewole, J. T., & Knokh, I. (2016). *MERLOT: A case study of sustainability in open educational resources (OER)*. Presented at the Pan-Commonwealth Forum 8 (PCF8). Retrieved from http://hdl.handle.net/11599/2538

Orr, O., Rimini, M., & van Damme, D. (2015). Securing the sustainability of open educational resource (OER) initiatives. In *Open educational resources: A catalyst for innovation, educational research and innovation*. Paris: OECD Publishing. Retrieved from https://doi.org/10.1787/9789264247543-12-en.

Petrucco, C., & Ferranti, C. (2020). Wikipedia as OER: The "learning with Wikipedia" project. *Journal of E-Learning and Knowledge Society, 16*(4), 38–45. https://doi.org/10.20368/1971-8829/1135322.

Poulter, M., & Sheppard, N. (2020). Wikimedia and universities: Contributing to the global commons in the age of disinformation. *Insight, 33*(1), 14. https://doi.org/10.1629/uksg.509.

Rasheed, R. A., Kamsin, A., Abdullah, N. A., Zakari, A., & Haruna, K. (2019). A systematic mapping study of the empirical MOOC literature. *IEEE Access, 7*, 124809–124827. https://doi.org/10.1109/ACCESS.2019.2938561.

Risquez, A., McAvinia, C., Desmond, Y., Bruen, C., Ryan, D., & Coughlan, A. (2020). Towards a devolved model of management of OER? The case of the Irish higher education sector. *The International Review of Research in Open and Distributed Learning, 21*(1), 100–112. https://doi.org/10.19173/irrodl.v20i5.4545.

Rodes-Paragarino, V., Gewerc-Barujel, A., & Llamas-Nistal, M. (2016). Use of repositories of digital educational resources: State-of-the-art review. *IEEE Revista Iberoamericana de Tecnologias Del Aprendizaje, 11*(2), 73–78. https://doi.org/10.1109/RITA.2016.2554000.

Ruipérez-Valiente, J. A., Halawa, S., Slama, R., & Reich, J. (2020). Using multi-platform learning analytics to compare regional and global MOOC learning in the Arab world. *Computers & Education, 146*, 103776. https://doi.org/10.1016/j.compedu.2019.103776.

Santos-Hermosa, G., Ferran-Ferrer, N., & Abadal, E. (2017). Repositories of open educational resources: An assessment of reuse and educational aspects. *The International Review of Research in Open and Distributed Learning, 18*(5). https://doi.org/10.19173/irrodl.v18i5.3063.

Stagg, A., Nguyen, L., Bossu, C., Partridge, H., Funk, J., & Judith, K. (2018). Open educational practices in Australia: A first-phase national audit of higher education. *The International Review of Research in Open and Distributed Learning, 19*(3). https://doi.org/10.19173/irrodl.v19i3.3441.

Stracke, C. M., Downes, S., Conole, G., Burgos, D., & Nascimbeni, F. (2019). Are MOOCs open educational resources? A literature review on history, definitions and typologies of OER and MOOCs. *Open Praxis, 11*(4), 331. https://doi.org/10.5944/openpraxis.11.4.1010.

TED Conferences, LLC. (n.d.). TED talks usage policy. Retrieved 28 June 2021, from TED.com website: https://perma.cc/T3ME-LYQR

Tisoglu, S., Kursun, E., & Cagiltay, K. (2020). Open educational resources in Turkey. In R. Huang, D. Liu, A. Tlili, Y. Gao, & R. Koper (Eds.), *Current state of open educational resources in the "belt and road" countries* (pp. 213–235). Singapore: Springer Singapore. https://doi.org/10.1007/978-981-15-3040-1_12.

UNESCO. (2019). *Recommendation on open educational resources (OER)*. Retrieved from http://portal.unesco.org/en/ev.php-URL_ID=49556&URL_DO=DO_TOPIC&URL_SECTION=201.html

Wiley, D., & Gurrell, S. (2009). A decade of development. . .. *Open Learning: The Journal of Open and Distance Learning, 24*, 11–21. https://doi.org/10.1080/02680510802627746.

Wimpenny, K., Merry, S. K., Tombs, G., & Villar-Onrubia, D. (2016). *Opening up education in South Mediterranean countries: A compendium of case studies and interviews with experts about open educational practices and resources*. OpenMed. https://doi.org/10.5281/ZENODO.4786108.

Yassine, S., Kadry, S., & Sicilia, M. A. (2016). Learning analytics and learning objects repositories: Overview and future directions. In M. J. Spector, B. B. Lockee, & M. D. Childress (Eds.), *Learning, design, and technology* (pp. 1–29). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-319-17727-4_13-1.

Yijun, Y., Xiaozhu, W., Anton, D., & Irum, R. (2020). MOOCs format of open educational resources (OER) repositories: An alternative route in China. In M. Brown, M. N. G. Mhichíl, E. Beirne, & E. Costello (Eds.), *Proceedings of the 2019 ICDE world conference on online learning* (Vol. 1, pp. 1082–1091). Dublin: Zenodo. https://doi.org/10.5281/ZENODO.3804014.

Zaatri, I., Margoum, S., Bendaoud, R., El Malti, I. L., Burgos, D., & Berrada, K. (2020). Open educational resources in Morocco. In R. Huang, D. Liu, A. Tlili, Y. Gao, & R. Koper (Eds.), *Current state of open educational resources in the "belt and road" countries* (pp. 119–134). Singapore: Springer. https://doi.org/10.1007/978-981-15-3040-1_7.

Zawacki-Richter, O., Bozkurt, A., Alturki, U., & Aldraiweesh, A. (2018). What research says about MOOCs – An explorative content analysis. *The International Review of Research in Open and Distributed Learning, 19*(1). https://doi.org/10.19173/irrodl.v19i1.3356.

Culture, Ethics of Care, Community, and Language in Online Learning Environments: Supporting Adult Educators in a Digital Era

19

Amir Hedayati-Mehdiabadi and Charlotte N. Gunawardena

Contents

Abstract

Considering the increase in the number of online courses and programs across the globe, preparing educators for creating inclusive online environments for learners to thrive is imperative. The worldwide pandemic of 2020, in a sense, only accelerated

A. Hedayati-Mehdiabadi (✉) · C. N. Gunawardena
Organization, Information & Learning Sciences, University of New Mexico, Albuquerque, NM, USA
e-mail: ahedayati@unm.edu; lani@unm.edu

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_19

the already rising trends of online course offerings in higher education and further expanded it to other sections of education and geographical locations. Reviewing the existing literature and building on the authors' experiences, this chapter uses a cultural and ethical lens to examine issues related to community and language to contribute to the design of equitable and inclusive online learning environments. Although these issues impact all segments of the educational enterprise, given the authors' experiences with adult learning, the focus in this chapter will be on adults as learners.

Keywords

Ethics of care · Cultural inclusivity · Online community · Teaching online · Inclusive learning environment · Translanguaging

Introduction

One way to address the challenges and disparities highlighted during the worldwide pandemic of 2020 is to pay attention to issues of ethics and inclusion in education. In a sense, now, with thousands of courses going from face-to-face to online delivery, it might be the time to revisit how faculty and instructors around the globe can be supported to create a more equitable and inclusive space for students to prosper. Education is an empowering platform that can transform individuals and their communities. This chapter would help educators recognize and address underlying ethical issues that they might encounter online.

In this chapter, first, concepts including ethics and culture will be defined, and examples of ethical issues that might arise will be provided. The next sections are organized as follows: (1) community, where the question of "how social presence contributes to the relational dimension of online learning" will be explored, (2) ethics where some of the ethical issues of online education, including issues of power, silence, privacy and confidentiality, and accessibility, are explored, and (3) language where relevant concepts for creating a linguistically inclusive learning environment will be briefly discussed. The chapter concludes with implications for incorporating cultural inclusivity in designing learning experiences and future research.

Concepts of Culture and Ethics in Online Learning Environments

In examining culture, this chapter focuses on how culture influences online communication and learning. Ethical issues are often not very evident in online learning environments. However, they affect how learners and educators negotiate their communications and expectations online.

Culture and Context

For this chapter, culture is defined as a "collection of shared perceptions of the world and our place in it. These values and beliefs affect both identity formation and societal roles. Each of us belongs to many tribes, and these memberships overlap sometimes in unexpected ways" (Gunawardena et al., 2019, p.3). The authors note that cultural affiliations can be considered broad or narrow. While national cultures can include millions of people, culture is also found at the regional, organizational, communal, and familial levels. Early studies that examined culture online (Uzuner, 2009) used Hofstede's (1980) national cultural dimensions (i.e., power distance, individualism-collectivism, masculinity-femininity, uncertainty avoidance, and long-term orientation) to describe online cultures. But these bi-polar dimensional constructs can be limiting when applied to the online context. Ess (2009) provided a critique of the applicability of Hofstede's framework to the online context and noted that what interests researchers is how national as well as other cultural identities, such as ethnicity, youth culture, and gender, interact with intercultural communication online. Therefore, defining culture from the national culture perspective, which is constantly changing, can lead to stereotyping. Cultures that emerge online transcend national culture, as culture online is negotiated by the interacting participants whose ethnic, gender, and religious identities are enacted, concealed, or merged into hybrid identities. Culture is experienced as part of a communication system of the interacting group where culture is developed through communication, dialoguing, sharing experiences, and interacting with each other.

Culture is generated from context and needs to be understood within context, and "context" refers to the setting or environment in which something exists. Hall (1959) made a distinction between high context (indirect) communication where many things are left unsaid, letting the context explain, and low context (direct) explicit communication. Hence, providing the context when messages are communicated online will reduce the chance of misunderstanding. Examining context further, Weissmann et al. (2019) observe that academic culture in the United States (US) tends to value "low-context" approaches to learning, for example, encouraging individual work, rigid schedules, faculty-oriented perspectives, subscribing to compartmentalized, and linear learning among other values. They noted that many women, underrepresented minorities, and bilingual students come from "high-context" cultures. They found communal work, flexibility in time, and nonlinear and contextual learning salient to their academic experience. Therefore, they advocate a shift in academia to "multicontext" perspectives that value context diversity to ensure inclusive learning environments. Multicontext theory suggests people are multicontextual (able to change and display flexibility across the cultural context spectrum) and have unique cultural identities and orientations (Ibarra, 2001).

Cultural Inclusivity

With these conceptualizations of culture and context in mind, it is time to explore the question: What does it mean to be culturally inclusive in online design? A culturally inclusive learning environment must foster communication and community. Participants must feel a sense of belonging to a learning community, which values different beliefs, worldviews, and educational experiences (Gunawardena et al., 2019). Online courses that are individualized and designed without interaction with other learners or facilitators are not culturally inclusive learning environments. Cultural inclusivity moves beyond diversity. To be inclusive, diverse views must be heard, appreciated, and valued. Such an environment will help all learners feel welcome and appreciated for their unique perspectives and contributions. To develop a culturally inclusive learning environment, designers must encourage interaction and negotiation of meaning while at the same time anticipating the influence of their own, instructors,' and learners' cultural values and programming. Cultural inclusivity means understanding one's learners and learning from a cultural perspective, considering learning preferences, educational expectations, prior knowledge, past experiences, linguistic ability, and ...more.

Ethics in Online Learning Environments

It has been argued that helping learners, which involves ethical issues, is at the center of instructional design and technology (Inouye et al., 2005). To position ethics at the center of education, Inouye et al. (2005) suggested changes in what educators know and do. Specifically, among other strategies, they discussed the importance of understanding context to be able to take proper actions and using learner-centered rather than instructor-centered approaches to teaching. Similar to Campbell et al. (2009) ideas regarding instructional design, morality in online education is not about right and wrong decisions. Rather, it is about the "importance of relationships in which mutual commitments are made, with integrity to enhance success – success in teaching, success in learning, success in service – success for positive social change" (Campbell et al., 2009, p. 646). Teaching in a digital era should go beyond offering courses in a technological format. In our view, the role of an educator is to build a community of engaged learners with empathy and care. From the existing ethical frameworks, ethics of care can be a good fit for discussing the ethics of online education, as several recent studies have argued for its promises (Rabin, 2021; Robinson et al., 2020). Ethics of care, also known as care ethics, is an ethical framework first introduced by Carol Gilligan (1982). It is a unique approach to moral theory that emphasizes responsibility and relationships over consequences (i.e., utilitarianism) or rules (i.e., deontology) (Nair, 2005). The use of ethics of care in online learning is not an intuitive task, as "the automation and standardization characterized by the online environment" (Rabin, 2021, p. 40) might seem antithetical to caring.

In this chapter, ethics of care has been used as a framework to look at ways online educators can create inclusive spaces for learners to prosper. The argument is that the mere switch of the mode of delivery from face-to-face to online, without adjusting and customizing existing educational content and techniques to the learners' needs and situations, is not sufficient and is, in fact, against the principles of care. The literature on ethics of care in online education has been grounded in social presence as it focuses on understanding the relational dimension of learning in an online environment (Rabin, 2021). Social presence is an essential ingredient in an online community as it focuses on the relationships between online participants.

Community

According to Watson (1998), community implies a basic connection to communication, and communication is a tool to create shared cultural meanings. "We should begin thinking of community as a product not of shared space, but of shared relationships among people" (Watson, 1998, p. 120). Community supports the social dimension of online learning and is the key recipe for an inclusive online learning environment. Building a culturally inclusive community is a gradual process that takes a collective effort from designers, facilitators, mentors, community experts, and participants. Several ingredients contribute to the community and a sense of community; "a feeling that members have of belonging, a feeling that members matter to one another and to the group" (McMillan & Chavis, 1986, p. 9). Among these ingredients, "social presence" takes the lead in helping educators focus on the relational dimension of an online community.

Social Presence

Social presence contributes to a sense of community online, the feeling that one can connect with other participants. Social presence was defined as the degree to which a person is perceived as a "real person" in mediated communication (Short et al., 1976). Researchers have shown that social presence is a key ingredient of the social environment of online learning (Kreijns et al., 2011; Richardson & Swan, 2003), a strong predictor of learner satisfaction in online environments (Gunawardena & Zittle, 1997), and a predictor of perceived learning in online courses (Richardson & Swan, 2003). Increased social presence, interaction, and collaborative learning among participants can support the development of each other's zones of proximal development (Whiteside, 2017).

Tu (2001) showed that engaging Chinese students in a more interactive online learning environment would increase social presence. These students perceived online communication as a more comfortable medium to express their thoughts due to lack of confrontation and face-saving concerns but were concerned that their messages may appear in public areas that may cause them to lose face and privacy. For Arab students, the lack of physical presence in the online environment was a positive feature because it provided a reduced risk of social embarrassment (Al-Harthi, 2005). In a study comparing online group process and group development in the USA and Mexico, Gunawardena et al. (2001) found that US participants needed an increased level of social presence to connect with each other, while Mexican participants felt that having personal information about the participants was not so important. For Mexican participants, how their peers contribute to the discussion is far more important than knowing personal information about them. Many of these prior studies of culture online have used Hofstede's definitions of national culture as a framework to understand culture and have missed out on the interactions that happened between participants.

Approaching the online environment as one in which culture is generated by the interacting participants, Gunawardena et al. (2006) found that social presence played a key role in the communication patterns of chat users in their study of chat forums in Morocco and Sri Lanka. Properties associated with social presence in both cultural contexts included: self-disclosure, building trust, expression of identity, conflict resolution, interpretation of silence, and the innovation of language forms to generate immediacy. In developing an inclusive community, social presence is critical to building online connections and relationships as it impacts participation, interaction, trust, group cohesion, and social equality.

Identity

Dennen and Burner (2017) observed that "Social presence and identity are closely intertwined" (p. 174), as identity (the sense of self) conveys the unique characteristics communicated by a person's presence. Identity in online learning environments involves both self and group identity. In their study of groups, Rogers and Lea (2005) found that social presence was enabled by emphasizing the shared social identity at the level of the collaborating group rather than the creation of interpersonal bonds between individual members of a group. Therefore, to develop a sense of community among group members, they recommend that identity online be "collectivized," reflecting the identity of the group rather than the individuals that make up the group. One technique that helps develop group identity is to allow groups to manage themselves, which will contribute to a shared group identity rather than prescribing roles and restrictive procedures for group members. Dennen and Burner (2017) observed that finding the appropriate balance of individual identity sharing and group identity creation remains an active topic of inquiry.

Therefore, when determining the appropriate level of social presence in an online environment, educators need to be mindful that participants have different perceptions of the degree of social presence necessary for online connections and interactions.

Ethics of Care in a Learning Community

Research on ethics of care in online education has been grounded in social presence. Robinson et al. (2020) explored how online students describe being cared for. The authors suggested that strategies "such as proper training for online faculty with explicit consideration to the affective/emotional element of online learning, timely communication with learners, and personalized feedback" (Robinson et al., 2020, p. 107) could help create an environment that makes students feel cared for.

Despite its importance, research on the ethics of instructional design and technology is limited (Moore & Ellsworth, 2014). Yusop and Correia (2012), critiquing the emphasis on approaches that neglect professionalism in preparing students in the field of instructional design and technology, argued the need for the formation of civic-minded instructional designers "who are both socially aware and technically competent in performing their job" (p. 180). In response to the lack of awareness of ethical issues, Gray and Boling (2016) analyzed the content of a selected number of instructional design cases to extract the ethical concerns of these cases (Gray & Boling, 2016). Lin (2007) conducted an empirical study to identify ethical issues experienced by instructional technologists and their coping mechanisms. This study identified six ethical issues, including (a) copyright, (b) privacy, (c) accessibility, (d) diversity, (e) conflicts of interest, and (f) professionalism/confidence to design quality courses. When asked about strategies to address these ethical issues, the participants of this study reported various coping mechanisms, including (a) team communication, (b) laws and policies, (c) management consultation, (d) professional integrity, and (e) technical solutions.

Teaching with empathy and care is at the core of an ethical approach to education in a digital era. Grounding in such aspiration, in the next section, some of the ethical issues of online education will be reviewed and discussed.

Issues of Power

Closing the gaps related to power and access to resources among students from different backgrounds is imperative. Although communication technologies have the potential to equalize the playing field and enhance knowledge acquisition, they can be misused and widen the gaps that exist (Lin, 2007). This raises an important ethical issue for educators in online settings. Ethics of care provides a unique perspective on the issues of power. According to de la Bellacasa's (2011) view, "care connotes attention and worry for those who can be harmed by an assemblage but whose voices are less valued, as are their concerns and need for care" (p. 92). Care ethics can expose how an understanding of needs might be twisted by people in power to maintain their positions (Tronto, 1993). Educators should be aware that no matter how hard they try, they may not fully understand their students' situations. As stated by Tronto (2005), "It would seem that by putting oneself in the other's situation, [the] distance can be overcome. But, . . . there is no way to guarantee that, in taking the place of the other, . . . the moral actor will recognize all of the relevant dimensions of the other's situation" (p. 257). This emphasizes the importance of hearing students' needs from their perspectives instead of making assumptions. As stated by Held (2006), "ethics of care advocates attention to particulars, appreciation of context, narrative understanding, and communication and dialogue in moral deliberation" (p. 158). Thus, teacher-centered online learning environments with little opportunity for interaction are not conducive to promoting ethics of care.

Rabin (2021) argued that issues of power in online settings "make understanding the cared-for's needs complex" (p. 42). As stated by Covarrubias (2008), "as central bearers of power in our classrooms, we shoulder the sometimes difficult challenge of negotiating diverse interests, perspectives, and emotions on behalf of our students" (p. 247). Online educators have the ethical obligation to ensure learners are treated equitably. The first step is to review course materials, ensuring they are not offensive or exclusive (Lin, 2007). Similarly, stereotyping students based on age, race, and gender is another issue that can happen in online settings and needs to be recognized and avoided (Lin, 2007). Educators have the responsibility to reflect on their approaches to teaching so that they create an inclusive environment in which learners feel respected. Only in such an environment can students from different backgrounds engage in the course meaningfully.

Intercultural understanding is at the core of learning in today's world (Morong & DesBiens, 2016). Effective intercultural learning involves a "direct experience of difference in supportive contexts" where participants are provided with a culturally safe environment and equal opportunities to engage in learning activities (p. 476). This is in line with "authentic caring," a term coined by Valenzuela (1999). Rabin (2021) stated that such caring "requires transcending a false veneer of neutrality and equality to affirm students' cultural, racial, and community identities and further their well-being beyond narrowly conceived academic achievement" (p. 40).

Silence

Although individuals often focus on what is seen or spoken when thinking about cultural differences, culture is also expressed through silence; silence has different meanings in different cultures. Researchers have looked at the meaning of silence among students from diverse backgrounds, including Native American and Chinese students and its implications in educational settings (e.g., Covarrubias & Windchief, 2009; Liu, 2002). The difference in meanings and interpretations of silence has important implications for teaching and learning. Global educators should create inclusive environments that are sensitive to issues of silence and its meaning in different cultures.

Another related issue is what Covarrubias (2008) defined as discriminatory silence, which is "the withholding of voiced objections to statements that dismiss, disconfirm, or alienate a person because of racial, ethnic, or cultural origin when the ethical action would be to speak up" (p. 246). Online educators are ethically responsible for speaking up against discriminatory statements that might be made by participants in discussion forums or synchronous meetings. According to Covarrubias (2008), "unvoiced objections to them gave the persons to whom the statements were addressed the impression that the discriminatory statements had been disregarded, shrugged off, and dismissed" and lead to the promotion of an exclusionary learning environment (p. 242).

Privacy and Confidentiality

Learners have the right to control their data. Technologies, if misused, can lead to the loss of control of personal data. One example of such a loss is the inappropriate use of learning management systems that keep learners' records. Another example is disseminating a student's work to future students without receiving proper permission.

Learner privacy was among the top ethical issues raised by participants (65%) in Lin's (2007) study. Examples provided by the participants included tracking students' activities using technology and the possibility of breaching students' privacy by sharing their postings in online discussion forums in conferences, etc., without obtaining proper permissions.

Accessibility

Accessibility is another issue related to the ethics of educational technology (Lin, 2007). Removing barriers to help learners with disabilities access equitable educational opportunities is a critical component of an inclusive community. As Moore and Ellsworth (2014) discussed, accessibility is rooted in the notion of "barrier free design," which emerged in the 1950s in some countries, including the United States. While the focus on accessibility has traditionally been from a regulatory and compliance perspective, educators need to go beyond that to ensure equal access by focusing on the actual outcomes for learners (Moore & Ellsworth, 2014). This aligns with the ethics of care in which specific relationships with individuals, instead of general rules or principles, guide one's behavior. The discussion on accessibility in online education is about the learner-focused considerations that need to be taken into account by educators.

Some researchers in the field have used universal design to inform the practice of design for online learning (e.g., Pittman & Heislet, 2014; Rogers-Shaw et al., 2018). Universal design is "the theory and practice pertaining to design, development, and implementation of communication, information and technology products and services that are equally accessible to individuals who are both disabled and non-disabled" (Crow, 2006, p. 20). Universal design for learning (UDL) emphasizes accessibility, collaboration, and community (Rogers-Shaw et al., 2018). Rogers-Shaw et al. (2018) shared their teaching experience and suggestions on how to apply the principles of UDL to an existing course, including simplifying the syllabus, offering multiple ways of communication and representation, and providing various options for learners to show what they have learned. However, inclusivity should go beyond UDL to ensure all learners are valued and their perspectives heard. Careful attention to the unique needs of each learner helps create a learning environment, which is accessible to all learners.

Language

Language, Translanguaging, and Linguistic Inclusivity in Online Learning Environments

The Merriam-Webster dictionary defines language as “the words, their pronunciation, and the methods of combining them used and understood by a community.” Language reinforces cultural values, perspectives, and worldviews. Learners from oral cultures may not embrace the abstract discussions prevalent in Western discourse. Individuals from collectivist cultures may not feel comfortable providing critical comments in online discussions to avoid disagreement and maintain interpersonal harmony (Hu, 2005). Limiting the communications of an online course to text-based interactions negatively influences the richness of a learning experience and diverse ways of communication.

Using English as the international lingua franca instead of one’s native language leaves learners disadvantaged. Learners might have little to no opportunity to use English daily, and English might be a learner’s third or fourth language. Communicating in English requires non-English speakers to refer to dictionaries frequently. These learners might need additional time to read and reflect on reading materials and review other course content.

Another issue is that when non-native English speakers are present in a group, learners from dominant cultures (because of misconceived generalizations) may deauthorize these group members by assigning fewer responsibilities and therefore limit the learning experiences of non-native English-speaking members (Smith, 2005). Perceiving non-native speakers as “others,” in a sense, mirrors hierarchical structures within the society and creates an unsafe learning environment (Smith, 2005).

Translanguaging and Communicating as Second-Language Speakers

Educational systems have long taken a monolingual orientation towards learning and forced learners to use the dominant language to make sense of the world (Makalela, 2015). However, through the recent shifts in technology and educational practices, the “monoglossic orientation towards language systems has lost space in the global, fluid and mobile communicative spaces” (Makalela, 2015, p. 16). Translanguaging techniques, by allowing more than one language, enable students to use more of their linguistic repertoire, assuring a deeper understanding of the knowledge (Fernández, 2019; Makalela, 2015). Using this approach, language becomes a resource rather than a barrier for meaning-making, specifically in contexts where learning the language is not the primary goal (Fernández, 2019).

Fernández (2019) suggested that translanguaging is a good strategy for culturally and linguistically diverse students to learn science as it contributes to equity. Another research confirmed that translanguaging within a dual language classroom increased opportunities for meaning-making for students as they could share the entirety of their ideas (Hamman, 2018). In addition, conducting an ethnographic study of an adult English as a Second Language (ESL) program among Hispanic restaurant workers, Emerick et al. (2020) found that translanguaging is most powerful if it is viewed as a component of culturally sustaining pedagogy (CSP) rather than an independent strategy. CSP supports students "in sustaining the cultural and linguistic competence of their communities while simultaneously offering access to dominant cultural competence" (Paris, 2012, p. 95).

Despite the increasing interest in translanguaging as a learning strategy, it has not been sufficiently discussed in adult education or online settings. The number of studies on translanguaging in the context of adult education is limited (e.g., Emerick et al., 2020; Wilkins et al., 2014). This calls for more research on the effectiveness of using translanguaging strategies for educating adults. Moreover, the limited research on translanguaging in online settings has focused on teaching language online (e.g., Adinolfi & Astruc, 2017). More research is needed to explore and investigate the role translanguaging can play in online learning.

Linguistic Inclusivity

Translanguaging promotes linguistic inclusivity in online courses and focuses on communication rather than language. Improving communication and improving fluency in a language are not one and the same. Communication involves more than fluency in a language; it consists of listening and sending a message that is understood for its intended meaning. Therefore, the question is how online learning facilitators can enable students to draw from their full linguistic repertoires relevant to the context of the communication and help them feel accepted and welcome in an online environment.

Another aspect of linguistic inclusivity that facilitators need to address is the use of nonstandard English in discussion forums. How can an educator provide positive feedback to students focusing on the meaning of the communication online rather than nonstandard English? In Fig. 1, we provide an example from a discussion on the definition of culture.

Linguistic inclusivity encourages the exchange of information, building on the full linguistic repertoires of learners. Linguistically inclusive learning environments are aware of how linguistic conventions in our disciplines reproduce inequitable social structures. Educators have an essential role in maintaining linguistic inclusivity and an equitable social environment.

Recommendations for Inclusive Online Course Design

Drawing implications from our discussion, the following guidelines for inclusive online learning design are offered.

1. To develop an inclusive learning environment, engage in creating community and a sense of online community. Use greetings as a strategy to build

Kate: Thanks for your response Rita. I thought I could respond quicklier than you, but I am late. This here is my response. When I think of culture I think of holidays. Though some of them don't have meaning, I not relate them to my culture. We celebrate Christmas, but it is different in my culture. It is quieter and less fancy. Do our holidays have to *be* a special meaning to be cultural?

Rita: Yeah, I get what you sayin because sometimes I look at all them fancy lights and think yeah back home we ain't never done nothing like that. My mama would say you got stock in the electric company girl?

Initial Reaction Focused on Language

Kate and Rita, it is important to remember that we need to use Standard English even if we are having a discussion online. It is difficult to decipher your meaning because of grammatical mistakes. Please review what you have written, edit it and post a meaningful response.

A More Thoughtful Considered Reaction Focusing on the Ideas Expressed

Kate and Rita, this is an excellent suggestion that holidays reflect culture. Yes, as you say the same holiday can be celebrated differently in different cultures. Your question is a good one. It is one we should consider as a group. Class, what do you think of this excellent question: Do holidays have to have a special meaning to be considered "cultural?"

Fig. 1 Example of feedback focusing on communication and not the language

relationships and trust. Greetings and introductions that generate social presence, including a separate page that summarizes the community talents where members are invited to share stories or short videos, will enrich the sense of community. Be mindful of expressions of identity, difficulty in self-disclosure, and discomfort in posting photographs. For example, provide guidelines for self-introductions allowing a degree of anonymity, perhaps having participants introduce each other online rather than themselves. For those uncomfortable with posting photographs of themselves, provide the option to post a picture/image that represents them with the explanation of why and how it represents them. Design greetings that facilitate online connections and avoid greetings that might detract from an egalitarian/equitable learning community.

2. To encourage trust-building, consider small group activities that focus on hobbies or mutual interests in large classes during the orientation session or as part of precourse activities.
3. Moderators/facilitators/instructors play an important role in relationship building, creating community, and maintaining a safe and conducive environment for all participants, and therefore, should be present online frequently.
4. Synchronous sessions can increase the sense of community and social presence.
5. Paying attention to the context of learning and learners is an important element of care. Educators need to actively identify learners' needs, take responsibility and action to address those needs, and rely on the feedback they receive from learners to adjust and adapt.

6. As a facilitator/instructor, clearly communicate expectations for the online course (preferably in the syllabus) and demonstrate how these expectations might be different from face-to-face learning environments and prior expectations students may have had. Provide the opportunity to ask questions about class expectations. A useful initial activity might be to have participants ask questions about the syllabus in a discussion forum.
7. Diversify ways to participate – synchronous, asynchronous, video, audio, text, etc., and create opportunities for learners to choose among learning activities that enable different ways to communicate, process, and produce.
8. Interactions in online communities can sometimes lead to conflict and misunderstandings and, if left unresolved, can derail the work of a group. Gunawardena et al. (2019) recommend safeguarding against five counterproductive patterns: Devaluing a participant's perspectives or contributions, disrespecting beliefs or values, disrupting conversations or activities, disengaging from a collaborative learning experience, and deceiving community members by misrepresenting one's work or intentions. Therefore, establishing explicit community standards such as a charter is the first step to ensuring constructive communication and minimizing disputes. Participants should be encouraged to use e-mail to resolve misunderstandings and post mutually agreed-upon understanding for the group when conflict situations arise.
9. Develop Netiquette or communication protocols addressing issues such as language and discourse, including translanguaging and the use of Standard English. Recognize translanguaging is a normal practice for multilingual people. Allowing for an element of multilingual communication and diversity in the expression of English will promote cross-cultural understanding and a comfort zone in online communication. Context is essential to understanding messages, and therefore, participants should be encouraged to provide the context to enable the deciphering of messages communicated through an ephemeral and fluid medium.
10. Discriminatory language by participants needs to be confronted immediately. Include some guidelines in the Netiquette protocol or syllabus to prevent such comments. Such guidelines will also help you as an educator address the issue more easily if it arises by referring to those resources.

For an extended discussion of many of these techniques, including learner support and co-mentoring, see Gunawardena et al.'s (2019) framework "Wisdom Communities" (WisCom) for developing culturally inclusive online learning environments.

Future Research and Directions

When a cultural perspective to research online learning is used, educators can be more attuned to the unique context and needs of learners who form the online community. Without such careful attention to the uniqueness of the learners and their communities, empathy and care for learners, as required elements of ethical education, cannot be achieved. Therefore, it is imperative for future researchers to take a cultural perspective to conduct their research in online learning while attending to "the unique qualities and characteristics of individuals" and avoiding "simplistic stereotyping" (Jung & Gunawardena, 2014, p. 190). In this regard, an approach of "cultural humility" (Tervalon & Murray-Garcia, 1998), or "cultural humbleness," rather than "cultural competence," which includes self-reflection, self-critique, and self-evaluation, is preferred. Individuals can never really be culturally competent and may never get at the cultural nuances present in the contexts they interact, teach, and work. With this approach, the following future research areas for consideration are suggested:

- Exploring ways in which ethics of care is related to online learning outcomes, including learner satisfaction.
- Examining the meaning and the role of silence in online learning environments.
- Exploring ways to use translanguaging in adult education and examining its benefits in improving online learning outcomes.
- Analyzing issues of identity, gender, and language in online spaces.
- Studying how learners are transformed by their interactions and engagement with diverse online learners.
- Exploring how to collaborate and create in the next generation of digital learning environments.

Concluding Reflections: Striving for Excellence in Students' Online Learning Experience

Designing courses attentive to learners and their specific context and needs is an ethical issue. As stated by Woodley et al. (2017), "as educators and instructors of culturally and linguistically diverse students it is our responsibility to meet the needs of our students by using the best possible methods in curriculum and course design" (p. 477). In addition, as Morong and DesBiens (2016) argued, "in design for learning the focus shifts from instructional inputs to learner experience, activities, and what students actually learn" (p. 476). In the context of teacher education, Rabin and Smith (2013) stated that attending to care from a multicultural perspective and questioning one's implicit assumptions are essential aspects to consider in preparing for caring relationships. The existing literature suggests that "engaged pedagogies, which highlights learner agency, group work and learning communities," can better support learning among culturally diverse students (Morong & DesBiens, 2016, p. 476).

A digital environment can provide effective learning experiences only if the educator is familiar with the learning technology and its possibilities so they can design the course accordingly. As Lin (2007) discussed, possessing the credentials to create quality learning modules and courses using appropriate technologies is an ethical issue. An ethical course design in this context involves going beyond the mindset of merely changing the delivery mode of a course. Instead, it should involve thoughtful reflection on the context, the subject, the learners, and the technology and how to best build on the strengths of the online platform and avoid the potential pitfalls while addressing specific needs of learners in a caring manner.

References

Adinolfi, L., & Astruc, L. (2017). An exploratory study of translanguaging practices in an online beginner-level foreign language classroom. *Language Learning in Higher Education, 7*(1), 185–204. https://doi.org/10.1515/cercles-2017-0008.

Al-Harthi, A. S. (2005). Distance higher education experiences of Arab Gulf students in the United States: A cultural perspective. *The International Review of Research in Open and Distance Learning, 6*(3). https://doi.org/10.19173/irrodl.v6i3.263.

Campbell, K., Schwier, R. A., & Kenny, R. F. (2009). The critical, relational practice of instructional design in higher education: An emerging model of change agency. *Educational Technology Research and Development, 57*(5), 645–663. https://doi.org/10.1007/s11423-007-9061-6.

Covarrubias, P. O. (2008). Masked silence sequences: Hearing discrimination in the college classroom. *Communication, Culture & Critique, 1*(3), 227–252. https://doi.org/10.1111/j.1753-9137.2008.00021.x.

Covarrubias, P. O., & Windchief, S. R. (2009). Silences in stewardship: Some American Indian college students examples. *The Howard Journal of Communications, 20*(4), 333–352. https://doi.org/10.1080/10646170903300754.

Crow, K. L. (2006). *Accommodating on-line postsecondary students who have disabilities* (Publication No. 3251012) [Doctoral dissertation, Northern Illinois University]. ProQuest Dissertation Publishing.

de la Bellacasa, M. P. (2011). Matters of care in technoscience: Assembling neglected things. *Social Studies of Science, 41*(1), 85–106. https://doi.org/10.1177/0306312710380301.

Dennen, V. P., & Burner, K. J. (2017). Identity, context collapse, and Facebook use in higher education: putting presence and privacy at odds. *Distance Education, 38*(2), 173–192. https://doi.org/10.1080/01587919.2017.1322453.

Emerick, M. R., Hoffman, B. Y., & Kanno, Y. (2020). Teaching Hispanic restaurant workers: Translanguaging as culturally sustaining pedagogy. *Anthropology & Education Quarterly, 51*(3), 304–321. https://doi.org/10.1111/aeq.12340.

Ess, C. (2009). When the solution becomes the problem: Cultures and individuals as obstacles to online learning. In R. Goodfellow & M.-N. Lamy (Eds.), *Learning cultures in online education* (pp. 15–29). London, UK: Continuum.

Fernández, R. G. (2019). Translanguaging and equity in groupwork in the science classroom: Adding linguistic and cultural diversity to the equation. *Cultural Studies of Science Education, 14*(2), 383–391. https://doi.org/10.1007/s11422-019-09919-w.

Gilligan, C. (1982). *In a different voice: Psychological theory and women's development*. Cambridge, MA: Harvard University Press.

Gray, C. M., & Boling, E. (2016). Inscribing ethics and values in designs for learning: A problematic. *Educational Technology Research and Development, 64*(5), 969–1001. https://doi.org/10.1007/s11423-016-9478-x.

Gunawardena, C. N., Bouachrine, F., Idrissi Alami, A., & Jayatilleke, G. (2006). *Cultural perspectives on social presence: A study of online chatting in Morocco and Sri Lanka*. San Francisco, CA: In Annual Meeting of the American Educational Research Association.

Gunawardena, C. N., Frechette, C., & Layne, L. (2019). *Culturally inclusive instructional design: A framework and guide to building online wisdom communities*. New York: Routledge.

Gunawardena, C. N., Nolla, A. C., Wilson, P. L., López-Islas, J. R., Ramírez-Angel, N., & Megchun-Alpízar, R. M. (2001). A cross-cultural study of group process and development in online conferences. *Distance Education, 22*(1), 85–121. https://doi.org/10.1080/0158791010220106.

Gunawardena, C. N., & Zittle, F. (1997). Social presence as a predictor of satisfaction within a computer mediated conferencing environment. *The American Journal of Distance Education, 11*, 8–25. https://doi.org/10.1080/08923649709526970.

Hall, E. T. (1959). *The silent language*. New York: Doubleday.

Hamman, L. (2018). Translanguaging and positioning in two-way dual language classrooms: A case for criticality. *Language and Education, 32*(1), 21–42. https://doi.org/10.1080/09500782.2017.1384006.

Held, V. (2006). *The ethics of care: Personal, political, and global*. New York: Oxford University Press.

Hofstede, G. (1980). Culture and organizations. *International Studies of Management & Organization, 10*(4), 15–41. https://doi.org/10.1080/00208825.1980.11656300.

Hu, G. (2005). Using peer review with Chinese ESL student writers. *Language Teaching Research, 9*(3), 321–342. https://doi.org/10.1191/1362168805lr169oa.

Ibarra, R. A. (2001). *Beyond affirmative action: Reframing the context of higher education*. Madison, WI: University of Wisconsin Press.

Inouye, D. K., Merrill, P. F., & Swan, R. H. (2005). Help: Toward a new ethics-centered paradigm for instructional design and technology. *IDT Record*, 1–27.

Jung, I., & Gunawardena, C. N. (2014). Looking ahead: A cultural approach to research and practice in online learning. In I. Jung & C. N. Gunawardena (Eds.), *Culture and online learning: Global perspectives and research* (pp. 186–195). Sterling, VA: Stylus Publishing.

Kreijns, K., Kirschner, P. A., Jochems, W., & Buuren, H. (2011). Measuring perceived social presence in distributed learning groups. *Education and Information Technologies, 16*(4), 365–381. https://doi.org/10.1007/s10639-010-9135-7.

Lin, H. (2007). The ethics of instructional technology: Issues and coping strategies experienced by professional technologists in design and training situations in higher education. *Educational Technology Research and Development, 55*(5), 411–437. https://doi.org/10.1007/s11423-006-9029-y.

Liu, J. (2002). Negotiating silence in American classrooms: Three Chinese cases. *Language and intercultural communication, 2*(1), 37–54. https://doi.org/10.1080/14708470208668074.

Makalela, L. (2015). Translanguaging as a vehicle for epistemic access: Cases for reading comprehension and multilingual interactions. *Per Linguam, 31*(1), 15–29. https://doi.org/10.5785/31-1-628.

McMillan, D. W., & Chavis, D. M. (1986). Sense of community: A definition and theory. *Journal of Community Psychology, 14*(1), 6–23. https://doi.org/10.1002/1520-6629(198601)14:1<6::AID-JCOP2290140103>3.0.CO;2-I.

Merriam-Webster dictionary. https://www.merriam-webster.com/dictionary/language

Moore, S. L., & Ellsworth, J. (2014). Ethics of educational technology. In J. M. Spector, M. D. Merrill, J. Elen, & M. J. Bishop (Eds.), *Handbook of research on educational communications and technology* (pp. 113–127). New York: Springer.

Morong, G., & DesBiens, D. (2016). Culturally responsive online design: Learning at intercultural intersections. *Intercultural Education, 27*(5), 474–492. https://doi.org/10.1080/14675986.2016.1240901.

Nair, I. (2005). Ethics of care. In C. Mitcham (Ed.), *Encyclopedia of science, technology, and ethics*. Macmillan Reference USA.

Paris, D. (2012). Culturally sustaining pedagogy: A needed change in stance, terminology, and practice. *Educational Researcher, 41*(3), 93–97. https://doi.org/10.3102/0013189X12441244.

Pittman, C. N., & Heiselt, A. K. (2014). Increasing accessibility: Using Universal Design principles to address disability impairments in the online learning environment. *Online Journal of Distance Learning Administration, 17*(3). https://eric.ed.gov/?id=EJ1044112.

Rabin, C. (2021). Care ethics in online teaching. *Studying Teacher Education, 17*(1), 38–56. https://doi.org/10.1080/17425964.2021.1902801.

Rabin, C., & Smith, G. (2013). Teaching care ethics: Conceptual understandings and stories for learning. *Journal of Moral Education, 42*(2), 164–176. https://doi.org/10.1080/03057240.2013.785942.

Richardson, J., & Swan, K. (2003). Examining social presence in online courses in relation to students' perceived learning and satisfaction. Journal of Asynchronous Learning Networks, 7(1), 68–88. https://doi.org/10.24059/olj.v7il.1864

Robinson, H., Al-Freih, M., & Kilgore, W. (2020). Designing with care: Towards a care-centered model for online learning design. *The International Journal of Information and Learning Technology, 37*(3), 99–108. https://doi.org/10.1108/IJILT-10-2019-0098.

Rogers, P., & Lea, M. (2005). Social presence in distributed group environments: The role of social identity. *Behavior & Information Technology, 24*(2), 151–158. https://doi.org/10.1080/01449290410001723472.

Rogers-Shaw, C., Carr-Chellman, D. J., & Choi, J. (2018). Universal design for learning: Guidelines for accessible online instruction. *Adult Learning, 29*(1), 20–31. https://doi.org/10.1177/1045159517735530.

Short, J., Williams, E., & Christie, B. (1976). *The social psychology of telecommunications*. London, UK: Wiley.

Smith, R. O. (2005). Working with difference in online collaborative groups. *Adult Education Quarterly, 55*(3), 182–199. https://doi.org/10.1177/0741713605274627.

Tervalon, M., & Murray-Garcia, J. (1998). Cultural humility versus cultural competence: A critical distinction in defining physician training outcomes in multicultural education. *Journal of Health Care for the Poor and Underserved, 9*(2), 117–125. https://doi.org/10.1353/hpu.2010.0233.

Tronto, J. (1993). *Moral boundaries: A political argument for an ethic of care*. New York, NY: Routledge.

Tronto, J. (2005). An ethic of care. In A. E. Cudd & R. O. Andreasen (Eds.), *Feminist theory: A philosophical anthology* (pp. 251–263). Oxford, UK: Blackwell Publishing.

Tu, C. H. (2001). How Chinese perceive social presence: An examination of interaction in online learning environment. *Education Media International, 38*(1), 45–60. https://doi.org/10.1080/09523980010021235.

Uzuner, S. (2009). Questions of culture in distance learning: A research review. *The International Review of Research in Open and Distributed Learning, 10*(3), 10.19173/irrodl.v10i3.690.

Valenzuela, A. (1999). *Subtractive schooling: U.S.-Mexican youth and the politics of caring*. New York: State University of New York Press.

Watson, N. (1998). Why we argue about virtual community: A case study of the Phish. Net fan community. In S. G. Jones (Ed.), *Virtual culture: Identity and communication in cybersociety* (pp. 102–132). London, UK: Sage.

Weissmann, G. S., Ibarra, R. A., Howland-Davis, M., & Lammey, M. V. (2019). The multicontext path to redefining how we access and think about diversity, equity, and inclusion in STEM. *Journal of Geoscience Education, 67*(4), 320–329. https://doi.org/10.1080/10899995.2019.1620527.

Whiteside, A. L. (2017). Understanding social presence as a critical literacy. In A. L. Whiteside, A. G. Dikkers, & K. Swan (Eds.), *Social presence in online learning: Multiple perspectives on practice and research* (pp. 133–142). Sterling, VA: Stylus.

Wilkins, J. R., Chen, J. C., & Jenkins, J. L. (2014). Rethinking workplace health & safety training: Utilizing the translanguaging instructional method to reach foreign-born construction workers of Hispanic origin. *Journal of Safety, Health & Environmental Research, 10*(1), 135–144. https://www.assp.org/docs/default-source/jsher/jshervol10n11.pdf?sfvrsn=6.

Woodley, X., Hernandez, C., Parra, J., & Negash, B. (2017). Celebrating difference: Best practices in culturally responsive teaching online. *TechTrends, 61*(5), 470–478. https://doi.org/10.1007/s11528-017-0207-z.

Yusop, F. D., & Correia, A. P. (2012). The civic-minded instructional designers framework: An alternative approach to contemporary instructional designers' education in higher education. *British Journal of Educational Technology, 43*(2), 180–190. https://doi.org/10.1111/j.1467-8535.2011.01185.x.

Challenges and Opportunities for Open, Distance, and Digital Education in the Global South

20

Tony Mays

Contents

Abstract

This chapter explores some of the challenges and opportunities for expansion of open, distance, and digital education in the global south. The discussion begins by defining the terms as used in the chapter and explains why such approaches are of relevance to the diverse countries involved. The chapter then provides some current examples of open, distance, and digital education provision and how some of these practices have been adapted in response to external factors such as climate, financial, and pandemic crises. The chapter then discusses the challenges and opportunities indicated both by current practice and by current research into

T. Mays (✉)
Commonwealth of Learning, Vancouver, BC, Canada
e-mail: tmays@col.org

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_20

issues such as open pedagogy, technology-enabled learning, and educational financing. The chapter then makes an argument for the development of more resilient, future-directed education provision, drawing heavily on the experience of the Commonwealth of Learning in its efforts to support sustainable development through learning.

Keywords

Global south · Open education · Distance education · Digital education

Introduction

This chapter explores the challenges and opportunities for expansion of open, distance, and digital education (ODDE) in the global south. The discussion begins by defining the terms as used in the chapter and explains why such approaches are of relevance to the diverse countries involved. The chapter provides examples of current practice in schooling and post-schooling contexts and how these practices have been adapted in response to external factors such as climate, financial, and pandemic crises. The chapter then discusses the challenges and opportunities indicated both by current practice and by current research into issues such as open pedagogy, technology-enabled learning, and educational financing. The discussion draws heavily on the experience of the Commonwealth of Learning (COL) in its efforts to support sustainable development through learning.

Definitions

The Commonwealth of Learning (COL) was established in 1987 by Commonwealth Heads of Government to promote the development and sharing of open learning and distance education knowledge, resources, and technologies. It is the world's only intergovernmental organization solely concerned with the promotion and development of open learning and distance education.

In an internal discussion document, COL defines open learning as an approach and distance education as a set of methods which can be combined as open (and) distance learning:

"Open and Distance Learning (ODL) is the provision of distance education opportunities in ways that seek to mitigate or remove barriers to access, such as finances, prior learning, age, social, work or family commitments, disability, incarceration or other such barriers." (COL internal discussion document).

COL does not have a definition of digital education but has proactively promoted technology-enabled learning (TEL), which it defines as follows:

"Technology-enabled learning refers to the application of some form of digital technology to teaching and/or learning in an educational context to support and facilitate student learning." (COL internal discussion document).

When the term open, distance, and digital education (ODDE) is used in this chapter, it is informed by the above understandings.

Context

As Mahler (2017) and Clarke (2018) observe, the term "global south" may be interpreted variously. However, this discussion focuses on an understanding of the term as a mix of geographical, historical, and socioeconomic variables which typically challenge the dominant views and practices of the "global north" countries, many of whom were former colonial powers in the "global south" and whose influence is often still strongly felt. This discussion accordingly privileges the experiences and voices of countries indicated in red in Fig. 1 while also considering some of the key trends in the "global north" which influence practice in the global south.

As observed by the United Nations (n.d.), the world's population continues to grow, with China and India accounting for 61% of the world's population and with Africa being the fastest growing continent whose population is expected to double by 2050. However, as noted by the International Monetary Fund (2020), most of the countries in the global south are experiencing zero or negative real growth in gross domestic product (GDP). With an increasing population and decreasing GDP per capita, we can anticipate increased challenges for education provision, with the threat of overcrowded classrooms leading to lower retention, lower attainment and higher dropouts from schooling, and increasing numbers of not in employment nor in education and training youths unable to progress. As argued by Kanwar and Daniel (2020, p. 2), in response to the campus closures caused by the COVID-19 pandemic, governments should move from simply responding to challenges to developing more resilient education systems by "having open and distance learning

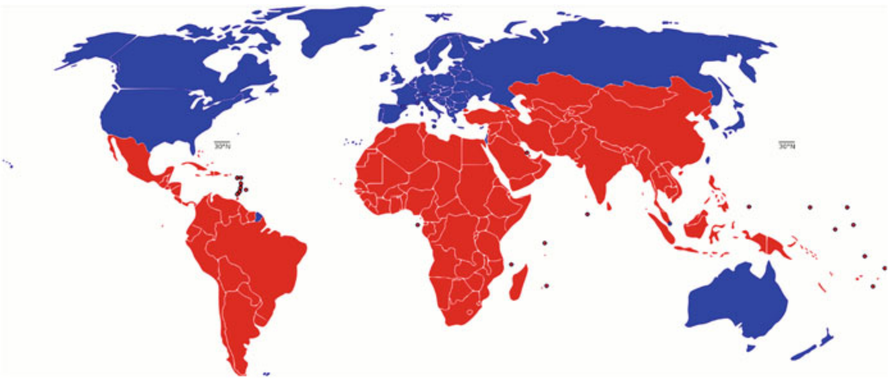


Fig. 1 A geographic depiction of the global south (in red). (Source: By Kingj123 – Wikipedia; This file was derived from: BlankMap-World6.svg, Public Domain, https://commons.wikimedia.org/w/index.php?curid=6603483)

(ODL) arrangements in place." Through appropriate ODL, or ODDE, provision, it is possible to increase access, success, and quality of educational opportunities in economically sustainable ways (Daniel, Kanwar, & Uvalić-Trumbić, 2009), but this does not necessarily mean going fully online (Hülsmann, 2016). There is evidence of a growing trend towards use of blended approaches which make use of digital and online learning complemented by some face-to-face contact.

Examples of Practice

Bwalya and Hamaluba (2020) observe that ODL is well established in sub-Saharan Africa with examples of well-established open universities in Botswana, Nigeria, South Africa, Tanzania, and Zimbabwe and open schools in Malawi, Namibia, and Zambia, among others. Due to the wide range of contexts in which ODDE provision is needed, it is not uncommon to find different generations of provision (e.g., print-based correspondence, broadcast media, interactive ICT, and online learning) all being used simultaneously to address different needs in the same country. It is argued that some of the challenges for expanded ODDE provision include the limited investment in digitization, lack of appropriate policy frameworks, inadequate funding, limited skilled personnel, commercialization at the expense of public provision, and the high cost of hardware and the Internet as well as limited technical support. Some regions also lack agreement on a common language that would more easily enable provision to be scaled.

Reflecting on the provision of ODDE in Asia, Kharbanda (2020) notes that Asia in general has moved strongly into the digital realm, with growing use of open educational resources (OER) and massive open online courses (MOOCs). There are very large-scale examples of ODDE provision at both university and schooling levels in Asia, for example, over the last 5 years, the National Institute of Open Schooling in India has reached more than 3.5 million learners. Despite this, and despite impressive reductions in the number of out-of-school children at the end of the twentieth century, the trend in the reduction is leveling off, suggesting the need for expansion of ODDE provision at the schooling level if education for all is to be achieved.

In the Caribbean region, Samuels (2020) notes that the Caribbean Community (CARICOM), comprising 20 countries and representing about 16 million citizens, is a key role-player. Although all CARICOM members met the Millennium Development Goals for primary education provision, there was mixed success at the secondary level, and in 2012, the Caribbean Regional Policy Framework for Open and Distance Learning was developed to address this and other challenges experienced by the traditional education system. Many of the countries in the region offer curricula developed and examined by the Caribbean Examinations Council (CXC), which leads both curriculum development and reform processes and promotes the use of OER which can be adapted for context. Samuels also cautions that there is no one-size-fits-all model for ODDE provision noting that depending on context, after-hours face-to-face classes, blended, and online learning may all be appropriate. An important post-schooling role-player in this region, the University of the West Indies not only has four campuses located in four different Caribbean countries but also has an open campus, and these facilities collectively cater for the needs of about 50,000 students.

In Latin America, Torres and Rama (2018) indicate that while distance higher education has been offered in many countries since the 1970s, its overall reach remains “marginal” (p. 5), although in the larger countries such as Argentina, Brazil, Colombia, Ecuador, and Mexico, distance provision was reaching 10–20% of students largely through the private sector offering technical and graduate programs. However, Romero (2021) observes that in response to the COVID-19 pandemic, there has been increased interest in exploring the potential of distance online learning, though access to the Internet and to devices varies widely between and within countries in the region and mitigates against widespread adoption.

In the Pacific region, Hollings and Naidu (2020) report that open education provision is well developed in New Zealand but less so in the smaller Pacific Island countries. For example, Te Kura was established more than one hundred years ago as the Correspondence School of New Zealand. More than 22,000 students are enrolled annually, including those who are enrolled at other state education providers and students beyond compulsory school age. In response to COVID-19, Te Kura made its content and a copy of its LMS, open to all secondary schools in New Zealand.

Along with nationwide delivery, another institution, the Open Polytechnic of New Zealand (OPNZ)‘s approach to open learning and access includes maintaining a program portfolio designed to ensure entry points for all learners, irrespective of prior educational background. Fee-free work and life skills programs are offered at foundation and certificate level, and OPNZ’s learner base includes significant numbers of people who are unemployed and/or have no high school qualifications. The Polytechnic also delivers courses in prisons.

New Zealand is also the home base of the OERu, which is coordinated by the OER Foundation and provides free access to recognized university learning and affordable credentialing through its growing network of partner institutions.

Also at the higher education level, the University of the South Pacific is a unique regional university, owned by and serving 12 island nations of the southwest Pacific region: Cook Islands, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, and Vanuatu. It has established an extensive ICT infrastructure and has used this to accelerate online provision in response to the closure of campuses due to the COVID-19 pandemic.

At a national level, the flexible, open, and distance education (FODE) division within the Ministry of Education in Papua New Guinea made use of a combination of digital resources, tablets, and limited physically distanced face-to-face contact sessions at decentralized centers to try to ensure continuity of provision during the pandemic.

In Vanuatu, ODDE is being explored to support open schooling provision. The geographically dispersed population (Vanuatu comprises an archipelago of some 83 islands) means it is not financially viable to offer traditional brick-and-mortar, face-to-face schooling for all learners.

Insights from Research and Literature

Several recurring themes can be identified by an examination of the literature. It is worth noting that many of the issues currently being researched and debated in the literature related to online learning have also been the focus of research and discussion previously in the distance education literature, which covers a wider spectrum of provision.

Diversity of ODDE Models

There is a growing diversity of possible distance and online learning and blended models like "flipped" classrooms (Fresen, 2018; Olelewe & Agomuo, 2016). Different tools may be used for different purposes and levels, but the trend is increasingly digital, connected, cloud-based, and mobile across diverse contexts, disciplines, and education levels (Firdhouse, 2016; Imhonopi, Urim, Onwumah, & Kasumu, 2017). In sub-Saharan Africa, for example, access to mobile phones has widely outpaced access to computers, and so mobile platforms like *M-Omulimisa* are now being used to support learning and development even in rural communities (Kalibwani, Kakuru, Carr, & Tenywa, 2021). There is increasing use of distance and blended approaches but also some recognition that decisions about how best to mediate learning must be based on some contextual understanding (Vaa, 2015). In the Caribbean, for example, open and innovative schooling provision has unfolded differently in the three countries with which COL has recently been working – Belize (where there is a high degree of decentralized autonomy and consequently different models being used in different communities by a variety of institutions and organizations), Guyana (where COL is working with the Adult Education Association to blend contact and online provision), and Trinidad and Tobago (where provision is increasingly moving online with the support of UNICEF).

Policy Support

The need for policy to guide developments in a rapidly changing education environment has been long recognized as has the diverse ways in which policy may be understood. Specific policy guidelines are required for distance and online learning models in single, dual, mixed, and flexible modes of provision (Kanwar, Carr, Ortlieb, & Mohee, 2018; Naidu, 2017). One of the more interesting initiatives from a policy perspective is the Virtual University of Small States of the Commonwealth (VUSSC) which is a network of small states which collaborate to develop and share free content and which has developed a transnational qualifications framework to facilitate sharing of programs and recognition of credentials across national boundaries.

Language

It has long been recognized that a key issue that needs to be addressed in all learning models is the language of learning and teaching. The more open the access, the more diverse the language learning support needs will be. In an African context, for example, it is likely that at the senior schooling and post-schooling levels, the language of learning and teaching will be a colonial language and not a local or home language. Therefore, the learning resource design team should ideally include people with expertise in supporting the teaching of speakers of other languages, supporting learners through the process of acquiring academic literacy in the target language of learning and teaching and working from an informed understanding of the extent to which schooling has prepared learners for learning in another language. In addition, reading on paper is not the same as reading on screen, and so new techniques may be required. It may be necessary to adopt strategies such as development of multilingual glossaries, multilingual captions for video materials, or even full translation of some resources into other languages, as well as the development of a related set of more general digital literacy skills (Daniels & Richards, 2017; de la Fuente & Comas-Quinn, 2016).

Quality Assurance

Concerns about the maintenance (or improvement) of quality across different modes of provision (Abrahams & Witbooi, 2016; Council on Higher Education, 2014), in specific contexts (Raturi, 2016; Simui, Namangala, Tambulukani, & Ndhlovu, 2018), and across borders (AAOU, 2017; SADC, 2012) are shared concerns of both traditional distance and emerging online provision.

In similar vein, the more open the access, including access that transcends national borders, the more investment that will need to be made in program design, learning resource development, and learner and learning support if institutions are to ensure a quality learning experience for all learners offering a reasonable chance of turning access into success. This requires both a pedagogic (AAOU, 2017; Amory, Bialobrzeska, & Welch, 2018) and an agile regulatory perspective (CHE, 2014; UNESCO, 2005). Increasingly, student satisfaction will be a key indicator for judging quality as students progressively take greater control of their own learning (Chen & Yao, 2016; Tufue-Dolgoy, Vaai, & Suaali'I, 2016). As noted above, CXC, OERu, and VUSCC all provide examples of models which might be considered for assuring quality across multiple institutions and countries.

Assessment

In both traditional distance education and more recent online provision, assessment plays a critical role, with a strong emphasis on its formative function in recognizing prior learning and in providing feedback both on student achievement and also on how students can improve on authentic assessment tasks mediated in authentic ways using a variety of tools (Franklin, Li, & Jamieson, 2015; Ng, 2016). Many of the guidelines for good practice in assessment of older forms of distance provision equally well apply for online provision, but of course the growing use of technology also opens opportunities for new approaches and tools for assessment as well.

Ethical and constructive tracking of student online engagement and achievement, including checking of authenticity, should make it possible to provide critical, targeted, and personalized feedback, although the assessment of student online activity requires a credible set of metrics to be established first (Kim, Huang, & Emery, 2016; Zhou, 2015).

Continuous Professional Development

It seems clear also that there is a need for significant investment and support to help teachers manage and use appropriate technology to mediate learning and then to use information from student engagement and achievement to improve practice (Hennessy, Haßler, & Hofman, 2015; Macharia & Pelser, 2013). Careful consideration must also be taken about changes to staff working conditions, workload, and remuneration in moving between modes of provision (Gregory & Lodge, 2015; Kennedy, Laurillard, Horan, & Charlton, 2015) as well as the impact on students and the support that they might need (OECD, 2015).

Digital technologies may allow more flexible learning student-centered learning, as well as opportunities to learn in very different spaces, when designed for use in these ways, thus blurring the boundary between physical and virtual presence on the part of teachers and encouraging more collaborative and cooperative approaches (Orr et al., 2020).

However, Trotter and Hodgkinson-Williams (2020) observe that while there is growing use of OER by both teachers and learners, the possibilities for inclusive co-creation and collaboration in the adaptation and creation of OER, along a continuum of access, participation, and empowerment, are currently more often seen among higher education teachers than learners and much less so at the schooling level. In addition, much OER that is available and being shared and used is in English, whereas it is estimated that there are some 7,102 living languages in the world with the global south being particularly rich in languages with an estimated 2,301 in Asia and 2,138 in Africa alone (Noack & Gamio, 2015).

Finance and Sustainability

All the above issues raise questions about how education provision should be financed, and the relative contributions of individuals, the state and institutions themselves in this regard (Murangi, 2020).

Notwithstanding reservations raised by Kanuka and Brooks (2010) that when using technology we may achieve any two of improved access, quality, and cost-savings but not all three concurrently, two experts in the field of financing distance education suggest that it should still be possible to scale the use of ICTs; for example, Rumble (2012, p. 41) notes: "The most important finding is that mass-media-based distance education could achieve economies of scale and could be designed so that the average cost per student (and to a lesser extent, because of higher dropout rates, per graduate) could be lower than similar costs found in face-to-face education." Although having considered the matter, Hülsmann (2016, p. 37) concludes: "... in developing countries a combination of traditional mass-media-based instructional approaches with the intelligent use of mobile technologies appears to be more promising than imitating an online class model while having to increase class sizes to an extent that compromises the original instructional intentions of the model."

Open Questions and Direction for Future Research

While there is a clear potential for greater use of ODDE in the global south, there is a need for continuous research into contextualized lessons of experience in the following areas, among others, and the generation of appropriate new theory:

- Curriculum design, development, implementation, review, and improvement
  – How do we respond to continuously emerging learning and development needs in ways that ensure learning programs of quality that are both scalable and sustainable?
- Content/open educational resources (OER) development
  – How do we encourage greater use of OER and develop the skills of learners and teachers to find, adapt, and share back OER?
- Teacher training needs
  – What are the continuous professional development needs of teachers as they move into ODDE provision, and how can we address those needs at scale in ways that are both affordable and flexible?
- Manager training needs
  – As campus-based institutions migrate increasingly into blended learning and multi-mode ODDE provision, what are the training needs of managers, and how can we best support them?
- Technology-enabled learning
  – How do we keep abreast of the rapid developments in technology and ensure that learners, teachers, and managers all have access to the devices, connectivity, and skills training to maximize the potential of technology-enabled learning?
- Monitoring and evaluation
  – How well are we monitoring and evaluating ODDE provision and ensuring that we close the feedback loop into enhanced practice?
- Financing
  – What are the most appropriate ways to finance public education and enhance the offerings of the private sector and public-private partnerships?

- Gender equality
  - How do we ensure that ODDE provision helps us to reach the most marginalized learners and works towards attaining gender equality?
- Policies and models
  - What policies and models exist which might be used to inform increased engagement with ODDE provision?
- Quality assurance
  - With an increasing number of stakeholders offering increasingly flexible forms of ODDE, what quality assurance measures need to be in place? And how do we manage the tension between assuring quality and also being nimble to address constantly emerging needs in the most flexible and affordable ways?

Implications for ODDE Practice

As observed in a recent COL briefing note (2020), to manage the COVID-19 pandemic, governments around the world were compelled to restrict travel and impose physical distancing norms. This meant finding alternative ways, using distance education methods, to ensure that school learning could continue without requiring teachers and learners to be in the same space at the same time. Even very remote learners can be reached via distance education. In the past, it has been used to reach children from the Australian outback to the Canadian prairies, and it currently supports millions of learners in Southern Asia and sub-Saharan Africa.

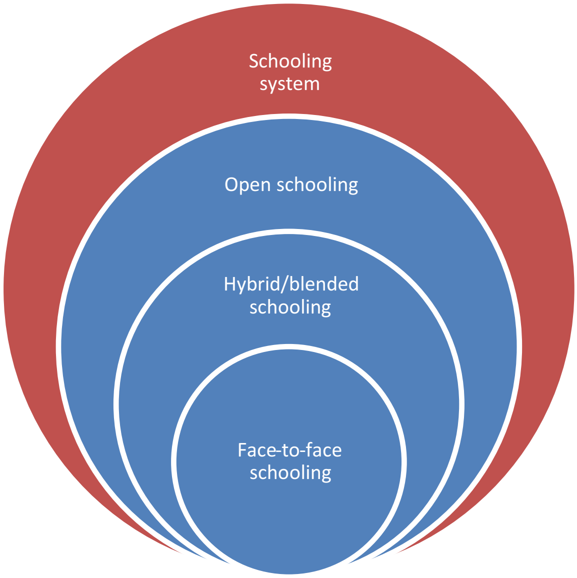
Developing approaches for more flexible provision of schooling opportunities can also help education systems meet the needs of numerous other learners who have been unable to access schooling, are in school but are not learning effectively, have dropped out of school, or need a second opportunity to improve their schooling outcomes to access employment or further education and training opportunities. Responding effectively to a short-term crisis can therefore help education systems develop more flexible and resilient approaches for the longer term, as illustrated in Fig. 2.

As illustrated in Fig. 2, face-to-face schooling will likely remain at the heart of the schooling system and is probably the preferred option for very young learners as well as learners with special educational needs that parents/caregivers may not be well equipped to address. However, hybrid (some face-to-face, some distance, some online, some broadcasting) and blended (face-to-face and online) provision could conceivably become the norm for older learners.

But for the approximately 300 million children unable to get to a physical school, an open schooling model, using ODDE approaches and methods, should be an essential element of an integrated schooling system.

It is possible that learners could move between models as needed. For example, learners attending face-to-face schooling who encounter certain barriers (e.g., ill health) might continue learning from home through distance learning; learners struggling with some subjects through distance learning might be integrated for a time into more structured blended or face-to-face learning.

Fig. 2 A resilient schooling system (COL, 2020, p. 8)



As noted by Hollings and Naidu (2020, p. 243), however, learners who successfully complete schooling or schooling-equivalent programs through open and online learning will likely find new employment and educational opportunities open to them. In addition to obtaining a recognized qualification or credential, they will have developed the independent study skills and dispositions that make it more likely they will choose open and online learning for any further technical or vocational education and training or higher education they may pursue during their lifelong learning. So there is a need to extend ODDE provision at both further and higher education levels.

Conclusion: Challenges and Opportunities

Although there is a clear potential for the expanded use of ODDE, there are several challenges. UNICEF (2020) notes that two in three children do not have Internet access at home, and those without such access are found in the lowest-income countries, mostly located in the global south. In addition, Internet data costs remain high relative to salaries in many global south countries, particularly in sub-Saharan Africa and the Pacific (Cable, 2021; Hülsmann, 2016). As noted previously, addressing challenges such as lack of guiding policies, limited funding (especially for digital infrastructure), limited technical support for educators, diverse language needs, and increasing commercialization requires a constructive partnership between the government and civil society partners. There is also a need for extensive investment in the continuing professional development of teachers (Mays, 2020).

However, the combination of digital technology, a more collaborative relationship between teachers and learners, and the ability to disseminate information quickly in support of change have certainly opened up new opportunities to support deep learning (Fullan & Langworthy, 2014) in affordable, scalable, and sustainable ways (Bates, 2018).

Contact programs, despite the often stringent conditions for entry, often experience very high failure and dropout rates in the first year but then subsequently tend to result in relatively high rates of retention and success (DHET, 2020). However, expansion of numbers in traditional contact provision requires expansion of facilities and staff, and hence costs, if quality is to be maintained. Appropriately designed and costed, ODDE provision can offer the potential to retain some of the cost-savings of provision at scale, by amortizing design and development costs over larger numbers while retaining some of the individual and group support processes that are associated with quality in more traditional contact provision (Hülsmann, 2016). The key issue would seem to be to find the right balance between real- or near-real-time human individualized support by institutional staff, creating the conditions for more peer collaboration and support than was ever possible in traditional distance provision and providing access to high-quality learning resources that maximize the potential for individual and peer learning. The issue to be explored, then, is how global south distance education providers are making informed choices about what teachers and managers do, what learners do, and what resources are made available in the online environment to balance the otherwise potentially competing concerns of access, quality, and cost.

As Mishra and Panda (2020) observe, technology has the potential to enable greater access to and success in learning, but it requires that we create appropriate national policy and development frameworks, that we learn from practice and that we continue to conduct research and evaluation into what works.

If we can ensure access to appropriate devices and Internet, we can use the new possibilities to work towards more open educational practices which provide training and support to staff in sharing their intellectual property and experience, making more constructive use of videos and discussion forums, and guiding and supporting learners towards self-regulation and engagement with authentic assessment tasks (Karunanayaka & Naidu, 2020).

Cross-References

▶ Resilient Leadership in Time of Crisis in Distance Education Institutions in Sub-Saharan Africa

References

Abrahams, M. A., & Witbooi, S. (2016). A realist assessment of the implementation of blended learning in a south African higher education context. *South African Journal of Higher education, 30*(2), 13–30. https://doi.org/10.20853/30-2-577.

Amory, A., Bialobrzeska, M., & Welch, T. (2018). Learning designing for multiple modes of provision: The Zambian community school teacher development Programme. *Distance Education, 39*(2), 241–258.

Asian Association of Open Universities (AAOU). (2017). Quality Assurance Framework. Retrieved from http://aaou.upou.edu.ph/quality-assurance-framework/

Bates, A. W. (2018, February 14). Some thoughts on scaling online and digital learing. [Blog post]. Retrieved from https://www.tonybates.ca/2018/02/14/some-thoughts-on-scaling-online-and-digital-learning/

Bwalya, C., & Hamaluba, T. (2020). Chapter 10: Developing practice in Africa. In T. Mays & R. K. Singh (Eds.), *Addressing the learning needs of out-of-school children and youths through expansion of open schooling* (pp. 196–204). Vancouver, BC: Commonwealth of Learning (COL). Retrieved from http://oasis.col.org/handle/11599/3731.

Cable.co.uk. (2021). *The price of fixed-line broadband in 211 countries*. https://www.cable.co.uk/broadband/pricing/worldwide-comparison/

Chen, W. S., & Yao, A. Y. T. (2016). An empirical evaluation of critical factors influencing learner satisfaction in blended learning: A pilot study. *Universal Journal of Educational Research, 4*(7), 1667–1671.

Clarke, M. (2018, August 8). *Global South: What does it mean and why use the term?* [Blog post]. Retrieved from https://onlineacademiccommunity.uvic.ca/globalsouthpolitics/2018/08/08/global-south-what-does-it-mean-and-why-use-the-term/

Commonwealth of Learning (COL). (2020). *Towards more resilient schooling: Possible models for the future*. Vancouver, BC: COL. Retrieved from https://oasis.col.org/handle/11599/3612.

Council on Higher Education (CHE). (2014). *Distance higher education programmes in a digital era: Good practice guide*. Pretoria, South Africa: CHE. Retrieved from https://www.saide.org.za/documents/CHE_-_Distance_Higher_Education.pdf.

Daniel, J., Kanwar, A., & Uvalić-Trumbić, S. (2009). *Breaking higher education's iron triangle: Access, cost and quality*. Vancouver, BC: COL. Retrieved from http://oasis.col.org/bitstream/handle/11599/1442/2009_DanileKanwarUvalicTrumbic_BreakingIronTriangle_Transcript.pdf?sequence=1&isAllowed=y.

Daniels, S., & Richards, R. (2017). Equitable multilingualism? The case of Stellenbosch University writing laboratory. *Stellenbosch Papers in Linguistics, 53*, 59–77. https://doi.org/10.5842/53-0-734.

de la Fuente, L. C., & Comas-Quinn, A. (2016). Situated learning in open communities: The TED open translation project. In P. Blessinger & T. J. Bliss (Eds.), *Open education: International perspectives in higher education* (pp. 93–114). Cambridge, UK: Open Book Publishers. https://doi.org/10.11647/OBP.0103.

Department of Higher Education and Training (DHET). (2020). *2000 to 2017 first time entering undergraduate cohort studies for public higher education institutions*. Pretoria, South Africa: DHET. Retrieved from https://www.dhet.gov.za/HEMIS/2000%20TO%202017%20FIRST%20TIME%20ENTERING%20UNDERGRADUATE%20COHORT%20STUDIES%20FOR%20PUBLIC%20HEIs.pdf.

Firdhouse, M. (2016). Cloud computing for rural ICT implementations: Methods, models and architectures. In Information Resources Management Association (Ed.), *Web-based services: Concepts, methodologies, tools, and applications* (pp. 496–527). Hershey, PA: Information Science Reference (an imprint of IGI Global).

Franklin, A., Li, T., & Jamieson, P. (2015). *Evaluating metrics for automatic mind map assessment in various classes*. Paper presented at Frontiers in education, El Paso, TX.

Fresen, J. W. (2018). Embracing distance education in a blended learning model: Challenges and prospects. *Distance Education, 39*(2), 224–240.

Fullan, M., & Langworthy, M. (2014). *A rich seam: How new pedagogies find deep learning*. London: Pearson.

Gregory, M. S.-J., & Lodge, J. M. (2015). Academic workload: The silent barrier to the implementation of technology-enhanced learning strategies in higher education. *Distance Education, 36*(2), 210–230.

Hennessy, S., Haßler, B., & Hofman, R. (2015). *Challenges and opportunities for teacher professional development in interactive use of technology in African schools*. Retrieved from https://www.repository.cam.ac.uk/bitstream/handle/1810/248308/Hennessy_et_al-2015-Technology,_Pedagogy_and_Education.pdf?sequence=1

Hollings, M., & Naidu, S. (2020). Chapter 13: Developing practice in the Pacific. In T. Mays & R. K. Singh (Eds.), *Addressing the learning needs of out-of-school children and youths through expansion of open schooling* (pp. 235–256). Vancouver, BC: Commonwealth of Learning (COL). Retrieved from http://oasis.col.org/handle/11599/3731.

Hülsmann, T. (2016). *The impact of ICT on the costs and economics of distance education: A review of the literature*. Vancouver, BC: Commonwealth of Learning. Retrieved from http://oasis.col.org/handle/11599/2047.

Imhonopi, D., Urim, U. M., Onwumah, A., & Kasumu, T. O. (2017). An appraisal of information and communication technologies as new media tools for language teaching and learning in tertiary institutions in Nigeria. *Ife Psycholog IA, 25*(1), 185–209.

International Monetary Fund. (2020). *Real GDP Growth – Annual percent change*. Retrieved from https://www.imf.org/external/datamapper/NGDP_RPCH@WEO/OEMDC/ADVEC/WEOWORLD

Kalibwani, R., Kakuru, M., Carr, A., & Tenywa, M. (2021). Scaling smallholder farmer empowerment: Lessons from the lifelong learning program in Uganda. *Journal of Learning for Development, 8*(2), 431–447. Retried from https://jl4d.org/index.php/ejl4d/article/view/501/629.

Kanwar, A., & Daniel, J. (2020). *Report to commonwealth education ministers: From response to resilience*. Vancouver, BC: Commonwealth of Learning. Retrieved from http://oasis.col.org/bitstream/handle/11599/3592/2020_Kanwar_Report_to_Commonwealth_Education_Ministers__.pdf?sequence=5&isAllowed=y.

Kanwar, A. S., Carr, K., Ortlieb, R., & Mohee, R. (2018). Opportunities and challenges for campus-based universities in Africa to translate into dual-mode delivery. *Distance Education, 39*(2), 140–158.

Karunanayaka, S. P., & Naidu, S. (Eds.). (2020). *Pathways to open educational practices*. The Open University of Sri Lanka. Retrieved from https://www.ou.ac.lk/home/images/Faculty_and_institute/Edu/Pathways_to_OEP_eBook.pdf.

Kennedy, E., Laurillard, D., Horan, B., & Charlton, P. (2015). Making meaningful decisions about time, workload and pedagogy in the digital age: The course appraisal model. *Distance Education, 36*(2), 177–195.

Kharbanda, A. (2020). Chapter 11: Developing practice in Asia. In T. Mays & R. K. Singh (Eds.), *Addressing the learning needs of out-of-school children and youths through expansion of open schooling* (pp. 205–222). Vancouver, BC: Commonwealth of Learning (COL). Retrieved from http://oasis.col.org/handle/11599/3731.

Kim, Y., Huang, J., & Emery, S. (2016). Garbage in, Garbage out: Data collection, quality assessment and reporting standards for social media data use in health research, infodemiology and digital disease detection. *Journal of Medical Internet Research, 18*(2), e41. https://doi.org/10.2196/jmir.4738.

Macharia, J. K. N., & Pelser, T. G. (2013). Diffusion and infusion of information and communication technologies in Kenyan higher education. *South African Journal of Higher Education (SAJHE), 27*(3), 662–681.

Mahler, A. G. (2017, October 25). *Global South*. [Blog Post]. Retrieved from https://www.oxfordbibliographies.com/view/document/obo-9780190221911/obo-9780190221911-0055.xml

Mays, T. (2020). Teaching the teachers. In D. Burgos, A. Tlili, & A. Tabacco (Eds.), *Radical solutions for education in a crisis context: COVID-19 as an opportunity for global learning* (pp. 163–176). Singapore, Singapore: Springer. https://doi.org/10.1007/978-981-15-7869-4_12.

Mishra, S., & Panda, S. (Eds.). (2020). *Technology-enabled learning: Policy, pedagogy and practice*. Vancouver, BC: Commonwealth of Learning. Retrieved from http://oasis.col.org/handle/11599/3655.

Murangi, H. V. (2020). Chapter 6: Finance and open schooling. In T. Mays & R. K. Singh (Eds.), *Addressing the learning needs of out-of-school children and youths through expansion of open schooling* (pp. 101–125). Vancouver, BC: Commonwealth of Learning (COL). Retrieved from http://oasis.col.org/handle/11599/3731.

Naidu, S. (2017). How flexible is flexible learning, who is to decide and what are its implications? *Distance Education, 38*(3), 269–272.

Ng, E. M. W. (2016). Fostering pre-service teachers' self-regulated learning through self- and peer assessment of wiki projects. *Computers & Education, 98*, 180–191.

Noack, R., & Gamio, L. (2015). The world's languages, in 7 maps and charts. *Washington Post*, April 23, 2015. Retrieved from https://www.washingtonpost.com/news/worldviews/wp/2015/04/23/the-worlds-languages-in-7-maps-and-charts/

OECD. (2015). *Students, computers and learning: Making the connection*. Paris, France: OECD. Retrieved from https://www.oecd.org/publications/students-computers-and-learning-9789264239555-en.htm.

Olelewe, C. J., & Agomuo, E. E. (2016). Effects of E-learning and F2F learning environments on students' achievement in QBASIC programming. *Computers & Education, 103*(December 2016), 76–86.

Orr, D., Luebcke, M., Schmidt, J. P., Ebner, M., Wannemacher, K., Ebner, M., & Dohmen, D. (2020). *Higher education landscape 2030. A tren6d analysis based on the AHEAD international horizon scanning*. Springer Briefs in Education. https://doi.org/10.1007/978-3-030-44897-4.

Raturi, S. (2016). *Education development challenges and potential for flexible & open learning in Tuvalu for Department of Education, Ministry of Education Youth & Sports*. Vancouver, BC: COL. Retrieved from http://oasis.col.org/handle/11599/2665.

Romero, T. (2021, July 6). *Online education in Latin America – Statistics & facts*. [Blog post]. Retrieved from https://www.statista.com/topics/7239/online-education-in-latin-america/

Rumble, G. (2012). Financial management of distance learning in dual-mode institutions. *Open Learning, 27*(1), 37–51.

Samuels, S. (2020). Chapter 12: Developing practice in the Caribbean. In T. Mays & R. K. Singh (Eds.), *Addressing the learning needs of out-of-school children and youths through expansion of open schooling* (pp. 223–234). Vancouver, BC: Commonwealth of Learning (COL). Retrieved from http://oasis.col.org/handle/11599/3731.

Simui, F., Namangala, B., Tambulukani, G., & Ndhlovu, D. (2018). Demystifying the process of ODL policy development in a dual mode context: Lessons from Zambia. *Distance Education, 39*(2), 176–193.

Southern African Development Community. (2012). *Regional open and distance learning policy framework*. Retrieved from https://www.sadc.int/files/3113/7820/8525/Approved_Regional_ODL_Policy_Framework_June_2012_1.pdf

Torres, P. L., & Rama, C. (2018). Distance education leaders in Latin America and the Caribbean. *Journal of Learning for Development, 5*(1), 5–12. Retrieved from https://jl4d.org/index.php/ejl4d/article/view/286/301.

Trotter, H., & Hodgkinson-Williams, C. (2020). Chapter 12 – Open educational resources in the global South: Degrees of social inclusion. In M. L. Smith & R. K. Seward (Eds.), *Making open education inclusive: Lessons from IDRC research* (pp. 317–356). The MIT Press. Retrieved from https://idl-bnc-idrc.dspacedirect.org/bitstream/handle/10625/59418/IDL-59418.pdf?sequence=2#page=332.

Tufue-Dolgoy, R., Vaai, E. K., & Suaali'I, F. (2016). *Teacher perceptions of open distance learning in Samoa*. Vancouver, BC: Commonwealth of Learing (COL). Retrieved from http://oasis.col.org/bitstream/handle/11599/2601/PDF?sequence=4&isAllowed=y.

UNICEF. (2020). *How many children and young people have internet access at home? Estimating digital connectivity during the COVID-19 pandemic*. Retrieved from https://data.unicef.org/resources/children-and-young-people-internet-access-at-home-during-covid19/

United Nations (UN). (n.d.). *Population – Our growing population*. Retrieved from https://www.un.org/en/sections/issues-depth/population/

United Nations Educational Scientific and Cultural Organisation. (2005). *Guidelines for quality provision in cross-border higher education*. Paris, France: UNESCO. Retrieved from https://cupdf.com/document/unesco-quality-assurance-guidelines.html.

Vaa, L. R. (2015). *A baseline study on technology-enabled learning in the commonwealth Pacific countries: Report*. Vancouver, BC: Commonwealth of Learing (COL). Retrieved from http://oasis.col.org/handle/11599/1738.

Zhou, M. (2015). SCOOP: A measurement and database of student online search behaviour and performance. *British Journal of Educational Technology, 46*(5), 928–931. Retrieved from https://ur.booksc.eu/book/56297638/3ed82d.

Open, Distance, and Digital Non-formal Education in Developing Countries

21

Sanjaya Mishra and Pradeep K. Misra

Contents

Abstract

Non-formal education contributes significantly to improve the literacy and livelihoods of individuals. Its significance becomes much more in developing countries where 70% of the world population lives. However, population densities, geographical diversities, and varied socioeconomic conditions in many developing countries make it difficult to offer need-based non-formal education (NFE) to all. Fortunately, open, distance, and digital education (ODDE) has emerged as a viable approach to offer quality non-formal education programs at a minimal cost. Research reveals that proper and effective use of ODDE to offer NFE changes the lives of many citizens in developing countries and may help these countries achieve the Sustainable Development Goals. This chapter presents in its first section an overview of the use of ODDE for supporting NFE initiatives in the developing world and identifies issues and challenges faced. The next section of the chapter outlines theoretical insights and findings of valued publications

S. Mishra (✉)
Commonwealth of Learning, Burnaby, BC, Canada
e-mail: smishra@col.gmail.com

P. K. Misra
National Institute of Educational Planning and Administration, New Delhi, India

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_21

regarding the use of ODDE for offering NFE. The final section provides the strategies for making the best and optimum use of ODDE to make NFE accessible to all eligible and willing ones in developing countries.

Keywords

Distance education · Digital education · Non-formal education · Developing countries · Distance learning · Digital learning

Introduction

Over 85% of countries on this planet, with more than 70% of the world population, are developing countries. [The use of the term developing countries is in decline now, but continually growing economic disparities and resource divide among the world countries compelled us to stay with this nomenclature.] Citizens of the developed countries (15% of countries on the planet) enjoy better living conditions, affordable health services, ample job opportunities, good education, and advanced technological services, whereas citizens of the developing countries live in poor conditions, hardly afford basic health services, face growing unemployment, lack quality education, and constantly encounter the digital divide. Considering the challenges faced by the world, the global community adopted the Sustainable Development Goals (SDGs) in 2015. The SDGs are a collection of 17 interlinked global goals designed to achieve a better and more sustainable future for all. The SDGs recognize that ending poverty and other deprivations must go together with strategies that improve health and education, reduce inequality, and spur economic growth, all while tackling climate change and working to preserve our oceans and forests. The timeline to achieve SDGs is 2030. Following the commitment, governments across the globe are trying to achieve SDGs by 2030 (Misra, 2021; United Nations, 2021).

The success of SDGs is dependent on the implementation of developmental measures in developing countries, and education is a key to the success of SDGs (Vladimirovaa & Le Blanc, 2015). Providing need-based quality education to all citizens irrespective of their age or stage is the way to achieve SDGs and improve the status of a developed country. Research shows that the private return on investment in education is over 25% in primary education, followed by over 15% for secondary and higher education (Psacharopoulos & Patrinos, 2018). Recognizing the importance of education for development, providing quality education to all is a priority area for every government in the world. As a result, today, there is only about 13% illiterate population in the world. However, the bulk of this illiterate population is in developing countries (Roser & Ortiz-Ospina, 2018). In addition to making this vast population literate, providing educational opportunities to all, continuingly, is equally important for developing countries to develop sustainably. This is not possible through the use of formal education practices alone.

The formal education systems are usually the backbone for the development of a country. But non-formal education (NFE) also contributes significantly to improve the literacy and livelihoods of individuals. Therefore, it becomes significant for developing countries to offer meaningful NFE opportunities to the citizens in addition to formal education. However, offering need-based NFE is a challenge in many developing countries due to the size of the population as well as many other geographical and economic conditions. Fortunately, many countries have started using open, distance, and digital education (ODDE) to make NFE more accessible and approachable to the masses. The assumption is that ODDE can offer quality educational programs at a minimal cost to the citizens that come from varied cultures, live in different geographies, speak multiple languages, and face economic inequalities. Proper and effective use of ODDE may change the lives of many citizens in developing countries and help these countries achieve SDGs. This chapter presents an overview of the use of ODDE for supporting NFE initiatives in the developing world and identifies issues and challenges faced. The chapter also reviews theoretical insights and major findings of key publications to further explore the use of ODDE for NFE. The final section provides the strategies for promoting NFE through ODDE in developing countries.

Characteristics and Benefits of NFE

Like formal education (but unlike informal, incidental, or random learning), NFE is institutionalized, intentional, and planned by an education provider (UIS, 2012, p. 11). In a way, NFE is the mid approach between formal and informal education. NFE is more flexible than formal education in terms of rules, regulations, and certifications but more organized and goal-oriented in comparison with informal education. Khasnabis et al. (2010) observe that:

> Non-formal education refers to education that occurs outside the formal school system. Non-formal education is often used interchangeably with terms such as community education, adult education, lifelong education and second-chance education. It refers to a wide range of educational initiatives in the community, ranging from home-based learning to government schemes and community initiatives. (para 1)

Usually, an individual's educational journey focuses on two approaches that complement each other: formal education and informal education. One attends schools and afterward higher education institutions to receive formal instruction. The successful completion of formal instruction is acknowledged in the form of degrees or diplomas. Simultaneous to formal education, an individual also learns from family, peers, and society. This education does not provide his/her any certificate or diploma, but the most valuable lessons to succeed in life. This education is named informal education. And the third type of education is NFE that supports or complements both formal and informal education. Assuming the image of education as a sandwich, then it will be appropriate to say that "formal education" forms its upper layer, "informal education" forms its lower layer, and "non-formal education" is the filling connecting both the layers. A report from UNESCO highlights the characteristic of NFE in the following words:

> The defining characteristic of non-formal education is that it is an addition, alternative, and/or complement to formal education within the process of lifelong learning of individuals. It is often provided in order to guarantee the right of access to education for all. It caters to people of all ages but does not necessarily apply a continuous pathway structure; it may be short in duration and/or low-intensity; and it is typically provided in the form of short courses, workshops or seminars. Non-formal education mostly leads to qualifications that are not recognised as formal or equivalent to formal qualifications by the relevant national or sub-national education authorities or to no qualifications at all. Nevertheless, formal, recognised qualifications may be obtained through exclusive participation in specific non-formal education programmes; this often happens when the non-formal programme completes the competencies obtained in another context. (UIS, 2012, p. 11)

NFE has emerged as a tool that offers multiple possibilities and opportunities for individuals, societies, and countries, especially for the young and adult population. NFE caters to the needs of the society, especially those who are weaker sections of the society and may not have access to formal education due to a range of barriers including socioeconomic conditions. Explaining the utility of NFE for various user groups, a write-up from a working group on NFE of the Association for the Development of Education in Africa (2021) suggests:

> Education will never be enjoyed by all without a wide variety of non-formal or 'non-school forms of provision: 'second chance' schools for children having passed the legal enrollment age; community schools for children in areas lacking formal provision; literacy and 'post-literacy programs for teenagers and adults; programs combining basic education with various forms of vocational training; and so on. (para 5)

Countries envision many benefits by offering need-based NFE opportunities for all. For example, NFE helps individuals to:

- Gain specific knowledge or skills
- Get learning and experiences in actual work settings
- Fulfil their personal, social, and professional development needs
- Improve or adapt their existing qualifications and skills
- Keep ready and updated for changing demands of jobs or industries
- Live an active, joyful, and productive life

There is a general principle that individual benefits collectively help societies and countries to develop socially, culturally, and economically. NFE works on similar principles and supports individuals to develop socially, culturally, and financially.

Mechanism to Deliver NFE

As discussed earlier, the nature NFE depends on the need of the stakeholders. People usually opt for NFE due to five main reasons:

- Supplementing their formal education
- Compensating lack of formal education
- Increasing professional competence
- Having a desire for personal development
- Practicing a hobby or leisure activity

NFE is clubbed into four main categories. These categories are paranormal education, popular education, education for personal development, and professional training (Carron & Carr-Hill, 1991). Due to the advent of mobile communication technologies, people are also opting for NFE for popular and personal development reasons.

Several organizations and agencies provide NFE in developing countries. First among them are the governments. In Latin America and the Caribbean, Redvers-Lee (2002) found that governments are the key players in NFE. This observation is equally applicable for the majority of developing countries (Carron & Carr-Hill, 1991). Besides governments, other major providers of NFE in developing countries include educational institutions, non-governmental organizations, industrial houses, self-help groups, citizen forums, and international organizations. NFE is mainly provided in the form of short-term courses, training programs, seminars, and workshops. The duration of such programs ranges between a few months or weeks and few days. The training includes both theoretical and practical aspects and is facilitated by subject experts. At the end of the training, candidates are provided a certificate of successful completion or a certificate of attendance.

Increased literacy rates, higher gross enrolment ratios in the education sector, the changing demands of professions, changing requirements of the job market, and the desire to raise the financial and social status are significantly contributing to popularize NFE in developing countries. NFE has also emerged as a viable means to benefit from opportunities offered by liberalization, privatization, and globalization. As a fact, developing countries are relying heavily on NFE for achieving the SDGs. Summarizing the reasons behind the need and popularity of NFE, a report from a working group on NFE (Association for the Development of Education in Africa, 2021) states:

> Non-formal education does not merely fill a gap. It also enables countries to consider their educational needs more holistically as they progress toward the goal of education for all. Moreover, non-formal education is better placed to meet the needs of disadvantaged groups and offers the advantage of being grounded in the workplace and the grassroots level. It can thus help to revitalize education [in Africa] by forging closer links between education and the realities of everyday life. (para 4)

While most of the NFE programs are organized at evening and weekend activities to accommodate the needs of the stakeholders, the time and location-dependent nature of the events are not normally suitable for many participants. Therefore, many governments and organizations are also using ODDE to offer NFE programs.

ODDE as a system of teaching and learning is a provision where the learners and teachers are quasi-permanently separated by space and time; there is an organization to facilitate the process of learning; use technical media (such as print, audio, video, digital technologies) for delivery of learning; provision of two-way communication (with assignments and online discussion); and occasional provision of the meeting of the participants to create and promote social learning (Keegan, 1996). It provides flexibility to the participants to join the learning opportunity from anywhere and learn at their own pace and time to accomplish their goal with limited requirements to join an in-person event. While the flexibility of ODDE offered the opportunity to many participants to join the programs, the increased number of participants also provided the "economies of scale" to the NFE providers to adopt this approach. In the past decades, the main changes for ODDE were on media and technology used for resources and delivery. Open and distance education started by using the print medium as a resource and subsequently added audio, video, and electronic resources. The delivery mode uses postal medium, radio, television, the Internet, and mobile as a mechanism to deliver ODDE. Nowadays, most providers use different resources and media in combination to offer ODDE.

ICTs have emerged as the backbone of ODDE for NFE. The NFE providers are now using ICTs, such as Internet-enabled computers and mobile phones, for instruction, resources, discussions, guidance, evaluation, and certification. The NFE providers advertise their courses online or on the institutional website or social media, admit students online, teach them online or in blended mode, ask them to submit their assignments online, examine them either online or offline, and also award certificates online. While there are also NFE distance learning provisions that are not facilitated by the use of ICTs, the ICT-supported versions offer a speedy, convenient, personalized, cost-effective, and cross-border supply of NFE. As observed by Latchem (2012):

> Low-income and middle-income countries fully recognise the need to develop their human capital in order to develop sound market-based economies. NFE is a key feature in pursuing this goal. However, so great is the task that it cannot be achieved by conventional means alone. This is why applications of open and distance education and of information and communications technology (ICT) can play such a vital role. (p. 2)

The advocacy for using ODDE for NFE in developing countries is supported by many arguments. These arguments suggest that ODDE-supported programs and activities can be:

- Accessible to many learners residing in different localities
- A viable option for people with low or poor economic status
- Offered by any willing institution or organization or individual with minimal resources and facilities
- A cost-effective and economical way for learners to enhance their knowledge and competencies
- Helpful to cater the learning needs of youth and adult learners by reaching their doorsteps
- Used in combination with the formal system of education

Examples of NFE Through ODDE

There are limited NFE provisions in developing nations (Latchem, 2014). However, the earliest report on the use of distance learning for NFE listed 73 projects in 56 developing and 17 industrialized countries (Dodds, 1996). Presenting a compilation of several case studies of NFE by distance and open learning, Siaciwena (2000) stated that distance learning demonstrates potential in enhancing the contribution of NFE to socioeconomic development, for example:

> . . . the Zambia Radio Farm Forum programme enables the Ministry of Agriculture, Food and Fisheries to reach larger numbers of peasant farmers than is possible through other extension services. The Radio Farm Forum programme helps over 21,000 small-scale farmers/peasants in rural areas, who listen and participate in the programme, to learn new knowledge and develop new skills. In the Ghanaian case study, the use of radio strengthened the coverage, by the literacy programme, of the functional and developmental themes. Another important lesson is that distance learning approaches can be effective in changing people's attitudes/behaviour and in motivating rural communities to undertake action leading to the improvement of their socio-economic conditions. (p. 5)

In 2007, the Bangladesh Rural Advancement Committee (BRAC) came out with an interactive audio course to deliver information over mobile phones. Each course had a few points to convey, such as the importance of clinician-assisted birth or the dangers of indoor smoke. As an incentive to take the courses, there was a short quiz at the end of each call, and if the caller passed the quiz, free airtime was delivered to their mobile phone (InfoDev, 2010, p. 14). The BRAC experiment showed that with a vision, proper planning, and appropriate infrastructural support, ODDE-supported NFE can be a game-changer.

In India, the National Institute of Open Schooling (NIOS) offers several vocational education programs to meet the need for skilled and middle-level human resources working in both organized and unorganized sectors. The NIOS has expanded the range of vocational education courses over the years depending upon the needs of learners and market demands. In addition, vocational education courses of NIOS are for both urban and rural sectors. The success of NIOS in offering vocational education programs shows that ODDE-supported NFE can bring several social and economic gains (NIOS, 2021). NIOS also offers an open basic education program to increase the literacy rate in the country. Priyadarshini (2006) reported that the priority groups of this program include women, disadvantaged communities, daily wage earners living below the poverty line, rural persons, and those living in urban slums.

The UNESCO Institute for Lifelong Learning's database on literacy case studies reports the use of computer-based functional literacy in India by Tata Consultancy Services in nine languages. The adult literacy program uses a multimedia software package and e-Learning system to help adults speaking the native language without literacy skills to learn basic reading, writing, and arithmetic. Through this initiative, "The content is presented via a multimedia puppet show and focuses on individual words rather than the alphabet, with the aim of teaching learners to read and write 700 commonly used words in their native language" (Chatzigianni, 2019).

The Alphabétisation de Base par Cellulaire (ABC) (en: Mobiles 4 Literacy) program in Niger uses mobile phones to promote adult literacy and numeracy. Reporting the case study, Hanemann (2017) states the project enhanced the reading and writing and math scores over time from zero to, on average, between two and three, meaning that learners could read and write sentences and complete addition and subtraction problems.

The Commonwealth of Learning (COL) has been promoting the use of distance learning for non-formal education since its establishment. COL's Lifelong Learning for Farmers (L3F) program has demonstrated huge success in the use of distance education and low-cost technologies in improving the lives of farmers in Asia and Africa. Rooted in the idea that cognitive social capital is a precondition for lifelong learning, the approach taken is to focus on the community for imparting training and use of radio and low-cost mobile phones alongside face-to-face meetings to provide functional literacy. A study in Africa reports members of L3F to have significantly higher empowerment scores than the non-L3F control groups and also have higher profits and profit efficiency in poultry farming, thereby significantly improving their livelihoods (Balasubramanian, Carr, Yindok, Atieno, & Onyango, 2014). Evaluating L3F in India, the National Institute of Bank Management reported that the program yielded a 9:1 financial return on the investment by COL, and the L3F community members have substantially high earnings than the non-L3F group (Kumar and Kulkarni, 2013).

ODDE provisions are not only effective in increasing access to learning opportunities for those who need education but are also cost-effective solutions for NFE. Arguing in favor of using ODDE for NFE, Latchem (2018) noted:

> The developing countries experience great difficulty in funding the current forms of formal education and escalating access to equitable and quality non-formal education (NFE) by conventional means on the scale needed would cost many billions if not trillions of dollars. It is here that open and distance learning (ODL) can play a significant role by opening up access and lowering the costs by the use of alternative methods and information and communications technology (ICT). (p. vii)

In addition, Table 1 presents a summary of some key publications that the readers may find useful to further explore the use of ODDE for NFE.

Issues and Challenges for NFE Through ODDE

While ODDE has the potential to increase access and reduce the cost of quality NFE in many countries, there are several concerns and challenges faced by developing countries regarding the provision of NFE to all willing citizens. Research reveals that the poor and least educated in the developing economies are unable to take benefit of NFE due to many barriers including situational barriers (those arising from one's situation in life), institutional barriers (practices and procedures that hinder participation), and dispositional barriers (attitudes and dispositions toward learning)

Table 1 Insights from key publications for NFE through ODDE

Title of publication	Key insights
Latchem, C. (2018). *Open and distance non-formal education in developing countries*. Singapore: Springer	This comprehensive book with a development agenda is directly related to the topic of this chapter. Colin Latchem covers the topic of NFE to inspire the readers and inform policymakers and providers how distance learning has been successfully used. The book covers the use of radio, television, mobile learning, open educational resources, massive open online courses, and traditional performing arts, to design non-formal distance education. Several case studies are grouped under thematic areas such as out-of-school children and youth literacy, gender equality, adult learning, and language learning, persons with disabilities, agriculture, health care, and small and medium enterprises. This is a book for anyone interested in this field for an in-depth review
Latchem, C. (2014). Informal learning and non-formal education for development. *Journal of Learning for Development*, 1 (1). https://jl4d.org/index.php/ejl4d/article/view/6/6	This seminal work examines the issues of open, distance, and technology-based informal learning and NFE for individual and community development. Considering the significance of informal learning and NFE, it makes a case for more research and evaluation on the design, development, and application of appropriate methods, ICT, mass media, and traditional forms of communication for learning to lead to development
Latchem, C. (2012). *Quality assurance toolkit for open and distance non-formal education*. Vancouver: Commonwealth of Learning. http://oasis.col.org/handle/11599/106	This publication explores quality assurance in NFE with an emphasis on the evaluation of their outcomes, outputs, and impacts. The publication examines approaches to quality assurance that are needed in NFE and introduces a rigorous but simple quality assurance framework. This is a definitive toolkit for anyone using ODDE for NFE
Siaciwena, R. (Ed.) (2000). *Case studies of non-formal education by distance and open learning*. Vancouver: Commonwealth of Learning. http://oasis.col.org/handle/11599/38	This research report presents the use of a range of media such as print, audio, video, broadcast radio, and television for NFE in five African countries (Ghana, Kenya, Tanzania, Uganda, and Zambia). This report will be of interest to anyone involved in the planning, development, and implementation of NFE programs
Dodds, T. (1996). *The use of distance learning in non-formal education*. Vancouver: Commonwealth of Learning; Cambridge: International Extension College. http://oasis.col.org/handle/11599/253	This report, one of the initial works in this field, documents the use of distance learning for non-formal education. This study reports 73 projects in 56 developing countries and 17 industrialized countries. The directory of the projects provides insights into early experiments and successes. The report also

(continued)

Table 1 (continued)

Title of publication	Key insights
	notes that non-formal distance education projects are often poorly funded, which often leads to low quality, disappointing results, and lack of sustainability. The findings of this study are still relevant today

(Latchem, 2014; UNESCO, 2019). In addition, the following factors are also responsible for the less reach of NFE in developing countries.

Social status of NFE: Two decades earlier Perraton (2000) noted that distance learning NFE programs are regarded as second-class provisions for groups of low social standing and have little political influence. While COVID-19 has significantly changed the mindset about distance learning, the status of NFE has not changed much in the last two decades. There is a popular belief that NFE is practical and skill-based; hence, face-to-face or in-person teaching or instruction is best to get it. As a result, in-person NFE is still the first choice among the masses.

Policy (political) support to NFE: The education systems in developing countries, both formal and non-formal, are mainly devised and promoted by governments (popular political parties), which do not recognize the role of distance learning as a policy for promoting lifelong learning. Distance learning for NFE has been visualized as a series of pilots that never became institutionalized or taken seriously by governments (Dodds, 1996; Perraton, 2000). The governments across developing countries are promoting online learning and coming up with several projects. But these projects mainly focus on using online learning in the formal education sector rather than for the NFE sector. To make extensive use of ODDE in NFE, supportive policies and political support are needed. For example, in India, the open basic education program of the NIOS is recognized as equivalent to the formal school for purposes of higher education and employment (UIL, 2015).

Inexperience among NFE providers to adopt ODDE: NFE providers in developing countries have evolved their mechanism and methodology to offer the programs. The providers mainly use the experiences and expertise that they receive from the formal education sector. The providers rarely received training on how to use ODDE to provide NFE to the masses. There are limited training opportunities on distance learning for NFE. As a result, the NFE sector in developing countries still depends on the formal system of instruction.

Marketing and publicity of NFE: ODDE-supported NFE has its success stories, but unfortunately, these stories hardly become viral or reach the stakeholders (Latchem, 2018). These success stories remain confined to a particular sector or region. There is no agency to promote and publicize such success stories in other parts of the country or across countries. Nowadays, participants and providers are using online social media to promote such stories, but that is not enough. The other notable point is that the majority of the population in developing countries lives in rural areas and hardly watches such success stories on social media.

Private players to promote NFE: After the advent of globalization, private players are playing an active role in the formal education systems of developing countries. But private players are not active in the NFE sector. The cost structure of NFE and the paying capacities of the stakeholders to access NFE programs do not encourage the private players to work in this area. However, the emergence of technology-enabled NFE programs creates new opportunities for private players, non-governmental organizations, and philanthropic organizations to actively engage in this area to support development.

Research on designing, delivering, and evaluating NFE: Research plays a significant role in realizing the educational needs of individuals or society and accordingly designing and developing educational programs or activities. Research guides effective and efficient way to design and offer educational programs and informs whether offered programs or activities are working well or able to meet the expectations. Unfortunately, not much research is available on designing and delivering need-based NFE for the masses in developing countries. The evaluation studies on ongoing NFE initiatives are also missing or remain unreported. Needless to say, the absence of research on designing, delivering, and evaluating NFE is severely hampering the progress and prospects of NFE through ODDE in developing countries.

Besides, some other factors that affect the use of ODDE for NFE in developing countries are:

- The demands for offering NFE in local or regional languages
- The digital divide among NFE aspirants
- Hesitation to join NFE as adults
- Family- and work-related responsibilities of NFE aspirants
- Lack of guidance and counselling about the benefits of NFE
- The social mindset that blocks the road of NFE for women

In a nutshell, developing countries face several challenges to promote open, distance, and digital non-formal education. Therefore, it can be stated that to promote the use of ODDE for NFE, developing countries need specific strategies to implement ODDE in NFE contexts.

Strategies for Promoting Use of ODDE for NFE

NFE in developing countries has been visualized and offered on the pattern of the formal education system. In reality, only a limited number of institutions or organizations offer NFE. The NFE programs are delivered on a set pattern, and both providers and takers have their reasons to celebrate. The providers feel happy to claim that they have offered so many programs, and participants feel jubilant to get a completion certificate to show. But the real intent behind offering NFE, i.e., bringing a change in the lives of participants by helping them to update their knowledge or skills, remains absent in such proceedings. To overcome such a situation, this becomes the responsibility of governments, NFE providers, and all associated institutions to adopt innovative policies and practices for delivering quality distance learning for NFE at the doorsteps of the masses. We discuss some of the possible strategies that could be adopted by governments and NFE providers in developing countries.

National policy: National education policies are a regular feature in developing countries. These policies refer to NFE, but ODDE is hardly a part of the discourse in such policy documents. A well-thought and focused policy is a must for promoting any educational program or scheme. Realizing this necessity, the governments in developing countries need to adopt specific policies for distance learning operations of NFE opportunities. These policies can be made as per the need and ground realities of a particular country but must necessarily answer the following.

- What types of ODDE NFE programs will be delivered?
- Who is eligible to offer ODDE for NFE?
- What will be the terms and conditions for such providers of ODDE?
- How do NFE providers ensure the quality of ODDE programs?
- What will be the mechanisms for certification of ODDE NFE programs?
- How can providers of ODDE for NFE be accredited?
- What will be the legal framework for accepting ODDE for NFE within the national qualifications' framework for employment and other educational purposes?

Adopting a specific policy would help increase the visibility of ODDE for NFE programs and the acceptance of the pilot projects to become mainstream.

National coordinating agency: Multiple agencies provide NFE in developing countries. Unfortunately, all these agencies work in isolation. They only cater to their target groups and feel happy by achieving designated targets. Realizing the isolation among providers of NFE, developing countries must think of setting up a dedicated agency to coordinate and manage the NFE offerings. This is important if the economies of scale are to be leveraged to reduce the cost of operation and make ODDE a viable option for NFE. This coordinating agency may act as a one-stop shop for curriculum design and development of learning materials and guide the providers in the effective delivery of ODDE for NFE programs. This agency may also conduct training, ensure quality, and maintain data for the government to take policy decisions.

Online portal for NFE: Online services significantly improve good governance in the developing countries. Online portal helps the governments or concerned agencies to get real-time data and monitor the progress of different schemes or projects. A national portal for resources, expertise, and programs on ODDE for NFE could help improve access to information for all concerned. The governments can use this online portal for many purposes and in several ways. The providers can be allowed to use this platform for the complete cycle of ODDE (enrolment, instruction, examination, and certification). The resources on the portal could be made available as open educational resources to help reuse and remix to offer programs by several providers and contextualize the resources by translating these to local languages.

Increase funding: ODDE programs require an initial higher investment due to the preparation of learning materials and the use of technological systems. While the recurring costs are less, the initial fixed costs sometimes are deterrent for NFE providers to adopt ODDE, even when there is a high scalability of the program to reach enough participants for economies of scale. Thus, governments in developing countries must provide adequate funding support for NFE programs to adopt ODDE and become sustainable. While governments may take the bulk of such responsibility, the private sector and philanthropy could play a significant role in increasing the funding base for ODDE. Availability of increased funding support could help the development and offer more of NFE programs using ODDE in many different areas to reduce unemployment, speed up the economy, increase productivity, promote self-sufficiency, and achieve SDGs.

Partnership and collaboration: Providing NFE to every willing citizen is a mammoth task. Governments in developing countries alone cannot fund and run such programs. As indicated above, this calls for partnership with the private players to collaborate in developing joint programs and offer these on a large scale. In such partnership, the role of state-owned institutions will be to provide infrastructural facilities, and the private players will be responsible to run the program and offer instructional support. In addition, the governments may also offer several incentives to private players for offering NFE in less reached areas. Collaboration at the local level is vital for ODDE for NFE, as local partners would provide community-level support to reach many participants. Also, with the use of digital tools, it is important to have a partnership with Internet service providers and telecommunication providers to offer zero ratings of NFE platforms and portals and provide free SIMs and data access for learning.

Marketing and publicity: The ODDE for NFE is hardly a part of national discourse in developing countries. In the absence of any national policy, the ODDE options are considered largely an individual choice that is fulfilled by specific agencies working at selected places or regions. These success stories are not widely known to many people to attract their attention to the ODDE provisions. Therefore, it is important to create a system to document the success stories of using ODDE for NFE and its wide circulation in social media as well as mainstream media, including radio, television, and newspapers. In addition, there is a need for local community engagements in creating awareness about the advantages of ODDE, which is flexible and provides social learning opportunities and skill-building through limited in-person engagements.

Employers' support: The majority of the NFE aspirants in developing countries is either employed or would like to be employable. In other words, prospective participants see NFE as an opportunity to enhance their competencies and skills for improving their livelihoods. Therefore, it is important that NFE providers engage with industry and employers to develop and offer courses that could lead to employment and improve the livelihoods of the participants. The credibility of ODDE among stakeholders is necessary to create the cycle of confidence. Employer engagement in the design and development of ODDE programs would build their confidence in the participants completing the NFE programs.

Training of NFE providers: The majority of NFE providers in developing countries still rely on the traditional method of instruction, i.e., face to face. For them, one-to-one or personalized instruction in the face-to-face mode setting is still the best way to deliver NFE programs to the aspirants. There is an urgent need for training the NFE providers to understand how to design, develop, and deliver ODDE programs. The ODDE experts and institutions in developing countries may come forward to identify, enrol, and train such providers who are significantly contributing to the NFE sector. Such training opportunities will help improve the availability of more ODDE for NFE programs and improve the quality of those that are available. Training in the field is also important, as the technologies of ODDE are changing very fast with the use of learning management systems, mobile apps, and many other tools such as augmented reality and virtual reality for skills development.

Research on ODDE for NFE: Considering the lack of research on NFE, national governments, international organizations, and educational institutions must come forward to support and fund research focusing on the effective use of ODDE for NFE at both policy and practice levels. It is equally important to carry out evaluative research on ongoing NFE schemes and projects in different parts of the world. The outcomes of these evaluative studies would build a knowledge base for the long-term sustainability of such projects in the future and their adaptation in different contexts. The other area for research may be to assess the impact of technology interventions in NFE programs and the possibilities of using OODE for NFE. Future studies on ODDE NFE may need to be situated in local contexts and adopt participatory approaches where all the stakeholders are engaged and contributing to the critical reflection and understanding. While the researchers use more qualitative approaches to study NFE, future research should also try using rigorous quantitative methods such as randomized control trial (Connolly, Keenan, & Urbanska, 2018) to focus on causality and theory building. The prospective areas for research related to OODE for NFE may include:

- Understanding and evaluating how ODDE NFE policies lead to improved practices
- Ways of using ODDE for NFE by different age groups
- Outcomes of using ODDE for NFE in different sociocultural contexts
- Influence of the ODDE in promoting NFE among adult learners
- The impact of ODDE-supported NFE on the individual’s socioeconomic growth
- How the choice of digital tools for NFE shapes the learning outcomes

Conclusion

The developing countries have a consistent desire to come at par with developed countries at most social and economic indicators. There is no single route to achieve this dream. The developing countries need to work on many fronts, and offering need-based ODDE for NFE is one such route. The ODDE helps the workers to gain further expertise and knowledge while remaining in employment, and this enhanced competence helps them to further excel in their career. The updated knowledge of the workers also brings benefits to the multiple stakeholders that include governments, industries, markets, families, communities, and societies. Notwithstanding a significant correlation between socioeconomic development and ODDE, the developing countries hardly have any comprehensive scheme or mechanism to fund, support, and invest in ODDE for NFE. This chapter lists the potential reasons or challenges holding back developing countries to promote ODDE for NFE. Afterward, the chapter suggests some simply workable strategies for promoting and making the best use of ODDE in developing countries to offer NFE programs. We hope that governments of developing countries will take note of this analysis and implement the suggested strategies for promoting and maximizing the benefits of ODDE for NFE.

Cross-References

► Challenges and Opportunities for Open, Distance, and Digital Education in the Global South
► Resilient Leadership in Time of Crisis in Distance Education Institutions in Sub-Saharan Africa

References

Association for the Development of Education in Africa. (2021). *Working group on non formal education*. Retrieved from https://www.adeanet.org/en/working-groups/non-formal-education

Balasubramanian, K., Carr, A., Yindok, T., Atieno, R., & Onyango, J. (2014). *Smallholders' transformation to business enterprise in Africa: A reality or a mental illusion?* Paper presented at the 7th Africa Agricultural Science Week (7AASW), Forum for Agricultural Research in Africa (FARA), Kigali, Rwanda. Retrieved from http://oasis.col.org/handle/11599/2353

Carron, G., & Carr-Hill, R. A. (1991). *Non-formal education: Information and planning issues*. Paris, France: International Institute for Educational Planning, UNESCO.

Chatzigianni, S. (2019). *Tata consultancy services' adult literacy programme: Computer-based functional literacy, India*. UNESCO Institute for Lifelong Learning. Retrieved from https://uil.unesco.org/case-study/effective-practices-database-litbase-0/tata-consultancy-services-adult-literacy-programme

Connolly, P., Keenan, C., & Urbanska, K. (2018). The trials of evidence-based practice in education: A systematic review of randomised controlled trials in education research 1980–2016. *Educational Research, 60*(3), 276–291. https://doi.org/10.1080/00131881.2018.1493353.

Dodds, T. (1996). *The use of distance learning in nonformal education*. Vancouver, BC/Cambridge, UK: Commonwealth of Learning/International Extension College. Retrieved from http://oasis.col.org/bitstream/handle/11599/253/Use_of_DE_in_Nonformal_Ed_Dodds_T.pdf?sequence=1

Hanemann, U. (Ed.). (2017). *Alphabétisation de base par cellulaire (ABC): mobiles 4 literacy (Niger)*. UNESCO Institute for Lifelong Learning. Retrieved from https://uil.unesco.org/case-study/effective-practices-database-litbase-0/alphabetisation-base-cellulaire-abc-mobiles-4

InfoDev. (2010). *Information and communication technology for education in India and South Asia: Essay V – ICT in non formal education*. London, England: Pricewaterhouse Coopers.

Retrieved from https://www.infodev.org/sites/default/files/resource/InfodevDocuments_937.pdf
Keegan, D. (1996). *Foundations of distance education*. London, England: Routledge.
Khasnabis, C., Motsch, K. H., Achu, K., Jubah, K. A., Brodtkorb, S., Chervin, P., et al. (Eds.) (2010). *Community-based rehabilitation: CBR guidelines*. Geneva, Switzerland: World Health Organization. Retrieved from https://www.ncbi.nlm.nih.gov/books/NBK310920/#:~:text=Non%2Dformal%20education%20is%20often,government%20schemes%20and%20community%20initiatives.
Kumar, N., & Kulkarni, A. (2013). *Investments by the commercial banks in training of rural communities and its impact: Scope of open and distance learning*. Pune, India: National Institute of Bank Management. Retrieved from http://oasis.col.org/bitstream/handle/11599/214/InvestmentsCommercialBanks_Rural.pdf?sequence=1&isAllowed=y
Latchem, C. (2012). *Quality assurance toolkit for open and distance non-formal education.* Vancouver, BC: Commonwealth of Learning. Retrieved from http://oasis.col.org/handle/11599/106
Latchem, C. (2014). Informal learning and non-formal education for development. *Journal of Learning for Development-JL4D*, *1*(1). Retrieved from https://files.eric.ed.gov/fulltext/EJ1106082.pdf
Latchem, C. (2018). *Open and distance non-formal education in developing countries*. Singapore, Singapore: Springer.
Misra, P. K. (2021). School culture as a means to engage students with SDGs. *Pedagogical Dialogue, 2*(36), 68–77.
NIOS. (2021). *Vocational education*. Retrieved from https://www.nios.ac.in/departmentsunits/vocational-education.aspx
Perraton, H. (2000). *Open and distance learning in the developing world*. New York, NY: Routledge.
Priyadarshini, A. (2006). *Basic education through open schooling*. Paper presented at the Pan-Commonwealth Forum on Open Learning (PCF4) held at Sunset Jamaica Grande Resort, Ocho Rios, Jamaica, 30 October–3 November, 2006. Retrieved from http://pcf4.dec.uwi.edu/viewpaper.php?id=274
Psacharopoulos, G., & Patrinos, H. A. (2018). Returns to investment in education: A decennial review of the global literature. *Education Economics, 26*(5), 445–458.
Redvers-Lee, P. (2002). Is non-formal education in Latin America good for the poor? *Focus Journal*. Retrieved from http://www.escotet.org/infocus/forum/2002/redvers.htm
Roser, M., & Ortiz-Ospina, E. (2018). *Literacy. Our world in data*. Retrieved from https://ourworldindata.org/literacy#:~:text=While%20only%2012%25%20of%20the,1960%20to%2086%25%20in%202015.
Siaciwena, R. (Ed.) (2000). *Case studies of non-formal education by distance and open learning*. Vancouver, BC: The Commonwealth of Learning. Retrieved from http://oasis.col.org/bitstream/handle/11599/38/Case_Studies_Non-Formal_Education.pdf?sequence=1&isAllowed=y
UIL. (2015). *India RVA case study in education: National Institute of Open Schooling (NIOS)*. Retrieved from https://uil.unesco.org/case-study/rva/india-rva-case-study-education-1
UIS. (2012). International standard classification of education ISCED 2011. Montreal, QC: UNESCO Institute for Statistics. Retrieved from http://uis.unesco.org/sites/default/files/documents/international-standard-classification-of-education-isced-2011-en.pdf
UNESCO. (2019). *4th global report on adult learning and education*. Hamburg, Germany: UNESCO Institute for Lifelong Learning. Retrieved from https://uil.unesco.org/system/files/grale_4_final.pdf
United Nations. (2021). *The 17 goals*. Retrieved from https://sdgs.un.org/goals

Vladimirovaa, K., & Le Blanc, D. (2015). *How well are the links between education and other sustainable development goals covered in UN flagship reports?: A contribution to the study of the science-policy interface on education in the UN system*. Retrieved from https://sustainabledevelopment.un.org/content/documents/2111education%20and%20sdgs.pdf

The Borderless Market for Open, Distance, and Digital Education 22

Jill Borgos, Kevin Kinser, and Lindsey Kline

Contents

Abstract

This chapter highlights the historical, current, and emerging trends on the borderless market for ODDE. The rate of growth of the global market for ODDE is unprecedented. Both the public and private sectors are capitalizing on the seemingly limitless opportunities to expand educational offerings and the innovative delivery of ODDE. In the twentieth century, there is evidence of distance education using media formats such as television and delivery of course material through correspondence programs. With the development of the computer and internet, the depth and scope of the ODDE market in the twenty-first century is changing every day. As venture capitalists seek new financially lucrative opportunities and alternative learning formats open doors for those who otherwise may not have had access to learning opportunities, questions and concerns remain. The digital divide (access and inequality), quality assurance, regulation, privacy, and security remain central to areas of concern in the ODDE

J. Borgos
State University of New York, Delhi College of Technology, Delhi, NY, USA
e-mail: borgosje@delhi.edu

K. Kinser (✉) · L. Kline
Pennsylvania State University, State College, PA, USA
e-mail: kpk9@psu.edu; ljk26@psu.edu

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_22

marketplace. Despite these concerns, across all educational sectors, the forging of partnerships within and across borders is enabling reskilling and upskilling of the labor force and advancing the conservation on how to improve transparency and protect vulnerable populations of current and future learners.

Keywords

Digital education · Online market · Technology · Private sector · Access and equity

Introduction

Since the beginning of the twenty-first century, the market for borderless open, distance, and digital education (ODDE) has been in a period of accelerated and on demand growth. Every sector of education has experienced some form of change related to the emergence of advances in technology. Learning that was once confined to location, time, and brick and mortar buildings is now conceptually unlimited in terms of location, time, and design. It is entirely possible – and even common – to create curricula and learning environments in one part of the world using one language and deliver them in another part of the world using another language. With a few clicks on a keypad, a student can be sitting at home in Germany and enroll in courses delivered in Australia. Forms of ODDE are found across the traditional primary, secondary, and tertiary education sectors, but educational ventures opened by the digital age now include tutorial programs in all subject areas, self-guided language programs, formal credentialing, massive open online courses (MOOCs), continuing education or professional development programs, video conferencing, and growing podcast lecture series, and a number of learning apps.

The estimated overall growth in the ODDE industry is projected to reach US$ 350 billion by 2025 (Globe NewsWire, 2020; Li & Lalani, 2020). In 2017, North America "held the largest market share of global online education" with the Asia-Pacific market poised to be the fastest growth market in the coming years (Globe Newswire, 2020, para. 7). In February 2020 at the beginning of the global coronavirus pandemic, a quarter of a billion full-time students in China moved to online instruction and to date it is the largest online movement in the history of education (Li & Lalani, 2020). In the USA, a large ODDE market that includes the company of Asia and Europe, it is estimated that 2.7 million K-12 students are engaged in some form of digital learning (Twinomugisha, 2019). In 2017, the whole US education market, including online and residential instruction, was valued at US$1.3 trillion with an expected growth to $2 trillion by 2026 (Schroder, 2019). Schroder (2019) notes that the education market has recently been drawing attention from venture capitalists with a number of edtech investors raising funds to create start-up educational programs that focus on moving a greater proportion of the students into online learning environments. Other closely connected entrepreneurial opportunities include supportive technologies such as course platforms, interactive video, security, data analytics, and instructional design, all of which add to the industry's market growth (Schroder, 2019). Globe Newswire (2020), a private research and market firm, points to the advances in cloud-based solutions, increasingly interactive software and investments in security development as drivers for developing huge volumes of content online, and the growing comfort by end users in embracing technology-based learning. Other changes in the education market further enhance industry growth, such as declining cost to use online programming, increased revenue from high tuition fees, reports of lack of competence in staff at brick and mortar schools, and government investment in education (Globe Newswire, 2020).

There are, however, some questions about what is drawing investors to the ODDE marketplace. Surprises in the market include Coursera's US$7 billion valuation in its initial public offering in April 2021. Coursera, a company co-founded almost 10 years ago by two Stanford University professors Andrew Ng and Daphne Koller, surprised many by selling much higher than expected shares at the initial public offering, catapulting the company to an industry leader in terms of highest valuation (McKenzie, 2021). It remains to be seen whether the high valuation of Coursera will pay off, but its recognizable brand, its business model of receiving direct payment from consumers, and having a history of partnering with government and businesses to deliver training and education to support the labor market seemed to be attractive features for those looking to invest in the online market (McKenzie, 2021).

The movement of educational programming to online platforms creates numerous opportunities, but it also calls into question the way in which online educational opportunity is translating with regards to equity and quality. A growing body of literature is illuminating the existing digital skills gap, access to the internet, special needs of at-risk learners, and the ability to transfer learning and skills globally as important issues for ODDE. Additionally, there are questions being raised regarding quality assurance, responsibility, and assessment of outcomes. Concerns raised by transnational educators in Australia reflect on setting effective price points, quality, training, academic supports, technical supports, and intellectual property (Croucher, Elliot, Locke, & Yencken, 2021, p.54). Both public and private entities have an interest in understanding how ODDE is being developed, delivered, and monitored to ensure that those seeking digital education are protected from bad actors and failed ventures.

Market Expansion and Attention to Access

The convergence of the technological age with the growing global concerns related to educational performance and student outcomes has undoubtedly contributed to the ongoing and rapid growth in the market for ODDE. With computers expanding opportunities even more than radio and television had, technologically assisted delivery of education assuaged the disquieted concerns about overcrowded schools, access to qualified teachers, provision of academic support or remedial course, accommodating students requiring alternative learning spaces, and the disparities created by geographic barriers in rural education settings (Cavanaugh, Barber, &

Clark, 2009; Khan, 2012). As new educational ventures, curriculum models, and delivery methods were being discovered and tested, scholarly attention expanded significantly.

Journals such as the Journal of Distance Education (now the International Journal of E-Learning and Distance Education), British Journal of Educational Technology, American Journal of Distance Education, Journal of Research on Technology in Education, Journal of Distance Learning (now the Journal of Open Flexible and Distance Learning), and the Journal of Online Learning and Research were some of the earlier peer-reviewed journals publishing the earliest scholars in the field on the study on digital and distance education (Arnesen et al., 2019). Scholarship populating the field included seminal works written by Micheal Barbour, Elizabeth Murphy, Charles Graham, Jared Borup, Cathay Cavanaugh, Maris Rodriquez-Manzanares, and Margaret Roblyer (Arnesen et al., 2019). By the mid-to-late twenty-first century, the *Handbook of Research on K-12 Online and Blended Learning* (Kennedy & Ferdig, 2014) and the *Handbook of Distance Education* (Moore, 2013) produced collective works on theoretical, methodological, technological, and pedagogical research with a primary focus on open, digital, and distance education.

It is not a coincidence that evidence of the interest and amount of scholarship increased in the first decade of the twenty-first century. The years of 2006 and 2007 have been noted as unprecedented years in terms of the largest market growth in the technology age to date (Friedman, 2016). It is during this time that the tech industry opened the world to digital platforms enabling connectivity and data storage at a faster and more expansive rate than had ever existed (Friedman, 2016). In September of 2006, the first six TED Talk series were released for free online and reached more than one million viewers, offering access to "some of world's greatest thinkers, leaders, and teachers'‘(TED, n.d.). TED Talks popularity in reaching the masses with informative educational content drove the development of the TED Translator program ensuring that its content could be viewed in a variety of languages which boosted viewership to 100 million views in just 2 short years (TED, n.d.). The year 2006 also marked the launching of Facebook and Google's purchase of YouTube. But these were only the beginning; Hadloop's cloud computing, Palantir Technologies' big data analytics, Intels' non-silicon computer processing material, VMare's translation software for Rosetta Stone, Twitter microblogging, and Qualcomm's 3G technology enabling the release of Amazon's Kindle were just a few of the technological advances in the market shaping ODDE (Friedman, 2016). In 2007, the Apple iPhone entered the market, creating a reported increase of mobile traffic on the AT&T network by over 100,000 percent between January 2007 and December 2014 (Friedman, 2016). With on demand access to information and educational content in the palm of the hand, many barriers previously restricting learning became irrelevant. However, despite the global expansion of the internet providing on demand educational opportunities to millions who otherwise would not have had access, challenges regarding access continued to exist. Some of the biggest challenges include basic access to electricity, access to computer hardware and hardware incompatibility, language barriers, and broadband internet access (Richardson, 2011). This is the digital divide that separates individuals and communities with the ready capacity to access the global information networks, from those who lack the devices and adequate internet services on which global knowledge systems increasingly rely.

Access and Inequality Related to Digital Access

Over 800 million students around the world do not have a household computer (UNESCO, 2020), and although global internet access has nearly doubled in the past decade, only 47% of people living in developing economies and 19% of least developed countries (LDCs) used the internet in 2019 (Garrity, 2020). There is a similar disparity in internet usage by gender. Fifty-eight percent of males and 48.4% of females use the internet globally, but those percentages decrease to 52.8% of males and 40.7% of females in developing countries and 24.4% of males and 13.9% of females in LDCs (Garrity, 2020).

In addition to infrastructure and availability, digital literacy remains a significant barrier to internet use for people residing in Africa, East and South Asia, and Latin America (Garrity, 2020). The COVID-19 pandemic has also highlighted the limited pedagogical support available for teachers who are interested in or required to move their educational materials online (UNESCO, 2020) and for students in already under-resourced circumstances (Czerniewicz, 2018; Devkota, 2021).

Disparities also exist between the markets for the providers and consumers of ODDE. For example, of the 52 primary providers of MOOCs, 48% are based in North America and an additional 25% are based in Europe. Despite the initial promise of MOOCs to increase access to education, a 2019 study of participants in MOOCs offered by MIT and Harvard found that the majority of enrollments and certifications were from countries classified as "very high" on the UN Human Development Index (Reich & Ruiperez-Valiente, 2019). Although course content from the Global South exists, it can be difficult to find among the large quantity of Global North material that dominates these platforms (Czerniewicz, 2018). Similarly, the majority of providers of virtual K-12 education have been located in the Global North, particularly North America (77%) and Europe (11%), resulting in the majority of highly cited research related to virtual K-12 educational outcomes being focused on these regions as well (Arnesen et al., 2019). In countries with developing economies, ODDE may exacerbate existing educational inequalities that exist between students who live in rural and urban areas. In Nepal and Ethiopia, reliable internet access is concentrated in urban centers, placing learners in rural communities at a greater disadvantage (Belay, 2020; Devkota, 2021). ODDE facilitates the development of innovative educational technologies, but not all students benefit from these solutions equally (Belay, 2020). Additionally, the limited availability of languages in which ODDE content is offered reduces access for many learners. Upwards of 80% of ODDE online content is developed in one of ten languages, though in order to reach the equivalent percentage of the world's population, content would need to be delivered in over 90 languages (Czerniewicz, 2018).

As technology continues to facilitate growth in ODDE markets, it is critical to consider the learners that are being excluded from participation due to limits in internet access, and infrastructure, and the availability of languages that programs are being offered in. It is equally important to recognize that there may be an inherent tension between the market orientation of ODDE and equality of access to the educational opportunities it provides (Czerniewicz, 2018). Although ODDE has the technological potential to expand educational access, market forces and profit-seeking service providers may ultimately reinforce existing access inequalities, thus prioritizing the expansion of established global consumer markets, rather than creating new ones.

Reskilling and Upskilling the Workforce in a Growing Technology Economy

Despite the justifiable concerns, there are a number of innovative uses of ODDE aimed to advance the overall education level and the development of a nation's workforce. The ODDE market is both a resource for nations to build and sustain a knowledge economy and an avenue to meet what European Centre for the Development of Vocational Training (Cedefop)'s Executive Director, Jürgen Siebel, refers to as the crucial need for "building and maintaining employability for learners and workers and competitiveness for businesses" (Cedefop, 2021a, para. 4). ODDE resources can assist in developing new businesses, training and retraining the workforce, and to augment basic education at the compulsory level to support vocational education training through adult lifelong learning needs.

It has become increasingly evident that ODDE is a valuable asset to gain, maintain, and ensure employability and to meet national economic development goals. The ODDE market is not only providing educational opportunities to the individual user but also creating educational capacity for government strategic planning and training for corporations. National strategies targeted at reducing unemployment rates and domestic labor shortages, adjusting for the disappearance of low-skilled jobs, preparing an influx of immigrants to transition to the workforce, and meeting the growing demand for skilled labor in healthcare and the tech industries have sought to include the use of ODDE to address existing gaps in the current education level and/or skills of its citizens (Cedefop, 2021c; Cox & Prestridge, 2020; López Soblechero, Gonzalez Gaya, & Hernandez Ramirez, 2014; Stevenson, 2014). Long-standing issues like automation, sustainable use of resources, and the aging population, combine with emergent crises like the global pandemic, to influence and refocus the ways in which education, training, and career pathways are supported (Cedefop, 2021c). The European green deal (EGD) alone is estimated to contribute to an additional employment decline of 10% through 2030, particularly in jobs associated with coal and fuels (Cedefop, 2021c). Companies competing in the global market where the skill and training needs are rapidly changing and employee mobility is required are using differing distance education modalities and partnerships to accommodate the workforce. The degree of adaptation is driven by both the market and for the market with attention to both reskilling and upskilling needs. Adult learners as well as those within the compulsory schooling years are benefiting from ODDE opportunities, often from within traditional educational sectors.

Australia's labor market is largely dependent on the vocational education training (VET) sector, with more than half of all occupation qualifications requiring VET, making it the country's largest education sector (Atkinson & Stanwick, 2016; Cox & Prestridge, 2020). The Australian VET sector is critical to the skilling and upskilling of its labor force by providing opportunities for both secondary and lifelong learning and shifting to online education offerings for some of the VET (Cox & Prestridge, 2020; Reeson et al., 2016). Reeson et al. reported current VET units being taught online in 2016 was around 14–20% and growing. International student enrollment is a significant driver in the need for online delivery of the Australian VET sector (Gao, 2020). Australia's leadership in the delivery of VET and its proximity to Asia has resulted in a number of VET partnerships between China and Australia designed to meet the needs of China's large vocational education market (Lawson, 2017). These cross border Sino-Australian educational developments suggest that ODDE in the VET sector is not only addressing national need but also needs across borders, particularly with nations in geographic proximity to each other. Countries such as Australia are responsive to the skill development needs outside of their country, which can also extend into the postsecondary sector. Memorandum of agreements between Australia and China have enabled the development of programs with private and public providers. Lawson (2017) notes that the number of students from China studying in Australia for VET is dwarfed by the number of students staying in China studying Australian VET qualifications; "for every Chinese student who came to Australia to study VET with a public provider, twenty Chinese students undertook VET training in China with Australian public providers" (p. 2). The partnership between China Electricity Council and Chisholm Institute of TAFE (Australian Technical and Further Education) is one such example of a Sino-foreign VET arrangement where Chisholm staff travel to China to provide training to students who will seek jobs in the electricity and supply industry (Lawson, 2017, p.7).

Ireland's recent 5-year reform of its VET sector, as part of its Further Education and Training Strategy 2020–2024 road map, is targeted to better meet and provide educational needs for its citizens. It is an example of connecting learners with more flexible learning modalities. Ireland's ecollege, an online learning platform, now delivers courses to students who are in need of specific skills and training or those returning to the job market. Ireland's national strategy to acknowledge differing learners' needs combined with offering flexible learning modalities enables the use of innovative digital technologies to support learning for "people with disabilities, new migrants, the long-term unemployed, ex-offenders, and women" (Cedefop, 2021b, p.43). Similarly, Spain has been addressing the need for more flexible delivery modalities for VET as part of its economic recovery plans, as its citizens, with a high (41%) unemployment rate for workers with minimal qualifications, are contending with disappearing jobs across the European Union related to technological advances and increasing automation (López Soblechero et al., 2014). López

Soblechero et al. (2014) note that online distance VET is needed for "its flexibility and ability to reach the largest number of students at a lower cost" (p. 1). This is significant in a country with 47% of the working age population having less than a secondary education level education, and an economy increasingly seeking more knowledge-based workers.

Reskilling the workforce through ODDE is evident not only in national strategic planning but also in the private corporate sector with partnerships being developed between companies and higher education entities to deliver new education and training skills to the currently employed workforce. Promoting this lifelong learning mindset is a central concern for many corporations as reskilling and upskilling employees will enable companies to adapt to the ever-increasing idea-to-product cycle time (Friedman, 2016). In a rapidly growing technological global economy, corporations need to adapt and provide flexible, fast education and training for its employees to remain relevant. AT&T, the world's largest telecommunications company with approximately 300,000 employees, is a leader in corporate investment and strategy to upskill and reskill its employees (Friedman, 2016). By proactively assessing the skills its workforce would need to help meet their future corporate goals, AT&T, the "Big whale in the pathway of education to employment" (Friedman, 2016, p. 233), was able to seek out opportunities to partner with universities like the Georgia Institute of Technology, University of Notre Dame, University of Oklahoma, and online providers such as Udacity and Coursera to grant their employees access to online degrees and certificates targeted at the specific needs of AT&T, such as artificial intelligence, virtual reality, and predictive analytics.

Quality Oversight and Regulatory

As the market for ODDE grows, many have noted advantages to the alternative learning format. ODDE opens doors of opportunity to many students who would not otherwise have access, those who are not successful in a traditional face-to-face classroom, or for those who need the flexibility in terms of time and location constraints (Darby & Lang, 2019; Khan, 2012; Ortagus, 2020). For these reasons, in the USA, online education has become the main source of enrollment growth in higher education, seeing a jump in enrollment from 5.9% in 2000 to 42.9% in 2016 (Ortagus, 2020). The demand from students seeking online education is in part generating the supply of online education programming. However, as in all well-designed growth strategy scenarios, externalities exist and counterweights of checks and balances are needed to assure quality (Kinser, 2014). The rapid growth of ODDE is raising questions about the monitoring and evaluating of student outcomes, the quality of the online courses, and privacy concerns: particularly as education management organizations (EMOs) and online management programs (OPMs) increasingly promote and recruit students to ODDE formats. From a policy perspective, protecting vulnerable student groups is a key consideration in the development of online programs, courses, and the overall cost benefit of online education with attention to including quality oversight (Ortagus, 2020).

Kinser (2014) points out that the modern iteration of quality assurance for traditional higher education programs "emerged during a time of increased markets and competition" (p. 63). Quality assurance measures thus are one way to provide consumer protection, avail students of choices in the marketplace, act as a source of information for stakeholders, and signal legitimacy of an institution. The growth of global, cross-border, and online education has challenged existing quality assurance principles rooted in local values, questioned who is responsible for assuring quality and how it is measured in overlapping cultural contexts. Even though markets and competition have been such a significant factor in the expansion of quality assurance, students as customers have not historically been the primary constituents of these efforts (Kinser, 2014). There is some evidence, however, that this may be changing.

In 2016, a class-action lawsuit related to the quality of courses delivered online was filed by students at George Washington University (GWU), prompting an overview of the online and hybrid delivery of courses at the institution (McKenzie, 2017). Findings from the report indicated that in some instances the same level of quality oversight was not given to the development and delivery of online courses at GWU as compared to the face-to-face equivalent courses and generated a GWU review of best practices for delivering online education (McKenzie, 2017). This case highlight that as ODDE has grown, the need for adequate resources specific to the delivery of ODDE to support educational institutions and protect students entering the ODDE market has also grown.

The development of the Online Learning Consortium's (OLC) Scorecard is an example of an organization available for helping institutions evaluate and deliver online programs and courses. The Scorecard developed in the USA in 2011 is used by over 400 institutions and provides guidance on how to measure effectiveness of online programs with the use of handbooks, rubrics, and interactive dashboards (Online Learning Consortium [OLC], 2021). Colleges and universities can use the Scorecard for an "in depth review of instructional practices as compared to quality standards'‘(OLC, 2021). The Online Learning Consortium, in partnership with The State University of New York, the largest comprehensive university system in the USA, also offers a Course Design Review Scorecard, known as OSCQR. The course level design level scorecard is available for free, and consultants are available to assist with design, layout, technology, assessments, and interactive activities (OLC, 2021).

Quality assurance agencies monitoring and providing support services for the development of online learning are evident on a global scale. The International Network for Quality Assurance Agencies in Higher Education (INQAAHE) supports 250 quality assurance agencies in countries from Albania to Vietnam (International Network for Quality Assurance Agencies in Higher Education [INQAAHE], 2021).

Emergent Issues and Future Research

The growing ODDE market opens many doors for those who would not otherwise have access to educational content and resources. Moreover, technology-enhanced education expands the capacity of nonresidential learning models to effectively serve students. As ODDE is increasingly established as a core component of the provision of education globally, there are new issues, and new aspects of old issues, that need further attention and research. These include the privatization of the ODDE, especially through third-party management organizations; issues of security and privacy; and the changing expectations for educational flexibility and equity demanded in response to the global pandemic.

Privatization ODDE has developed in large part through extensive public-private partnerships. Much of the instructional design software, course management tools, and communication technologies in use today are the commercial products of private companies (e.g., Hill, 2019). The homegrown systems that may have populated early efforts have largely been supplanted such that there are few areas left where the private sector has not found its niche. These partnerships were initially based on tools needed to deliver programs at a distance or scale content on widely accessible programs. More recently, however, management organizations have taken responsibility for the actual operation of these programs. For example, Miron et al. (2021) document the profiles of the number of public schools in the USA that are now privately operated and increasingly owned by EMOs. These have predominantly emerged from market-based school reform initiatives and "a much-needed entrepreneur spirit and competitive ethic to public education" where competition is theorized as the motivation to drive improvement (Miron et al., 2021, p. 9). The Century Foundation has focused on the under-the-radar expansions of Online Program Management (OPM) companies in the USA (Mattes, 2017). The recent acquisition of edX by the OPM 2 U (Shaw, 2021) is an example of even when technology is developed in house (in EdX by Harvard and MIT), the trend suggests it will be commercialized and a for-profit entity (in this case 2 U) can ultimately assume control.

While the pattern of management organizations like the Knowledge is Power Program (KIPP) or 2 U appear to be filling a void in the education market for some, Miron et al. (2021) and Carey (2019) highlight that challenges exist with the vast organization of privatizing public education, particularly with analysis of the organizations, as multiple corporate parties are involved and many of the owner's or corporate headquarters are located at a distance or are "geographically distributed" across regions making monitoring and evaluating these entities difficult. The Century Foundation's multiple reports show that that OPMs have evaded oversight because of their status as a third-party contractor (Dudley, Hall, Acosta, & Laitinen, 2021). Market-based school reform initiatives are not new but with the increasing prevalence and "players" in the market, consideration of benefits, outcomes, student involvement, and student demographics are a few of the areas where grounded empirical research on the market-based approach are needed (Gulosino & Miron, 2017). Additionally, determining how quality is measured and who is responsible for monitoring quality in the growing private market should be further evaluated.

Security and Privacy The twin issues of security and privacy in online education, particularly for children, has become increasingly important. Remote monitoring of online activity – whether to measure time on task, establish metrics for learning modules, or guard against cheating – allows authorities to observe not only student behavior but also the personal environment where learning is taking place. Data on students and their families can be gathered by companies providing software and access to school materials and then used to enhance marketing or sold to third parties (Lieberman, 2020). Efforts to use technology to monitor students for cheating have been shown on the one hand to be an effective tool (Dendir & Maxwell, 2020), and on the other hand still result in false accusations that are difficult for the innocent to defend against (Singer & Krolik, 2021). As a regulatory issue, data privacy has received much attention in some parts of the world (e.g., the General Data Protection Regulation in the European Union), but global standards have not been established. Future research should examine how the security and privacy of ODDE students and teachers can be protected and assured.

Changing Expectations The global impact of the coronavirus pandemic may not be fully realized for years to come, but the unprecedented demands in the ODDE market may very well point to the future areas of growth. As a result of the lockdowns and school closures, UNESCO's global monitoring reports that over 210 million learners have been affected across all education levels: preprimary, primary, lower secondary, upper secondary, and tertiary (UNESCO, n.d.). Supporting "learning recovery" during COVID recovery has become a primary goal for UNESCO's Global Education Coalition (GEC) in action (UNESCO, 2021). GEC notes that there is an "urgency to invest" and "create innovative partnerships" to further prevent losses in learning, increasing drop-out rates, potential downstream economic, labor market, and social impacts (UNESCO, 2021, p. 8). One key objective proposed by the GEC is to scale up distance learning and connect every learner to the internet and in this way pursue attainment of the fourth Sustainable Development Goal (SDG), ensuring "inclusive and equitable education and promote lifelong learning opportunities for all" (p. 40). The pandemic has in many ways reinforced much of the already pre-pandemic national strategic initiatives focused on education as a path towards economic recovery and aligning workforce skill acquisition with the changing skill needs in the labor market. In other ways, the coronavirus pandemic has been a reminder of the value of partnerships and collaboration to bring about change to meet the needs of the globally diverse student populations. In this pursuit, future research should explore how the convergence of investment and innovative partnerships serves to produce ODDE models best designed at providing equity.

Conclusion

Removing the classic constraints of geography and time through ODDE opens up new possibilities for the variety of students seeking educational opportunity. There is growing evidence of developing collaborative partnerships both within geographic regions and also across borders in all educational sectors. These partnerships are growing out of a demand for upskilling, the need for reeducation of the labor force, a recognition of the lack of local resources, and the development of national strategic plans focused on diversifying the workforce, reducing unemployment, and competing in the global economy.

As the demand for ODDE continues and partnerships grow, so does the number of stakeholders. The sheer magnitude of the financial opportunity inherent in the ODDE market has prompted venture capitalists to increasingly support entrepreneurial endeavors in the education sector. Determining the outcomes, quality, and overall benefit to the students and society at large will continue to be a primary focus of study as the ODDE market evolves and continues to grow.

Developing parallel to the growth of ODDE markets is a growing need to understand the market trends and how organizations such as EMOs and OPMs are using these trends to further develop programs and unbundle services. Data analytics companies like HTF Market Intelligence and Market Data Forecast aggregate and analyze data on various market sectors of ODDE and then charge fees for other groups or companies to access the information. As countries and educational institutions seek to maintain their market competitiveness, the organizations with the greatest financial resources will predictably have greater access to and thus benefit the most from these data analytics. This reality draws further attention to issues of equity and access. Though education management organizations (EMO) are growing due to increased market demands, it remains to be seen whether or not these demands reflect the needs of all students and whether or not certain groups of students will continue to be excluded from the market.

Overall, the immense ODDE opportunities available to learners with access to digital resources is unprecedented, regardless of whether it is free or fee for service, sought for personal lifelong growth or required for the demands of the labor market. And while new players may enter the open and borderless education market without consideration for the importance of student outcomes and protecting at-risk populations, the tremendous benefits of envisioning and then offering new mediums for the delivery of education challenges the traditional ways in which education is delivered and provides a ripe environment for expanding educational opportunity. In any market in which independent producers and consumers exist, there will be trade-offs. Given the relative infancy of ODDE, identifying and labelling these trade-offs in ODDE remains challenging. If an understood goal of ODDE is to improve access to education for all persons, then a deliberate push for transparency through the elimination of information asymmetries should be a clear priority. Greater transparency, particularly in the world of ODDE, should lead to greater benefits to the individual student on both a personal and professional level, and in turn should also lead to greater benefits to society at large. It is not clear, however, whether the current regulatory structure is sufficient to compel such transparency. In the market for borderless ODDE, consideration for positive analysis (behavior of individuals or organizations with response to change) and normative analysis (value judgments) will need to be ongoing and responsive to the changing market with regard to the what, how, and whom of how students are choosing among their options in ODDE, and what type of content the producers of education choose to offer. This will be especially true with a rapidly changing educational environment in which ODDE continues to operate.

References

Arnesen, K. T., Hveem, J., Short, C. R., West, R. E., & Barbour, M. K. (2019). K-12 online learning journal articles: Trends from two decades of scholarship. *Distance Education, 40*(1), 32–53. https://doi.org/10.1080/01587919.2018.1553566.

Atkinson, G., & Stanwick, J. (2016). *Trends in VET: Policy and participation*. Adelaide, Australia: National Centre for Vocational Education Research. Retrieved from https://www.ncver.edu.au/__data/assets/pdf_file/0017/60722/Trends-in-VET.pdf.

Belay, D. G. (2020). COVID-19, distance learning and educational inequality in rural Ethiopia. *Pedagogical Research, 5*(4), 1–11. https://doi.org/10.29333/pr/9133.

Carey, K. (2019). *April*. Huffpost: The creeping capitalist takeover of higher education. Retrieved from: https://www.huffpost.com/highline/article/capitalist-takeover-college/.

Cavanaugh, C. S., Barbour, M. K., & Clark, T. (2009). Research and practice in K-12 online learning: A review of open access literature. *International Review of Research in Open and Distance Learning, 10*(1), 1–22. https://doi.org/10.19173/irrodl.v10i1.607.

Cedefop. (2021a). *Next generation skills intelligence to drive recovery in Europe*. Retrieved from https://www.cedefop.europa.eu/en/news/next-generation-skills-intelligence-drive-recovery-europe

Cedefop. (2021b). *Spotlight on VET-2020 compilation: Vocational education and training systems in Europe*. Luxemburg: Publications Office. Retrieved from https://www.cedefop.europa.eu/en/publications-and-resources/publications/4189.

Cedefop. (2021c). *Digital, greener and more resilient: Insights from Cedefop's European skills forecast*. Luxemburg: Publications Office. Retrieved from https://www.cedefop.europa.eu/en/publications-and-resources/publications/4201.

Cox, P., & Prestridge, S. (2020). Understanding fully online teaching in vocational education. *Research and Practice in Technology Enhanced Learning, 15*(1), 1–22. https://doi.org/10.1186/s41039-020-00138-4.

Croucher, G., Elliot, K., Locke, W., & Yencken, E. (2021). *Australia's higher education delivery offshore and online-trends, barriers, and opportunities*. Retrieved from Melbourne Centre for the Study of Higher Education: https://melbournecshe.unimelb.edu.au/__data/assets/pdf_file/0009/3568275/Australias-higher-education-deliveryoffshore-and-online.pdf

Czerniewicz, L. (2018). Inequality as higher education goes online. In N. B. Dohn, S. Cranmer, J. Sime, M. de Laat, & T. Ryberg (Eds.), *Networked learning: Reflections and challenges* (pp. 95–106). New York, NY: Springer.

Darby, F., & Lang, J. M. (2019). *Small teaching online: Applying learning science in online classes*. San Francisco, CA: Jossey-Bass.

Dendir, S., & Maxwell, R. S. (2020). Cheating in online courses: Evidence from online proctoring. *Computers in Human Behavior Reports, 2*. https://doi.org/10.1016/j.chbr.2020.100033.

Devkota, K. R. (2021). Inequalities reinforced through online and distance education in the age of COVID-19: The case of higher education in Nepal. *International Review of Education, 67*, 145–165. https://doi.org/10.1007/s11159-021-09886-x.

Dudley, T., Hall, S., Acosta, A., & Laitinen, A. (2021). Outsourcing online higher ed: A guide for accreditors. Retrieved from The Century Foundation: https://tcf.org/content/report/outsourcingonline-higher-ed-guide-accreditors/

Friedman, T. (2016). *Thank you for being late. An optimist's guide to thriving in the age of accelerations*. New York, NY: Farrar, Straus and Giroux.

Gao, Y. (2020). International collaborations in the VET sector: Motivations and challenges. *Journal of Studies in International Education, 24*(2), 232–248. https://doi.org/10.1177/1028315319835531.

Garrity, J. (2020). The state of broadband 2020: Tackling digital inequalities. A decade for action. *International Telecommunication Union*. Retrieved from https://www.itu.int/dms_pub/itu-s/opb/pol/S-POL-BROADBAND.21-2020-PDF-E.pdf

Globe Newswire. (2020, April 16). Global online education market worth $319+ billion by 2025 - North America anticipated to provide the highest revenue generating opportunities. *Research* *and Markets*. Retrieved from https://www.globenewswire.com/news-release/2020/04/16/2017102/0/en/Global-Online-Education-Market-Worth-319-Billion-by-2025-North-America-Anticipated-to-Provide-the-Highest-Revenue-Generating-Opportunities.html

Gulosino, C., & Miron, G. (2017). Growth and performance of fully online and blended K-12 public schools. *Education Policy Analysis Archives, 25*(124), 1–38. https://doi.org/10.14507/epaa.25.2859.

Hill, P. (2019, February). State of higher ed LMS market for US and Canada: 2018 yea-end edition. *eLiterate*. Retrieved from https://eliterate.us/state-higher-ed-lms-market-us-canada-end-2018/

International Network for Quality Assurance Agencies in Higher Education. (2021). *About Us*. Retrieved from https://inqaahe.org/presentation

Kennedy, K., & Ferdig, R. E. (2014). *Handbook of K-12 online and blended learning*. Pittsburgh, PA: Carnegie Mellon University: ETC Press.

Khan, S. (2012). *The one world schoolhouse education reimagined*. New York, NY: Hachette Book Group.

Kinser, K. (2014). Questioning quality assurance. *New Directions for Higher Education, 168*, 55–67. https://doi.org/10.1002/he.20113.

Lawson, C. (2017). *Sino-Australian vocational education and training cooperation. Helping provide skills and training for China's growing economy*. Beijing: Australian Embassy.

Li, C., & Lalani, F. (2020, April 29). The COVID pandemic has changed education forever. This is how. *World Economic Forum*. Retrieved from https://www.weforum.org/agenda/2020/04/coronavirus-education-global-covid19-online-digitallearning/

Lieberman, M. (2020, March). Massive shift to remote learning prompts big data privacy concerns. *Education Week*. Retrieved from https://www.edweek.org/technology/massive-shiftto-remote-learning-prompts-big-data-privacy-concerns/2020/03

López Soblechero, M. V., Gonzalez Gaya, C. G., & Hernandez Ramirez, J. J. (2014). A comparative study of classroom and online distance modes of official vocational education and training. *PLoS One, 9*(5), e96052–e96052. https://doi.org/10.1371/journal.pone.0096052.

Mattes, M. (2017). *The private side of public higher education*. Retrieved from The Century Foundation: https://tcf.org/content/report/private-side-public-higher-education/

McKenzie, L. (2017, October 18). Questions on quality of online learning. *Inside Higher Ed*. Retrieved from https://www.insidehighered.com

McKenzie, L. (2021, April 9). Coursera IPO 'seized on the right moment'. *Inside Higher Ed*. Retrieved from https://www.insidehighered.com

Miron, G., Gulosino, C., Shank, C., Elgeberi, N., Davidson, C., Hernandez De Alvarez, F., Jurdzy, B., Larsen, J., Pham, D., Ruder, K., Urdapilleta, L., Urschel, J. (2021). *Profiles of proprofit and nonprofit education management organizations*: Fifteenth edition. Retrieved from National Education Policy Center website.

Moore, M. G. (Ed.). (2013). *Handbook of distance education*. Oxfordshire, England: Routledge.

Online Learning Consortium. (2021). *OLC quality scorecard suite*. Online Learning Consortium. Retrieved from: https://onlinelearningconsortium.org/consult/olc-quality-scorecard-suite/

Ortagus, J. (2020). *What we know about the cost and quality of online education*. Retrieved from Thirdway AcadmeMIX UpShot: https://www.thirdway.org/report/what-we-know-about-the-cost-and-quality-of-online-education

Reeson, A., Mason, C., Sanderson, T., Bratanova, A., & Hajkowicz, S. (2016). *The VET era: Equipping Australia's workforce for the future digital economy*. Retrieved from http://hdl.voced.edu.au/10707/406916

Reich, J., & Ruiperez-Valiente, J. A. (2019). The MOOC pivot. *Science, 363*(6423), 130–131. https://doi.org/10.1126/science.aav7958.

Richardson, J. W. (2011). Challenges of adopting the use of technology in less developed countries: The case of Cambodia. *Comparative Education Review, 55*(1), 8–29. https://doi.org/10.1086/656430.

Schroder, S. (2019, August 14). Disrupting education. The rise of K-12 online and the entrepreneurial opportunities. *Forbes Magazine*. Retrieved from https://www.forbes.com

Shaw, J. (2021, June). Harvard and MIT to sell edX for $800 million. *Harvard Magazine*. Retrieved from: https://www.harvardmagazine.com/2021/06/sale-of-edx

Singer, N. & Krolik, A. (2021, June 10). *Online cheating charges upend Dartmouth medical school*. The New York Times. Retrieved from http://www.nytimes.com
Stevenson, C. (2014). Developing an online collaborative approach to global education in vocational contexts. *Journal of Perspectives in Applied Academic Practice, 2*(1). https://doi.org/10.14297/jpaap.v2i1.99.
TED. (n.d.). History of TED. *TED ideas worth spreading*. Retrieved from https://www.ted.com/about/our-organization/history-of-ted
Twinomugisha, A. (2019, October 4). *The promise and the challenge of virtual schools [Blog post]*. Retrieved from https://blogs.worldbank.org/edutech/promise-and-challenges-virtualschools
UNESCO. (2020). *Startling digital divides in distance learning emerge*. Retrieved from https://en.unesco.org/news/startling-digital-divides-distance-learning-emerge
UNESCO. (2021). Supporting learning recovery one year into COVID-19. *The global education coalition in action*. Retrieved from https://unesdoc.unesco.org/ark:/48223/pf0000376061

Virtual Internationalization as a Concept for Campus-Based and Online and Distance Higher Education

23

Elisa Bruhn-Zass

Contents

Abstract

The concept of Virtual Internationalization systematizes the many possible uses of digital technology in the internationalization of higher education. It is rooted in a comprehensive understanding of internationalization that encompasses the entire institution. Virtual Internationalization includes, but is not limited to, curricular concepts such as virtual mobility, virtual exchange, and virtual study

This article reflects the personal opinion of the author.

E. Bruhn-Zass (✉)
GIZ, Bonn, Germany

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_23

abroad. Beyond the curriculum, it also involves the internationalization of management and administration, academic and teaching staff, and the role of digital technology in physical student mobility, international partnerships, collaboration, and transnational education. Moreover, Virtual Internationalization systematically integrates online and distance education. Study programs that are offered fully online or at a distance are thus brought out of the blind spot of internationalization.

Keywords

Virtual internationalization · Comprehensive internationalization · Internationalization of higher education · Online and distance education · Hybrid internationalization · Virtual mobility · Virtual exchange

Introduction

Many higher education institutions around the world have internationalization high on their strategic agenda. A key objective of internationalization is the provision of international experiences to students – traditionally, through opportunities to study abroad for a period of time. However, physical mobility remains a privilege for a minority. Despite low-threshold and short-term programs (Erasmus+, summer schools, etc.), most students will not have experienced international learning mobility by the time they graduate. This is certainly true for open and distance universities (with their generally nontraditional clientele), but also for campus-based institutions. In the European Union, for example, the proportion of students with study-related international experiences in 2019 was estimated at between 13.5% (European Commission, 2020a) and 20% (Hauschildt, Gwosć, Schirmer, & Cras, 2020). Digitalization has also changed international activities in higher education and promoted "distant" forms of internationalization. Subsequently, virtual collaboration practices from online and distance education (ODE) have been introduced in campus-based international education. In addition, Open Educational Resources (OER) and Massive Open Online Courses (MOOCs) have opened up transnational education: Teaching and learning materials and entire courses have become available to anyone, anywhere at a global scale.

The concept of Virtual Internationalization (VI) has been developed to systematize the impact of digitalization and information and communications technology (ICT) on higher education internationalization (Bruhn, 2020). It is embedded in the internationalization discourse, which has become more complex in recent years. Initially focusing on physical student mobility and international partnerships, new aspects have emerged. The *Internationalization at Home* (IaH) movement (Crowther et al., 2000) in particular has left its mark, and today internationalization is often seen as a transversal concept that encompasses the different organizational levels of higher education. In the model of Comprehensive Internationalization (Helms & Brajkovic, 2017; Hudzik, 2011), this transversality is articulated particularly clearly.

Digitalization has had a massive impact on higher education, including in the area of internationalization. The advent of the Covid-19 pandemic has been a catalyst in reinforcing respective developments, with virtual forms of mobility having gone from niche to mainstream (Hudzik, 2020; IAU, 2020). The shift to (emergency) remote teaching and massive constraints on physical mobility have promoted virtual, hybrid, and blended study abroad. Such arrangements imply that students participate in classes from their host institution remotely – either as a complete substitute for physical mobility (= virtual), as an optional alternative to on-campus classes (= hybrid), or in combination with physical participation in classes (= blended) (Gaebel, Zhang, Stoeber, & Morrisroe, 2021). The crisis also boosted other distant forms of internationalization, including collaborative online international learning (COIL) or virtual exchange, in which classes from different countries collaborate remotely on a given project or topic (IAU, 2020; O'Dowd, 2021). Online conferences and virtual staff exchanges were offered, and international partnerships were used to pool resources for remote teaching and learning (European Commission, 2020b; IAU, 2020); ODE moved to the center stage of internationalization (de Wit, 2020; Kanwar & Carr, 2020).

Traditionally, higher education delivered entirely online or at a distance has not played a major role in the internationalization discourse. The only aspect that has been commonly studied is virtual transnational education (TNE) (François, Avoseh, & Griswold, 2016; Knight, 2016). The classification of Comprehensive Internationalization (Helms & Brajkovic, 2017) places ODE in the category of *collaboration and partnerships* – as part of "other offshore programs." While it is true that online TNE can be offered in collaboration with local partners ("locally supported distance education," Knight, 2016, p. 39), it can also be delivered independently of foreign partner institutions ("foreign sending provider operates without any formalized academic collaboration with local [institutions]," Knight, 2016, p. 39). A classification in the category *collaboration and partnerships* would therefore hide an important aspect of international delivery of ODE. Moreover, ODE is often not directed at an international clientele, but at a domestic one. Given the fact that this mode of study is becoming increasingly important around the world (e.g., Qayyum & Zawacki-Richter, 2018), IaH elements in ODE expand access to international experiences to a growing clientele. As a result, ODE degrees with a domestic focus may find international students enrolling in them.

Due to the complexity described above, in the VI concept, ODE is systematically included in the conceptualization of internationalization of higher education for the first time. The concept allows scholars and practitioners to systematize the entire spectrum of applications of ICT in higher education international contexts. It also offers possibilities for connection to open education (e.g., via transnational OER and MOOCs) and to other educational subsectors (e.g., secondary schools, technical and vocational education).

This chapter exploring VI in ODE begins by providing a definition, followed by a brief overview of the literature. Next, the two dimensions and typical means and measures are explained before the six parallel pillars of VI are presented in detail. This is followed by a discussion of the implications of the concept for the broader internationalization and ODE discourses. The relevance of the concept for research, as well as for campus-based and ODE institutions, is then discussed. Opportunities and limitations of the concept are then summarized.

Definition

Based on the longstanding definition of internationalization by Jane Knight (2003), VI is defined as "*the process of introducing an international, intercultural, or global dimension into the delivery, purpose or functions of higher education with the help of information and communications technology (ICT)*" (Bruhn, 2017, p. 2). This definition captures the connection between ICT and internationalization in a comprehensive sense, by including ICT-supported measures and processes at different organizational levels. Filling this definition with life, the VI concept is based on the model of Comprehensive Internationalization (Helms & Brajkovic, 2017) and integrates all six categories (see Fig. 1). Aside from *physical student mobility*, it also includes *collaboration and partnerships*, as well as IaH measures in the (home) *curriculum, co-curriculum, and learning outcomes*. In addition, *administrative leadership, structure, and staffing* form part of the comprehensive approach towards internationalization, and so do *faculty policies and practices*. *Strategies and articulated institutional commitment* is conceptualized as transversal to all VI. Beyond this, ODE is added as a seventh category. This addition is made in order to facilitate the identification of the different affordances of distance-only vis-à-vis primarily face-to-face education. VI thus encompasses the two traditional categories of *Internationalization Abroad* (mobility of people, programs, providers, projects/services, and policies) and IaH (curriculum, extracurricular activities, research, etc.) (Knight, 2012).

Literature on the Topic

VI, as a comprehensive concept, was first mentioned in Bruhn (2017) and conceptualized in more detail in Bruhn (2020). Prior to that, terms including "Virtual Internationalization," "digital internationalization," "e-internationalization," and

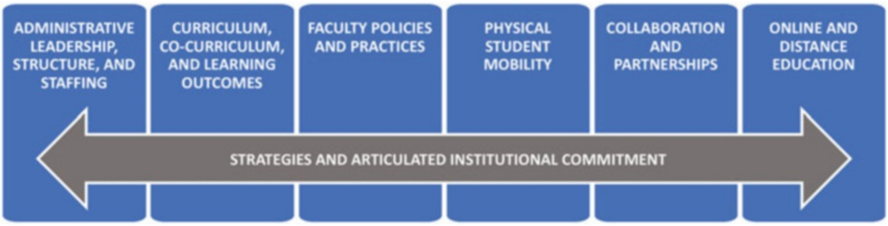


Fig. 1 The six parallel pillars and one transversal category of Virtual Internationalization. Note: From "Virtual Internationalization to Support Comprehensive Internationalization in Higher Education" by E. Bruhn-Zass, 2021, Journal of Studies in International Education. (Reprinted with permission)

"online internationalization" had been used inconsistently. As no clear-cut distinction could be determined between the terms, they are treated as synonyms in this cursory literature review. Two distinct concepts were identified:

1. **VI as a curricular concept.** Terms like virtual, digital, or online internationalization are often used to designate forms of virtual study abroad or collaborative online exchanges, in which students obtain an international experience without physically leaving their home. As early as 1999, Blight, Davis, and Olsen argued that "new technologies may allow a Virtual Internationalisation of the form of the curriculum" (p. 27). Further sources to be cited here include Fugate and Jefferson (2001), Wächter (2002), Ghasempoor, Liaghatdar, and Jafari (2011), Mavridis, Leftheris, Tsiatsos, and Kudryavtseva (2012), EICL Project (2013), Middlemas and Peat (2015), and Thorne (2016).
2. **VI in transnational education (TNE) and global "virtual universities."** In this perspective, VI is conceptualized as virtual TNE which "encompasses the utilization of ICT to dispense transnational education programs and courses to students" (Alqahtani, 2018, p. 4) or as a means to recruit international students into domestic online or distance programs (Lorenz, Wittke, Steinert, & Muschal, 2016). Additional sources that follow this approach are van Damme (2001) and Samoilenko (2013).

A broader conception is implicit in Teichler and Cavalli (2015), who propose "any type of Virtual Internationalization or globalization" (p. S114), yet without further specifying the term. For Knight (2014), virtual aspects of internationalization figure in the "program and provider mobility" ("second generation") category of her classification of three generations of crossborder higher education (p. 45). They include both the "virtual university" and "online/distance" program mobility.

Among the more comprehensive approaches to internationalization with ICT is Leask (2004). She discusses a variety of ways in which higher education institutions can "use ICTs to assist in achieving internationalisation outcomes" (p. 340). Examples given relate to curricula, as well as to international faculty connections and research. A still broader conceptualization can be found in Hénard, Diamond, and Roseveare (2012). The authors describe ways in which ICT can support internationalization: helping institutions collaborate and compete, overcoming countries' regulatory policies (such as immigration policies), fostering partnerships for joint programs, recruiting foreign experts, offering virtual mobility options, and democratizing access to international learning experiences (Hénard et al., 2012, p. 28). It was not until Bruhn (2017) that a comprehensive approach appeared, which other scholars have since supported (e.g., Bedenlier & Marín, 2020; de Lima, Bastos, & Varvakis, 2020; Hartzell, 2019; Nascimbeni, Burgos, Spina, & Simonette, 2020; Tjulin et al., 2021).

The advent of the Covid-19 pandemic in 2020 has intensified the discourse on virtual forms of internationalization. The idea of the shift to online education as a "catalyst for a new normal" in internationalization (Hudzik, 2020, p. 1) has become widespread. Li and Haupt (2021) argue that distance TNE could become a growth area post-Covid-19, with Ogden (2021) adding that education abroad may have to be re-defined due to the increasing nonphysicality of international experiences. Ogden, Streitwieser, and van Mol (2020) suggest that the shift to online teaching and learning caused by Covid-19 can accelerate looming opportunities for international higher education by challenging the primacy of physical mobility and other "traditional" forms. Hunter and Sparnon (2020) equally see an "opportunity in crisis," namely, to embrace the full potential of online education and collaboration for internationalization. By making continued use of ICT for internationalization, White and Lee (2020) argue, deficiencies of mobility can be circumvented. These deficiencies include high cost (and as a result: unequal access), brain drain, and environmental issues – in particular, CO_2 emissions generated by travel (cf. also Bruhn-Zass, 2021).

These sources share the view that universities will have to diversify their understanding and practice of internationalization by incorporating ICT and approaches from the ODE field, not only as an emergency response, but also strategically, in the mid- and long term (cf. also Zhou, 2021). The extent to which this is going to be the case is highly contested – ranging from scenarios of a "postmobility world" (White & Lee, 2020) to a by-and-large return to the prepandemic status quo (Altbach & de Wit, 2020), with most scholars settling for something in the middle.

A related concept to VI is that of *Internationalization at a Distance* (Mittelmeier, Rienties, Gunter, & Raghuram, 2020; Mittelmeier, Rienties, Rogaten, Gunter, & Raghuram, 2019). It takes into account "all forms of education across borders where students, their respective staff, and institutional provisions are separated by geographical distance and supported by technology" (Mittelmeier et al., 2019, p. 2). The concept adds a complementary perspective on ICT-supported internationalization: While VI addresses the transversal role of ICT for internationalization and thus encompasses the areas of IaH and Internationalization Abroad, Internationalization at a Distance is developed as a parallel category that focuses exclusively on remote experiences.

In summary, recent years have seen scholars and practitioners discuss ICT use in various international contexts. The Covid-19 pandemic and questions around a postpandemic "new normal" have intensified this discussion. The concept of VI represents a more comprehensive approach towards ICT-supported internationalization of higher education than other concepts in the literature.

Dimensions of VI

Two dimensions of VI are distinguished (see Fig. 2):

1. *ICT and internationalization* describes, in a narrower understanding of internationalization, how ICT is used to internationalize or to meet the challenges of internationalized contexts (intercultural diversity, geographical distance, etc.). Respective aims or functions include the development of intercultural, international, and global competencies, the enhancement of the experience of

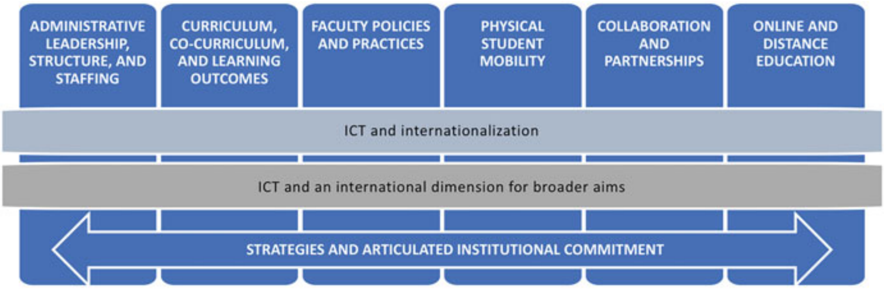


Fig. 2 Seven categories and two dimensions of Virtual Internationalization. Note: From "Virtual Internationalization to Support Comprehensive Internationalization in Higher Education" by E. Bruhn-Zass, 2021, *Journal of Studies in International Education*. (Reprinted with permission)

international students (including online and TNE students), improvement of the experience abroad, access to an international experience, and the export of higher education.

2. *ICT and an international dimension for broader aims* contain more general objectives that are to be achieved by combining ICT with an international aspect. These include broader skills, competencies and knowledge, innovation in teaching and learning, the enhancement of staff and faculty training/development, capacity building, and quality enhancement.

This distinction of two dimensions is made for analytical purposes. It has limited relevance for practice, since the goals of internationalization are usually formulated on both levels from the outset: Intercultural competencies, for example, go hand in hand with skills in dealing with diversity, and an expansion into foreign markets generally has the aim to create high-quality educational offerings (capacity development) (cf. Tait & O'Rourke, 2014, p. 45). In fact, as scholars have emphasized, internationalization and its broader functions are inextricably linked (Brandenburg, de Wit, Jones, & Leask, 2019; de Wit, Egron-Polak, Howard, & Hunter, 2015, p. 29).

Means and Practices in VI

Digital technologies commonly used in higher education can also be employed in international contexts. These include different kinds of online media and e-learning platforms, as well as social media and virtual communities. Websites play a role, especially for transnational marketing and information on exchange programs. MOOCs are often employed as an international marketing tool, while they can also enrich the (flipped) classroom. OER can be used transnationally, and games/gamification can be introduced in learning environments to engage international learners. M-learning can help access content with mobile devices *anytime, anywhere*, and virtual and augmented reality can create impressions of distant places.

Internationalization-specific means and practices prominently include virtual mobility – in the form of COIL/virtual exchange or other formats such as online internships and study abroad at a distance. They furthermore include virtual TNE, in which students from abroad enroll in online or distance degrees. ICT can also be utilized to engage learners in interculturally diverse courses, or for standardizing processes and reducing bureaucracy across borders (supporting enrollment via data portability, recognition of credits, etc.). Moreover, ICT can be used in staff/faculty development, in transnational e-mentoring or e-tutoring, or to facilitate collaboration at a distance among staff/faculty in different countries.

The Six Pillars of VI

In the following, the six parallel pillars of VI are presented, with a particular focus on the different aims and functions that may be addressed.

Administrative Leadership, Structure, and Staffing

Higher education administration and management have been identified in Bruhn (2020) as key stakeholders for tapping the potential of ICT for internationalization. They are largely responsible for the development of strategies and articulated institutional commitment (as in the transversal category of VI, see Fig. 1), and they also directly promote ICT-based internationalization activities, for example, in the form of financial or structural support for virtual exchange. International office staff play a key role for introducing and supporting VI activities (as displayed in the other pillars of VI). Hiring and developing administrative staff is important in order to build up the necessary competencies for using ICT in international contexts (and beyond). This may include targeted staffing, formalized training, or nonformal support services (networks, software tools, etc.). ICT-supported staff development is also used in international contexts for broader aims of increasing access, capacity, or quality (at home and abroad), for instance, by developing and promoting global standards.

Curriculum, Co-curriculum, and Learning Outcomes

In the curriculum, various ICT-based measures can be used to integrate an international experience. These include *virtual mobility,* which Bruhn (2020) uses as an umbrella term for virtual forms of study abroad, exchange, field trips, transnational labs, or expert mobility. ICT-supported internationalization of curricula and co-curricula also includes “nonmobility” forms such as the use of teaching/learning materials from abroad.

A frequent aim of internationalization is the promotion of intercultural, international, and global competencies. This includes the enhancement of intercultural understanding and language skills. Improved access to the acquisition of such competencies beyond the “mobile few” is a frequently cited argument for the use of ICT in IaH. Forms of virtual mobility commonly serve these purposes.

In addition, ICT can expand opportunities for connecting international and domestic students within the same institution or program: Virtual platforms allow both groups to get in touch and collaborate with each other, whether they are on the local campus or abroad. ICT is also used for the broader aims of enhancing the quality of curricula, access to education, and capacity building. Examples include the transnational provision of OER or MOOCs to institutions in developing countries, or the application of gamified learning to engage international students enrolled domestically.

Employability and preparing students for the living and working conditions of the twenty-first century – twenty-first-*century skills* – are broader aims of the use of ICT in international curricular contexts. For example, virtual exchange can be used to create collaborative and transversal competencies and to train students in dealing with diversity. Broader aims also include the enhancement of discipline-specific knowledge and skills. For example, virtual exchange in a design, art, or architecture course can serve to broaden students’ horizons with approaches from other cultures.

Finally, VI can involve innovation in teaching and learning – for instance, when international MOOCs are used to create flipped classroom experiences.

Faculty Policies and Practices

Academic and teaching staff are vital for implementing VI. They engage in remote international research collaboration, implement IaH in curricula, and provide education and academic support for international (online) students (Bond, Marín, & Bedenlier, 2021).

Institutional policies can address both domestic and international staff and concern their recruitment and professional development. Among the measures are online training that coaches domestic faculty in conducting successful international exchanges and transnational cooperation or in dealing with international students. Other training is aimed at international lecturers and researchers, for example, to help them navigate the domestic higher education system.

Among the broader aims addressed in this category is again innovation in teaching and learning – for example, when social media is used for transnational professional exchange on teaching practices. Other aspects are broader skills and competencies obtained in transnational cooperation – beyond intercultural and international competencies.

Physical Student Mobility

To support physical student mobility, ICT is used for both domestic students studying abroad and for international students on campus. For both groups, ICT can also be used during periods when students cannot be easily reached by other means – in a sense, *anytime, anywhere*. This includes the *before* (predeparture) and *after* (alumni) phases for international students and the *during* (study abroad) phase for domestic students. By embedding physical mobility in virtual offerings, ICT also facilitates seamless transitions from one phase to the next, for example, when orientations are begun prior to the actual stay.

ICT diversifies the possibilities for advising and for enhancing the overall experience for mobile students – by adding chat, webinars, tutorials, predeparture online language courses, or automated data transfer between institutions (as with Erasmus Without Paper (n.d.)). Blockchain is sometimes considered a promising technology for supporting data and credit transfer.

ICT is also widely used in international marketing and the promotion of study-abroad – with social media marketing in particular. International exchange programs can also become more attractive through virtual IaH: Students who have been introduced to international experiences at home may be more inclined to pursue a stay abroad. Possibilities to blend shorter physical mobility stays with virtual elements can also improve access to international experiences for those students who are unable to spend a longer period abroad.

Employability is a central theme among the broader aims of ICT use in physical mobility. For example, e-portfolios are used to make professional skills acquired abroad visible.

Collaboration and Partnerships

ICT can foster and support international partnerships at departmental or institutional level. Examples of applications include digital communication channels and intrainstitutional collaboration platforms (for e-learning, MOOCs, or OER).

ICT diversifies transnational education through blended or hybrid learning options and can thus be used to support the presence of universities abroad. Such diversification can serve to enhance the experience of international students at a branch campus. This is done, for example, through the flexible provision of educational services and the ability to address intercultural challenges between home institution and branch campus – be it with interculturally sensitive online elements, e-mentoring, or with social media tools that create a sense of community.

In terms of the broader aims of ICT use in international collaborations and partnerships, access to higher education and capacity building are key issues – in TNE and other forms of collaboration, such as dual degree programs. Finally, innovation in teaching and learning is an issue in this category. The focus here is on aspects such as improving teaching in TNE or supporting international double-degree programs. ICT facilitates transitions for students from one institution to another and fosters curricular innovation at all participating institutions.

Online and Distance Education

Looking at domestic ODE, ICT-based interventions are often the only way for students to gain study-related international experience – instead of an alternative or supplement of physical mobility, like is the case in campus-based internationalization. This is also due to the enrollment structure inherent to distance education, that is, learners tend to be older and have family and/or job commitments (e.g., Dolch & Zawacki-Richter, 2018). Virtual exchanges and the enrollment in courses from a partner institution (virtual study abroad) are examples. Where international students are enrolled, taking advantage of this diversity can contribute to the internationalization of the study experience.

A broader aim of integrating international aspects into domestic online and distance learning is to tap into knowledge and expertise from abroad, aided by the location-independence of study. The barrier to inviting international experts into the classroom is lower, as neither they nor the students have to physically travel. Looking at transnational delivery, distance, and even online offerings were early forms of TNE (François et al., 2016, p. 7). Via virtual TNE, ODE can provide an international education for students in another country who would not be able to travel abroad nor have access to “physical TNE” in the form of a branch campus (Li & Haupt, 2021). This increases access to an international experience. Hand in hand with this are the broader aims of increasing access to higher education, as well as capacity development and quality enhancement of education. This applies to developing and emerging economies, but can also serve to counteract regional disparities in industrialized nations. Virtual TNE can also be used to address particular student groups such as expatriate or military learners.

Implications and Insights from the Concept of VI for the Higher Education Internationalization and ODE Discourses

The concept of VI sheds light on the diversity of possible uses of ICT in higher education international contexts. It helps to examine how ICT can be used in the sense of Comprehensive Internationalization. Unlike concepts such as COIL or virtual exchange, VI is not limited to the curriculum. It concerns the university in its entirety – be it administrative, academic and teaching staff, physical student mobility, international partnerships, or other forms of collaborations and TNE. The combination of physical and virtual elements leads to a hybridization of internationalization.

In the VI concept, ODE is systematically included in the conceptualization of higher education internationalization for the first time. Study programs that are offered entirely online or at a distance – and which have been increasing worldwide for years (e.g., Qayyum & Zawacki-Richter, 2018) – thus step out of the blind spot of internationalization. In fact, for students enrolled, VI may be the only accessible form of internationalization. This applies to domestic students who are unable to physically travel abroad and to international students who are either enrolled in virtual TNE or in primarily domestic higher education. It should be noted that distance learning institutions and open universities differ from campus-based institutions especially in the area of the curriculum and (partly) in that of partnerships, while the other pillars of VI apply to them in the same way as to (majority) campus-based higher education institutions.

Virtual forms of internationalization are not easily described with the vocabulary traditionally used in the internationalization discourse. In particular, the dichotomy of "at home" vs. "abroad" (Knight, 2012) loses its coerciveness. Students may seamlessly mix domestic with international experiences regardless of their current location, orientations for international students may begin even before arrival on campus, and credentials for joint degrees may be obtained entirely online. The conceptualization of a third category, Internationalization at a Distance (Mittelmeier et al., 2020), has been offered to integrate hybrid as well as fully distant and online education into internationalization theory. The VI concept does not contradict this approach. It merely takes a different perspective by focusing on the permeation of both IaH and Internationalization Abroad with ICT, while integrating the roles of strategic management, administration, and faculty in a comprehensive sense.

Relevance for Research

VI is designed as transversal to the comprehensive internationalization of higher education. The concept broadens the perspective of ICT use in these contexts by providing a framework for examining the impact of ICT on higher education internationalization in all its complexity.

Future research may further explore areas of VI that have so far not been studied in depth. These include curricular aspects other than virtual exchange, the impact of ICT on partnerships and international relations, as well as the role played by strategies, administration, and academic and teaching staff. Influences from outside of individual institutions, including sectoral policies, trends and crises, may also come into focus. A particular blind spot so far has been the international side of ODE. The ways in which ODE is internationalized – and how ODE permeates international education – may be further researched.

Future research may also study VI in open education and other education subsectors, including in their online and distance delivery formats. The impact of digitalization on international operations of primary and secondary schools and technical and vocational education has yet to be studied in depth. Furthermore, in order to provide guidance for practitioners, it would be advisable not only to focus on the opportunities that ICT opens up, but also to consider their limitations, as well as success factors.

Relevance for Primarily Campus-Based Institutions

Digitalization has had an impact on higher education internationalization for years. Hybrid and blended offerings have proliferated, and virtual exchange (COIL, or related concepts) has obtained a prominent place in IaH activities. The comprehensive concept of VI broadens the perspective beyond such collaborative experiences, shows how ICT can be integrated in curricula in other ways, and promotes the internationalization of institutions beyond the classroom. What is more, the Covid-19 pandemic has demonstrated that resilient internationalization practice should include virtual elements to sustain international relations and maintain international experiences during times when physical mobility – and potentially, campus operations in general – are compromised.

Aspects of sustainability also challenge the primacy of physical mobility. The carbon footprint may be reduced by moving project-related meetings online, thus limiting (air) travel and contributing to climate action, the United Nations' Sustainable Development Goal (SDG) 13. Other sustainability aspects may come into play as well. Exemplary opportunities of VI lie in promoting quality education (SDG 4), reducing inequalities (SDG 10), and improving gender equality (SDG 5), for example, by increasing access to international higher education for disadvantaged populations through virtual TNE.

Relevance for ODE Providers

Rationales for ODE providers to consider comprehensive internationalization, including the ODE-specific approaches provided in the VI concept, include the following.

1. ODE has gained in importance in higher education in recent years and is likely going to play a larger role in years to come. This development encourages the consideration of how international experiences and institutional internationalization can be integrated to serve all students, not just those enrolled in on-campus education.
2. ODE has a role in educational delivery to nontraditional learners. Access to an international experience to this student group is essential to ensure equitable opportunities.
3. As ODE also serves students from abroad (intentionally or unintentionally), it is important to recognize and accommodate their needs.

Conclusion

By taking a comprehensive look at the possibilities of using ICT for internationalization, the VI concept can help higher education leaders and internationalization practitioners to systematically integrate virtual elements into strategies and activities. The broad portfolio of VI, with its claim to comprehensiveness, can open up new avenues for internationalization. The VI concept invites ODE practitioners to fully participate in the internationalization discourse. ODE is included in VI in two perspectives:

1. Education that primarily targets a domestic clientele (whether or not international students are enrolled)
2. Education that targets students abroad (virtual TNE)

It should be emphasized that other areas of comprehensive internationalization (strategies, administration, faculty, and partnerships) apply to ODE institutions just as they do to all other institutions. A particular area of opportunity is the combination of expertise and experience from on-campus education with that from the ODE field.

VI is a concept developed for higher education, but other educational subsectors may also integrate its principles. International experiences and intercultural competencies are not only relevant for higher education, but for society as a whole. ICT and digitalization have massively impacted other educational subsectors as well. Following this development, collaborative virtual exchange has been implemented in secondary schools (Chia & Pritchard, 2014), and other formats such as virtual internships or expert mobility may be considered in technical and vocational education in particular. In these subsectors, too, it may be advisable to broaden the perspective beyond curricular forms of VI.

It is important to acknowledge limitations of VI. A lack in digital literacy or in technical infrastructure, for instance, can counteract well-intended efforts. Therefore, VI should be weighed against other (physical) measures in different contexts. Success factors and obstacles must be analyzed and taken into account. For a successful implementation of VI, research and practice must go hand in hand.

References

Alqahtani, E. D. (2018). *Virtual internationalization of higher education: A comparative study between Saudi and UAE universities* (Doctoral dissertation). Retrieved from https://www.researchgate.net/messages/attachment/1410165_EbtisamAlqahtani_Dissertation.pdf

Altbach, P. G., & de Wit, H. (2020). Covid-19: The internationalization revolution that isn't. *International Higher Education, 102*, 16–18. https://doi.org/10.36197/IHE.2020.102.08.

Bedenlier, S., & Marín, V. I. (2020). Engaging students through virtual mobility: A systematic mapping review. In S. Chang & C. Gomes (Eds.), *Digital experiences of international students: Challenging assumptions and rethinking engagement* (pp. 85–105). Abingdon, NY: Routledge.

Blight, D., Davis, D., & Olsen, A. (1999). The internationalisation of higher education. In K. Harry (Ed.), *Higher education through open and distance learning* (pp. 15–31). London, UK: Routledge.

Bond, M., Marín, V. I., & Bedenlier, S. (2021). International collaboration in the field of educational research: A Delphi study. *Journal of New Approaches in Educational Research, 10*(2), 190–213. https://doi.org/10.7821/naer.2021.7.614.

Brandenburg, U., de Wit, H., Jones, E., & Leask, B. (2019, June 29). Defining internationalisation in HE for society. *University World News*. Retrieved from https://www.universityworldnews.com/post.php?story=20190626135618704

Bruhn, E. (2017). Towards a framework for virtual internationalization. *International Journal of E-Learning & Distance Education, 32*(1), 1–9. Retrieved from http://www.ijede.ca/index.php/jde/article/view/1014

Bruhn, E. (2020). *Virtual internationalization in higher education*. Bielefeld, Germany: WBV. https://doi.org/10.3278/6004797w.

Bruhn-Zass, E. (2021). Virtual internationalization to support comprehensive internationalization in higher education. *Journal of Studies in International Education, 26*, 240. https://doi.org/10.1177/10283153211052776.

Chia, H. P., & Pritchard, A. (2014). Using a virtual learning community (VLC) to facilitate a cross-national science research collaboration between secondary school students. *Computers & Education, 79*(10), 1–15. https://doi.org/10.1016/j.compedu.2014.07.005.

Crowther, P., Joris, M., Otten, M., Nilsson, B., Teekens, H., & Wächter, B. (2000). *Internationalisation at home. A position paper*. Amsterdam, Netherlands: EAIE.
de Lima, C., Bastos, R. C., & Varvakis, G. (2020). Digital learning platforms: An integrative review to support internationalization of higher education. *Educaçao em Revista, 36*, 1–18. https://doi.org/10.1590/0102-4698232826.
de Wit, H. (2020, May 23). Business model of internationalisation falling apart. *University World News*. Retrieved from https://www.universityworldnews.com/post.php?story=20200519133420380
de Wit, H., Egron-Polak, E., Howard, L., & Hunter, F. (Eds.). (2015). *Internationalisation of higher education*. Brussels, Belgium: European Union.
Dolch, C., & Zawacki-Richter, O. (2018). Are students getting used to learning technology? Changing media usage patterns of traditional and non-traditional students in higher education. *Research in Learning Technology, 26*. https://doi.org/10.25304/rlt.v26.2038.
EICL Project. (2013). *The concept of Virtual Internationalization of higher education of Ukraine. Report from the EU Tempus IV project "E-internationalization for collaborative learning"*. Retrieved from http://eicl.kharkiv.edu/news/news17/
Erasmus Without Paper. (n.d.). About us. Retrieved from https://www.erasmuswithoutpaper.eu/about-us
European Commission. (2020a). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on achieving the European Education Area by* 2025. 30 September 2020, COM(2020) 625 final. Retrieved from https://ec.europa.eu/education/sites/education/files/document-library-docs/eea-communication-sept2020_en.pdf
European Commission. (2020b). *Survey on the impact of COVID-19 on learning mobility activities*. Retrieved from https://ec.europa.eu/programmes/erasmus-plus/sites/default/files/coronavirus-mobility-impact-results-may2020_en.pdf
François, E. J., Avoseh, M. B. M., & Griswold, W. (Eds.). (2016). *Perspectives in transnational higher education*. Rotterdam, Netherlands: Sense.
Fugate, D., & Jefferson, R. W. (2001). Preparing for globalization – Do we need structural change for our academic programs? *Journal of Education for Business, 76*, 160–166. https://doi.org/10.1080/08832320109601304.
Gaebel, M., Zhang, T., Stoeber, H., & Morrisroe, A. (2021). *Digitally enhanced learning and teaching in European higher education institutions*. Brussels, Belgium: EUA.
Ghasempoor, A., Liaghatdar, M. J., & Jafari, E. (2011). The internationalization of higher education: An effective approach for Iran higher education. *Higher Education Studies, 1*(2), 35–40. https://doi.org/10.5539/hes.v1n2p35.
Hartzell, C. (2019). Internationalizing the curriculum: Faculty and student perspectives. *Literacy Information and Computer Education Journal, 10*(2), 3202–3208. https://doi.org/10.20533/licej.2040.2589.2019.0421.
Hauschildt, K., Gwosć, C., Schirmer, H., & Cras, F. (2020). The social dimension of student life in the EHEA in 2019. *DZHW*. Retrieved from https://www.dzhw.eu/en/forschung/governance/pub
Helms, R. M., & Brajkovic, L. (2017). *Mapping internationalization on U.S. campuses: 2017 edition*. Washington, DC: ACE.
Hénard, F., Diamond, L., & Roseveare, D. (2012). *Approaches to internationalisation and their implications for strategic management and institutional practice. A guide for higher education institutions*. Paris, France: OECD.
Hudzik, J. K. (2011). *Comprehensive internationalization. From concept to action*. Washington, DC: NAFSA: Association of International Educators.
Hudzik, J. K. (2020). Post-Covid higher education internationalization. *NAFSA Trends & Insights* (September), 1–7. Retrieved from https://www.nafsa.org/sites/default/files/media/document/trends-insights-september-2020.pdf
Hunter, F., & Sparnon, N. (2020). There is opportunity in crisis: Will Italian universities seize it? *International Higher Education, 102*(Special Issue 2020), 38–39. https://doi.org/10.36197/IHE.2020.102.19.
IAU. (2020). The impact of Covid-19 on higher education around the world. IAU global survey report. Retrieved from https://www.iau-aiu.net/IMG/pdf/iau_covid19_and_he_survey_report_final_may_2020.pdf

Kanwar, A., & Carr, A. (2020). The impact of Covid-19 on international higher education: New models for the new normal. *Journal of Learning for Development, 7*(3), 326–333. Retrieved from https://jl4d.org/index.php/ejl4d/article/view/467

Knight, J. (2003). Updating the definition of internationalization. *International Higher Education, 33*(Fall), 2–3. https://doi.org/10.6017/ihe.2003.33.7391.

Knight, J. (2012). Concepts, rationales, and interpretive frameworks in the internationalization of higher education. In D. K. Deardorff, H. de Wit, & J. Heyl (Eds.), *The Sage handbook of international higher education* (pp. 27–42). Thousand Oaks, CA: Sage.

Knight, J. (2014). Three generations of crossborder higher education: New developments, issues and challenges. In B. Streitwieser (Ed.), *Internationalisation of higher education and global mobility* (pp. 43–58). Oxford, UK: Symposium Books.

Knight, J. (2016). Transnational education remodeled: Toward a common TNE framework and definitions. *Journal of Studies in International Education, 20*(1), 34–47. https://doi.org/10.1177/1028315315602927.

Leask, B. (2004). Internationalisation outcomes for all students using information and communication technologies (ICTs). *Journal of Studies in International Education, 8*(4, Winter 2004), 336–351. https://doi.org/10.1177/1028315303261778.

Li, X., & Haupt, J. (2021, February 13). Could 'distance TNE' become a growth area after COVID-19? *University World News*. Retrieved from https://www.universityworldnews.com/post.php?story=20210210074621731

Lorenz, A., Wittke, A., Steinert, F., & Muschal, T. (2016). Massive Open Online Courses als Teil der Hochschulstrategie [MOOCs as part of the higher education institutional strategy]. In N. Nistor & S. Schirlitz (Eds.), *Digitale Medien und Interdisziplinarität. Herausforderungen, Erfahrungen, Perspektiven* (pp. 102–112). Münster, Germany: Waxmann.

Mavridis, A., Leftheris, I., Tsiatsos, T., & Kudryavtseva, N. (2012). Supporting virtual internationalization of education by implementing and playing serious games. *Paper presented at the IEEE 15th international conference on Interactive Collaborative Learning (ICL)*, Villach, Austria. https://doi.org/10.1109/ICL.2012.6402169.

Middlemas, B., & Peat, J. (2015). 'Virtual internationalisation' and the undergraduate curriculum in UK and overseas universities. *Journal of Perspectives in Applied Academic Practice, 3*, 46–49. https://doi.org/10.14297/jpaap.v3i3.195.

Mittelmeier, J., Rienties, B., Gunter, A., & Raghuram, P. (2020). Conceptualizing internationalization at a distance: A "third category" of university internationalization. *Journal of Studies in International Education*, 1–17. https://doi.org/10.1177/1028315320906176.

Mittelmeier, J., Rienties, B., Rogaten, J., Gunter, A., & Raghuram, P. (2019). Internationalization at a distance and at home: Academic and social adjustment in a South African distance learning context. *International Journal of Intercultural Relations, 72*, 1–12. https://doi.org/10.1016/j.ijintrel.2019.06.001.

Nascimbeni, F., Burgos, D., Spina, E., & Simonette, M. J. (2020). Patterns for higher education international cooperation fostered by Open Educational Resources. *Innovations in Education and Teaching International, 58*, 361. https://doi.org/10.1080/14703297.2020.1733045.

O'Dowd, R. (2021). Virtual exchange: Moving forward into the next decade. *Computer Assisted Language Learning, 34*(3), 209–224. https://doi.org/10.1080/09588221.2021.1902201.

Ogden, A. C. (2021, January 23). Do we need a new definition of education abroad post-COVID? *University World News*. Retrieved from https://www.universityworldnews.com/post.php?story=20210119095105638

Ogden, A. C., Streitwieser, B., & van Mol, B. (2020, April 4). How Covid-19 could accelerate opportunities for IHE. *University World News*. Retrieved from https://www.universityworldnews.com/post.php?story=20200403133447141

Qayyum, A., & Zawacki-Richter, O. (2018). Open and distance education in a digital age. In A. Qayyum & O. Zawacki-Richter (Eds.), *Open and distance education in Australia, Europe and the Americas. National perspectives in a digital age* (pp. 1–8). Springer Open. https://doi.org/10.1007/978-981-13-0298-5.

Samoilenko, N. B. (2013). Use of internet resources for participation in the international educational programs in conditions of internationalization of education. *Information Technologies and Learning Tools, 34*(2), 1–10. https://doi.org/10.33407/itlt.v34i2.806.
Tait, A., & O'Rourke, J. (2014). Internationalization and concepts of social justice: What is to be done? In O. Zawacki-Richter & T. Anderson (Eds.), *Online distance education: Towards a research agenda* (pp. 39–74). Edmonton, AB: AU Press.
Teichler, U., & Cavalli, A. (2015). The diverse patterns and the diverse causes of migration and mobility in science. *European Review, 23*(S1), S112–S126. https://doi.org/10.1017/S1062798714000817.
Thorne, S. L. (2016). The virtual internationalization turn in language study. In R. O'Dowd & T. Lewis (Eds.), *Online intercultural exchange. Policy, pedagogy, practice* (pp. ix–xii). New York, NY: Routledge.
Tjulin, A., MacEachen, E., Vinberg, S., Selander, J., Bigelow, P. L., & Larsson, R. (2021). Virtual internationalization – we did it our way. *Högre utbildning, 11*(2), 1–13. https://doi.org/10.23865/hu.v11.2344.
van Damme, D. (2001). Quality issues in the internationalisation of higher education. *Higher Education, 41*, 415–441. https://doi.org/10.1023/A:1017598422297.
Wächter, B. (Ed.). (2002). *The virtual challenge to international cooperation in higher education*. Bonn, Germany: Lemmens.
White, B., & Lee, J. J. (2020, April 18). The future of international HE in a post-mobility world. *University World News*. Retrieved from https://www.universityworldnews.com/post.php?story=20200417105255362
Zhou, J. (2021, January 23). Understanding international HE as a dynamic system. *University World News*. Retrieved from https://www.universityworldnews.com/post.php?story=20210118073617320

International Students in Open, Distance, and Digital Higher Education

24

Jenna Mittelmeier

Contents

Abstract

International students are a group of rising prominence in open, distance, and digital higher education, although there is, at present, limited systematic data about their numbers worldwide. International students in open, distance, and digital education occupy an interesting "third space," whereby they commonly remain within their home environment and surroundings while simultaneously studying from an institution-based abroad. This means that many of the lenses used to frame and categorize international students in face-to-face settings – mobility, visas, and citizenship – are found problematic in online distance settings. This chapter reflects on these issues to outline complexities in catego-rizing international students in open, distance, and digital higher education and

J. Mittelmeier (✉)
The University of Manchester, Manchester, UK
e-mail: jenna.mittelmeier@manchester.ac.uk

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_24

the ways that their experiences may be distinct from international students who are geographically mobile. The chapter ends with a reflection on gaps in current research and suggestions for researchers who include international students in their work.

Keywords

International students · International distance students · Internationalization at a distance · International distance education

Introduction

International students represent a significant and growing population of open, distance, and digital education (ODDE) students, supported through increasing provisions for international distance education (Simpson, 2013; Subotzky & Prinsloo, 2011; Tait, 2018). Such trends provide potential opportunities for higher education students to learn from institutions based around the world without ever leaving "home." In this regard, it has been reflected that some of the underlying values of ODDE – such as openness, increased participation, or equity in access – converge with the recruitment of international distance students through extending intercultural learning opportunities across geographic borders (Pumela, 2012).

Although data about the number of students who participate in ODDE internationally are not systematically collected globally, there is evidence of its prominence in the higher education field. For example, the growing prevalence of open universities around the world (Tait, 2018) provides greater possibilities for international engagement through the enrollment of students from other countries. Other distance-based institutions have expanded their international reach; one example is the University of South Africa, which enrolls around 29,000 international students based in 90 different countries (Mittelmeier, Rienties, Rogaten, Gunter, & Raghuram, 2019). Other more limited country-specific data shows a similar picture, such as in the UK, where data from the Higher Education Statistics Agency (HESA, 2021) highlight that over 400,000 students enrolled in a British institution are based outside the country. These trends are likely to increase alongside growing interests in ODDE following the COVID-19 pandemic, whereby restrictions on international student mobility positioned international distance learning as a "panacea in a time of crisis" (Dhawan, 2020, p. 6). This had led to questions about whether such modes are the way forward for international higher education, with some arguing that we might move towards a "post-mobility world" (White & Lee, 2020) through the increased use of ODDE across borders.

This chapter reflects on the "third spaces" that ODDE creates for higher education, whereby students no longer must choose between relocating "abroad" and remaining "at home" due to the rising prominence of online and distance programs across borders. Within this, one particular notion in need of reimagining under the context of ODDE is that of international students. After all, existing tools or definitions for conceptualizing who "counts" as an international student are disrupted by removing geographic mobility from the equation. This chapter unpacks these complexities by bringing together existing definitions of international students in higher education and highlighting where they are problematic in light of ODDE. The second half of the chapter reflects on the ways that experiences may differ between international students in face-to-face context and international distance education, arguing for a need to see each group's experiences as distinct. Framing this argument is the concept of "internationalization at a distance," in which attention is turned to next.

Introducing Internationalization at a Distance

Prior research on international students and internationalization in higher education has classically organized activities into two categories: internationalization abroad and internationalization at home (Knight, 2004). On the one hand, internationalization abroad is typically framed through the lens of mobility and the movement of students, staff, or programs across geographic borders (de Wit, 2013). On the other hand, internationalization at home focuses on developing international and intercultural dimensions into existing provisions "at home," primarily for the benefit of home students who are not internationally mobile (Crowther et al., 2000).

However, ODDE has created new forms of internationalization that are difficult to classify within either category, particularly considering the increased opportunities for learning across international borders. In online and distance learning, for example, students can learn through the educational approaches of a country based "abroad" all while remaining "at home." For instance, a student may live in the USA and enroll through online distance education in an institution based in Brazil without relocating to that country. Such a learning experience would differ from the education obtainable within a students' own country of citizenship or residence, considering that issues such as the curricula and pedagogy are influenced by the culture, history, and educational values of the places where they are developed.

One way to frame international students' experiences under such circumstances is through the lens of "internationalization at a distance," a third space conceptualized within the existing dichotomous framework of internationalization (Mittelmeier et al., 2019; Mittelmeier, Rienties, Gunter, & Raghuram, 2021b). Internationalization at a distance is distinct from internationalization abroad (which assumes geographic mobility) and internationalization at home (which assumes affiliation with an institution "at home"). This concept can be defined as:

> "All forms of education across borders where students, their respective staff, and institutional provisions are separated by geographical distance and supported by technology." (Mittelmeier et al., 2021b, p. 269)

Internationalization at a distance, then, includes students who are geographically immobile (at least for the express purposes of academic study); they remain "at home" while simultaneously learning from an institution located "abroad." In this way, internationalization at a distance may provide alternatives to geographic mobility, as argued by Breines, Raghuram, and Gunter (2019), by providing avenues for students *not* to move. After all, the opportunities to obtain a degree from an international institution are expanded via ODDE through increased access to universities around the world without the necessity of crossing national borders. This conceptualization was intended to recognize that what is mobile under ODDE is not necessarily people but rather a mobility of knowledge and ideas. This broadens the space that is occupied by institutions internationally, as universities' student reach is expanded beyond their own campuses or national boundaries under ODDE.

This shift requires new considerations about what constitutes an international student, particularly when typical markers of difference – mobility, visas, and citizenship – may no longer apply or hold the same meaning in a more fluid online international space. In face-to-face contexts, for example, the designation of students as either "international" or "home" is often a question of place: home students as those already "here" and international students as those who are from "there." But these designations (already oversimplified and debatable – as expanded on below and in Jones, 2017) start to lose their meaning when institutions themselves begin to transcend national boundaries. Such situations raise a complex question, which will be addressed next: who, then, is an "international student" in ODDE?

Problems with Defining "International Students" in ODDE

Within ODDE, complications arise when one attempts to narrow down who "counts" as an international student, considering many of the categorizations typically used in face-to-face contexts are made more complex in internationalization at a distance. For example, international distance students are typically not eligible for student visas and are not usually geographically mobile for the purposes of education. International distance students, therefore, transcend the existing binary classification of student identities as "home" or "international." This section illuminates these issues, particularly in reflection of how international students are conceptualized and defined globally and how such approaches may make problematic assumptions about their underlying mode of study.

Defining International Students According to Mobility

Many definitions of international students focus on their mobility across national borders. For example, one prominent international higher education data source is the UNESCO Institute for Statistics (UIS), which defines international students as those who "have crossed a national or territorial border for the purpose of education and are now enrolled outside their country of origin" (UIS, 2021). The inclusion of the verb "crossed" within this definition highlights assumptions about the movement and mobility of students from Country A to Country B. In this regard, the OECD (2021) highlights that more than five million students worldwide are currently geographically mobile for the purposes of higher education. However, one distinctive quality of ODDE, as often perceived by students, is that it increases opportunities to obtain a degree abroad without being mobile (Breines et al., 2019). This also means that many sources of international data about international students fail to capture or record the number of international distance students studying via ODDE. One result is that, at present, there is no systematic global data collected about how many students study internationally via ODDE and there is no clear international picture of this trend over time.

Defining International Students According to Visa Status

Another common definition of international students focuses on visa status, which, in turn, also assumes international mobility for the purposes of study. The OECD (another prominent data source about international students), for example, defines international students as "those who received their prior education in another country and are not residents of their current country of study" (OECD, 2021). This is similarly defined by the Migration Data Portal (2021) as students who "typically hold a non-resident visa status (sometimes called a student's visa) to pursue a tertiary degree (or higher) in the destination country." Such definitions assume that international students are temporary visa holders in the country of their enrolled institution but are not permanent residents or citizens.

These arguments are problematic in the case of internationalization at a distance. In many countries, for example, distance learners are not eligible for student visas and are not granted rights for temporary residency (although a systematic global analysis of this is suggested for future research). This might be viewed through multiple lenses, as on the one hand, it could be argued that internationalization at a distance transcends existing national borders by allowing knowledge and learning opportunities to permeate geographic barriers. Yet, on the other hand, an alternative perspective is that internationalization at a distance perpetuates existing barriers to movement by closing off opportunities to be mobile that may have been possible via face-to-face learning arrangements. Thus, defining international students according to visa status falls into the same trap of assuming geographic mobility, of which international distance students do not or are not eligible to partake.

Defining International Students According to Geographic "Otherness"

Beyond mobility and visas, discourses about international students tend to label them according to what they are not: permanent residents or citizens of the country from which they study. For instance, ODDE and other higher education researchers frequently label international students as those who are simply based abroad – a binary opposite of home students. However, such definitions are rooted in problematic categorizations of "us" and "them," lending to tendencies for international students to be systematically “othered” or stereotyped (see, e.g., Moosavi, 2021). On a conceptual level, such labelings of international students in ODDE (and beyond) create segregated social containers that seek to divide individuals according to their perceived sameness or difference in relation to the country where their institution is based (Dervin, 2011). Thus, there are underlying, unspoken assumptions behind defining international students as “not home” that reveal (often problematically) who international students are expected to be or what their difference is expected to mean.

Defining international students according to their perceived geographic difference is also problematic on a more practical level in ODDE. One example is expatriate students, who may study at a distance from an institution based in their country of citizenship while they are living abroad in another country. For example, in research on international distance students at the University of South Africa, it was found that a significant number of “international students” were actually South Africans who were living abroad (Mittelmeier, Gunter, Raghuram, & Rienties, 2021a). This form of internationalization back home outlines a blurry gray area, where such students are geographically distant from their institution but presumably possess the cultural and linguistic knowledge or experiences that might be likely from a “home” student (although this cannot be assumed, given the complexity of individual migration experiences and identities).

Another example might be students with prior immigration histories who currently live in the same country where their institution is based, but are not citizens. Such students would not be counted as “international students” under this definition, but their experiences transitioning to learning in a new cultural or linguistic setting may have similarities to those labeled as “international” (as described in more detail in the next section). Although it is impossible to make assumptions about the unique and complex identities or experiences of individuals with various migration histories, these examples demonstrate the ways that geography cannot always be assumed to represent internationality and that there are limitations to simply dichotomizing “here” and “there.”

Problematic Assumptions of Binary Definitions more Broadly

As outlined above, there are practical and conceptual problems with labeling international students in ODDE. At the same time, it is important to reflect on how binaries of “home” and “international” are problematic on a more general level, including in face-to-face learning spaces (see, e.g., Jones, 2017). This tendency to refer to simple binaries of “international” or “not international” fails to capture the plurality of individual identities that go beyond citizenship, including students’ cultural, ethnic, racial, and linguistic diversities. One outcome of this is that students who are labeled as home students may identify with “the international” in multifaceted ways left unseen by their universities. After all, the ways that individual identities might align with “international-ness” is potentially infinite and oftentimes too complex to cleanly label or categorize.

The broad labeling of “international students” also problematically homogenizes a group of students who possess significant diversities through assumptions that there is a single, collective “THE” international student experience. For example, in a systematic literature review of research in the UK about pedagogies with international students, a full 57% of 49 included studies failed to include any other demographic information about participants beyond that they were categorized as international students (Lomer & Mittelmeier, 2021). This means that international students' intersectional identities are often ignored, both in research and in practice, by assuming their noncitizen status is a meaningful marker of diversity that signifies a shared experience. Although the intersections of international students' experiences and other identity markers such as race (Bardhan & Zhang, 2017; Madriaga & McCaig, 2019) or gender (Song, 2020) have received more recent attention, these reflections remain limited, particularly in research about ODDE.

One outcome of this homogenisation is that intranational differences are frequently ignored through latent assumptions that nations are homogeneous and culture is static (see, e.g., the argument in Lomer & Mittelmeier, 2020). For instance, claims are often made about "THE" Chinese learner (Carr, 1999; Gu & Schweisfurth, 2006), which fails to recognize that China has 55 recognized ethnic minority groups and dozens of regional language varieties. Such homogenization lends to limited reflection for international students on issues such as widening participation (Gayton, 2019), despite significant differences in their classed experiences in ODDE (Breines et al., 2019). It is also reflected through a pervasive deficit narrative, whereby international students are frequently assumed to, as a collective group, "lack" certain skills for successful study or "struggle" with integration into their host communities (Lillyman & Bennett, 2014; Moosavi, 2021).

Defining "International Students" in ODDE

These critical reflections form a backdrop for discussing who "counts" as international students in ODDE settings, demonstrating that the labeling of international students is complex and results in problematic outcomes even in face-to-face settings. As indicated in the previous sections, many of the assumptions underpinning the binary labeling of international students are made even more complex in ODDE, namely, through assumptions around mobility, visa status, and citizenship or residency. In reflecting on this plurality, Stewart (2017) has provided a helpful model which categorizes the multifaceted ways that students study through internationalization at a distance. This includes four distinct categories of students:

- **National**: Those who study online or distantly from within their own country of citizenship.
- **International**: Those who study online or distantly from an institution abroad while based in their own country of citizenship.
- **Transnational**: Those who study online or distantly from an institution abroad while living in a different country that is not their country of citizenship.
- **Expatriate**: Those who study online or distantly from an institution in their own country of citizenship while they are living abroad elsewhere.

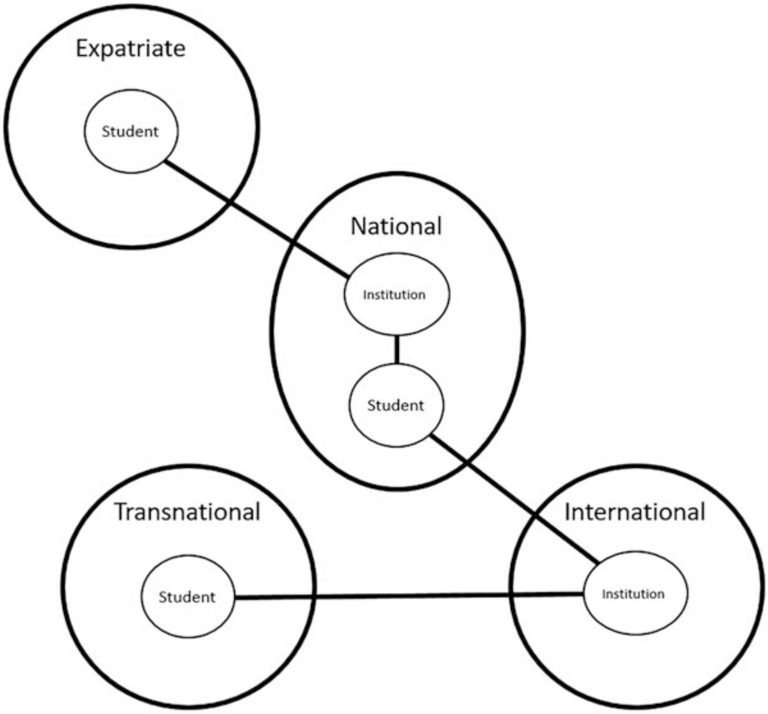


Fig. 1 Visual mapping of student categorizations in internationalization at a distance

This is visualized in Fig. 1, which helps demonstrate the complexity of the ways students can be categorized in internationalization at a distance.

Although it could be argued that such attempts to categorize students fall into similar traps of oversimplification of individual identities, this model does help demonstrate the multifaceted ways that students may engage within and across national boundaries in ODDE. This also demonstrates a need for researchers and practitioners to purposefully reflect on how they are categorizing “international students” in their work, with explicit justification and reflection on the underlying assumptions of taking such approaches.

Additionally, these issues highlight challenging gaps in systematic knowledge about the scope of internationalization at a distance, given that definitions of international students vary between data controlling bodies and that ODDE students are not systematically included or differentiated in major international student datasets. Yet, there has been limited recognition of the distinct experiences between students in these two groups, which necessitates their division in the data. Relatedly, there is also more limited knowledge about international distance students’ experiences in ODDE settings, particularly compared to the wealth of research about this in face-to-face contexts, which is drawn into attention next.

Understanding International Students' Experiences

In face-to-face settings, international students' social, cultural, and academic experiences have received much interdisciplinary research attention over the last few decades (see, e.g., a review by Kesnold Mesidor & Sly, 2016). For instance, it has been outlined that there are over 200 publications each year about the broader internationalization of higher education (Tight, 2021), of which research about international students plays a significant role. Although a full review of the literature in face-to-face contexts is beyond the scope of this present chapter, it is worth recognizing the established knowledge that international students may experience significant and multifaceted transitions while living and learning in a new cultural context (Jindal-Snape & Rienties, 2016). International students' transitions can be defined as "an ongoing process that involves moving from one context and set of interpersonal relationships to another" (Jindal-Snape & Rienties, p. 2). Thus, much research about international students has focused on their experiences as temporary sojourners, such as their sense of agency (Tran & Vu, 2018) or identity development (Bond, 2019) in new cultural and linguistic settings.

One key area of this research focuses on academic transitions and support, particularly international students' experiences with and perspectives towards learning in a new cultural context (e.g., Lillyman & Bennett, 2014). One extensive topic within this has been linguistic transitions and the ways that international students develop their knowledge of academic language (for instance, Dippold, Heron, & Gravett, 2021). Other work has focused on pedagogies, for example, by considering experiences of intercultural group work, including the social complexities of teamwork between peers from different countries (such as Reid & Garson, 2017). There have also been reflections on developing more explicit support provisions for international students, such as through strengthened approaches to feedback (Chew, 2014). Nonetheless, it has been previously argued that research about pedagogies with international students tends to be methodologically limited or focus on single-site case studies within lecturers' own practices, meaning there is significant room for development on this topic in the future (Lomer & Mittelmeier, 2021).

It is also recognized in the existing literature that geographic mobility means the uprooting of students from their established social support networks, often requiring international students in face-to-face settings to navigate social complexities and develop new support structures (Jindal-Snape & Rienties, 2016). As such, much research has also focused on international students' experiences developing social friendship networks (e.g., Rienties, Héliot, & Jindal-Snape, 2013). For example, Kudo, Volet, and Whitsed (2020) have conceptualized a three-stage ecological model for how students from different cultures develop friendships in higher education. It has been acknowledged that further support is often needed for international students' social transitions through the building of new social resources and networks (Arthur, 2017).

Despite the proliferation of research on this topic, it has been argued that much of it tends to be under-theorized, pragmatic, and developed through a deficit lens

(Lillyman & Bennett, 2014). For example, a discourse analysis of research about internationalization more broadly found limited criticality about underlying issues of power, privilege, and inequality in international education engagements (Mwangi et al., 2018). However, there has been a recent shift towards what has been called "critical internationalization studies," which seek to problematize underlying issues of "the continuation of enduring patterns of Eurocentric knowledge production, exploitive relationships, and inequitable access to resources" (Stein, 2019, p. 3). For work with international students, this means a growing recognition of the ways that they may be stigmatized and unfairly depicted through deficits (Moosavi, 2021). There is also a growing recognition for social inequalities, such as how international students' experiences may be racialized (Madriaga & McCaig, 2019). Thus, the subfield is slowly shifting towards critical recognitions of existing barriers and the framing of international students as "epistemic equals" (Hayes, 2019) – although Stein (2019) argues such approaches remain on the margins and require greater engagement.

Linking this back to ODDE, the research about international students in face-to-face contexts is shaped by mobility and the ways that immersion in a new country or culture impacts individual experiences. This work focuses on the impact and outcomes of being – physically, socially, and emotionally – uprooted and removed from existing known support systems. The social experiences of international students in face-to-face contexts also exist in spaces where difference is made more visible and is informed by everyday micro-interactions. Thus, there is caution needed in assuming the transferability of findings about international students in face-to-face contexts to the experiences of learning through internationalization at a distance. These, it can be argued, are two entirely distinct learning and social experiences, despite the tendency for some literature to conflate the two through the shared terminology of "international students."

Understanding International Distance Students' Transition Experiences

The lack of geographic mobility in ODDE means that the notion of "transition" takes on different meanings for international distance students. As international distance students remain for the most part "at home," this means that their social and cultural structures remain in place, limiting the sense of "uprooting" that is commonly experienced by international students in face-to-face contexts. International distance students also typically remain within their own cultural and linguistic settings, meaning there are fewer life transitions experienced compared to those inherent to migration. However, this raises other potential questions, considering international distance students do not have opportunities to "immerse" themselves in the cultural and linguistic settings of their host institution (Ramanau, 2016) and may encounter greater barriers of assumed knowledge. Some authors, for example, have argued that international distance students may have more limited understandings about the learning expectations of a country that they have less experience with or have perhaps never visited (Zheng & Kenny, 2010). For instance, research has reflected that international distance students may have fewer opportunities to engage with acquiring socially situated language and vocabulary (Fenton-O'Creevy & van Mourik, 2016).

Thus, it is recognized that transitions do still exist in ODDE and that international distance students still encounter new educational norms and values while undertaking a degree abroad (Ramanau, 2016). This may include transitions to using new technologies or encountering uncertainties about expectations for new communication mediums. For instance, research has reflected on cultural differences in online communication styles that may impact learning experiences (Zhang, 2013). This may help explain findings in a wide range of studies about international students' perceived "silence" or lack of engagement with online tools such as forums (see, e.g., Harrison, Harrison, Robinson, & Rawlings, 2018). This has led some to argue for a need for greater intercultural awareness in international distance settings and purposefully designed transition supports for international distance students (Kung, 2017).

Other researchers have considered the extent to which physical distance may create additional hurdles for international distance students. For example, in comparing the experiences of home and international distance students, Gemmell and Harrison (2017) found that international distance students more frequently encountered technical troubles with accessing required resources for study. This links to findings from Mittelmeier et al. (2019), where it was identified that some international distance students found it difficult to access required study materials, influenced by global inequalities in access to high-speed internet. Administrative barriers, such as the payment of tuition fees in foreign currencies (Raghuram, Breines, & Gunter, 2020), can also add additional stressors to routine student activities. Thus, there are practical considerations for international distance in addition to pedagogic reflections.

Previous research has highlighted the sense of social isolation or loneliness that distance learners may feel in the absence of tangible campus spaces for networking (Kaufmann & Vallade, 2020). In this regard, international distance education may create more hurdles for social involvement, though issues such as limited student networks outside of the host institution's country or time zone differences. For example, Madge et al. (2019) found that some international distance students relied on informal support networks through social media to develop a sense of belonging and community with peers. Yet, despite perceptions of limited social engagement, international distance students in some contexts have been shown to still hold a strong sense of belonging and appreciation for their institution (Mittelmeier et al., 2019), prompting consideration for future research about the meaning that distance learning may hold for international students' lives.

While this section is not intended to provide a full review of the research about international distance students' experiences (see, e.g., Lee & Blight, 2019; Stewart, 2019), the research conducted on this topic thus far does start to paint a picture of the complexity of international distance students' experiences. This also demonstrates the ways that the experiences of international distance students are distinct from international students who are geographically mobile, considering the significant differences in their practical environments and the ways that distance shifts their engagement with their institutions. Therefore, these two groups should be distinct in the literature, allowing researchers to focus on their individual situations and transitions. Yet, there is much left unknown at present about international students in ODDE, which is summarized next.

Gaps and Challenges in Existing Knowledge

Knowledge about the experiences and contributions of international distance students has remained relatively under-research and under-theorized in comparison with other aspects of ODDE. For example, in a recent synthesis of trends in research about distance education by Bozkurt and Zawacki-Richter (2021), there was no mention of international distance education or international students. In the research about international students, a systematic review by Yemini and Sagie (2016) noted a growing shift towards research in online spaces, but these comprise only a small number of studies and are clustered together with educational technology more broadly. Thus, there is a need for greater synergy between these two topics, drawing upon how these dual influences converge for international distance learners.

In particular, research about international distance students remains starkly more limited in comparison with the in-depth scholarly understandings about their experiences in face-to-face settings. Given the aforementioned differences in experiences between international students studying in face-to-face versus distance contexts, this represents a significant gap in knowledge against the backdrop of the growing prevalence of ODDE across geographic borders. This issue is exacerbated by a lack of systematic global data about the size and scope of international distance education. Altogether, critical empirical and conceptual knowledge about international students in ODDE remains an area worthy of scholarly attention in the future.

It has been previously argued that research about international students is often methodologically limited to case study research within researchers' own teaching practices (Lomer & Mittelmeier, 2021). Research about international distance students also falls into this trap, whereby much of the existing research considers the usage of highly contextualized pedagogies or technologies, primarily focusing on the use of different online tools. On the whole, there are few examples of longitudinal, cross-institutional, or comparative research on this topic (as, e.g., Gemmell & Harrison, 2017). There are also few studies that have compared issues of pedagogy or student experience between ODDE and face-to-face teaching contexts, meaning there is limited understanding of the specificities of their distinctiveness (although this has been in focus for home students, e.g., Shu & Gu, 2018).

Another issue facing research in this area is the persistent deficit narrative, which frames international students as lacking particular skills or experiences for success (Lillyman & Bennett, 2014; Lomer & Mittelmeier, 2021). In this way, perceptions of "difference" have commonly led to negative portrayals of international distance students' contributions to online learning environments. This is well described by

Lee and Blight (2019, pp. 159–160), who argued in their literature review about international distance students that "[s]pecific groups of students are positioned as being passive, conformist, uncritical and silent." Thus, there is a need for research on this topic to position itself more from the perspective of realizing the potential opportunities available, rather than the barriers created, by international distance learning. Engagement with existing critical internationalization theories (e.g., Stein, 2019), for example, can help develop more well-rounded reflections on experiences that are culturally, socially, academically, and geographically nuanced and complex.

Conclusions and Suggestions

This chapter has highlighted the growing role that international distance students play in ODDE and the ways that their experiences are significantly different from international students in face-to-face learning settings. However, knowledge about their experiences is presently limited due to conflicting definitions or categorizations, limited systematic data, deficit narratives, and limited scholarly attention. For example, there has been limited engagement between ODDE research and existing theories and conceptualizations of internationalization and international students. Yet, this represents an important avenue for research moving forward, particularly as ODDE continues to stretch beyond national borders. Thus, the following practical suggestions for researchers and practitioners provide avenues forward for strengthening understandings of this topic:

Reflect on and explicitly describe chosen categorizations of international distance students. The issues and ambiguities highlighted in this chapter demonstrate pragmatic needs for ODDE researchers and practitioners to critically reflect on labels and categorizations of (international) students with issues of space and place in mind. On a practical level, this means clearly and explicitly defining what is meant by the label of "international student" and reflecting on what assumptions might underpin such labeling. For instance, critical reflection is needed for addressing the fundamental reasons for labeling and the mechanisms with which this has been undertaken. In most circumstances, the phrases "international distance students" and "internationalization at a distance" are preferred terminologies that can more clearly describe the distinct phenomenon being studied or undertaken.

Collect and share systematic data about the prevalence of international distance students. At present, there are no global systematic data collected about the numbers of students who study via international distance education. For data governing bodies, this means work is needed to differentiate definitions of international distance students from international students in face-to-face settings, as their distinct experiences are not currently reflected in the data collected about them. In particular, mechanisms are needed for compiling the numbers of international distance students on a global scale. For individual researchers and practitioners, this means including information, where available, in publications or through public data repositories about the numbers of international distance students in the institutional context where the research or practice has been undertaken. Together, this can help paint a clearer picture of the size and scale of ODDE across borders.

Engage with existing critical theories of internationalization. For researchers, scholarship undertaken in ODDE settings about international distance students tends to frame research through the lens of ODDE without also engaging with the critical conceptualizations developed in the subfield of internationalization of higher education. Relatedly, there is a greater need for research in this area to consider the growing prevalence of critical internationalization studies (Stein, 2019), which seek to engage with the ways that internationalization is politicized and globally uneven. Engagement with this literature also applies to practitioners, considering that there is often limited training available at institutions which focuses on developing interculturally inclusive curricula and pedagogies.

Thus, ODDE research and practice on this topic can develop more complex understandings about international distance students by engaging with the "international-ness" of students' experiences and reflecting on how broader theories about online and distance education intersect with knowledge about internationalization (e.g., as in Pumela, 2012). In particular, one consideration is the ways that deficits currently frame research and practice with international distance students, through assumptions of experienced challenges or skills perceived to be in lack (Lee & Blight, 2019; Lillyman & Bennett, 2014; Lomer & Mittelmeier, 2021). A helpful starting point for researchers and practitioners who would like to engage more with these ideas is available at the following curated reading list: https://internationalpedagogies.home.blog/critical-reading-list-for-researchers/

For researchers, develop innovative research designs that encourage nuanced understandings about international students. The conclusion of Mittelmeier et al. (2021b) outlined a list of key questions to guide future research about internationalization at a distance and the experiences of international distance students. In this regard, one critique of the existing research about international distance students is that it tends to be limited in scope, focusing on specific tools, pedagogies, or experiences in single learning contexts. As such, there is space for more methodological and research design innovations that considers, for example:

- Cross-contextual experiences of international distance students, comparing their experiences across disciplines, institutions, or countries.
- In-depth and comparative analyses of students based in different countries or from different backgrounds.
- Comparisons of the experiences of international students in face-to-face and ODDE settings.
- Comparisons of the experiences of students based in the country of the awarding institution and those based in other countries.
- Longitudinal understandings of experiences over time or throughout a program of study.

- Sequential development of learning provisions over time with different cohorts of students.

Such approaches would add more nuances to emerging knowledge about this topic, which remains under-theorized compared to broader ODDE experiences or the experiences of international students in face-to-face settings.

Altogether, this chapter has argued that we presently have limited vocabulary and knowledge in both research and practice for discussing the experiences of international distance students in ODDE who learn under internationalization at a distance. However, international distance students are a growing group of learners with distinct experiences that are characterized by wide-ranging dualities, particularly in their status as both located "at home" while learning "abroad." The nuances and complexities of such experiences are a growing topic of interest for scholars and a key area of further conceptualization in the work on ODDE to come.

References

Arthur, N. (2017). Supporting international students through strengthening their social resources. *Studies in Higher Education, 42*(5), 887–894.

Bardhan, N., & Zhang, B. (2017). A post/decolonial view of race and identity through the narratives of U.S. international students from the Global South. *Communication Quarterly, 65*(3), 285–306.

Bond, B. (2019). International students: Language, culture, and the 'performance of identity'. *Teaching in Higher Education, 24*(5), 649–665.

Bozkurt, A., & Zawacki-Richter, O. (2021). Trends and patterns in distance education (2014–2019): A synthesis of scholarly publications and a visualization of the intellectual landscape. *The International Review of Research in Open and Distance Learning, 22*(2), 19–45.

Breines, M. R., Raghuram, P., & Gunter, A. (2019). Infrastructures of immobility: Enabling international distance education students in Africa to not move. *Mobilities, 14*(4), 484–499.

Carr, R. (Ed.). (1999). *The Asian distance learner*. Open University of Hong Kong Press.

Chew, E. (2014). "To listen or to read?" Audio or written assessment feedback for international students in the UK. *On the Horizon, 22*(2), 127–135.

Crowther, P., Joris, M., Otten, M., Nilsson, B., Teekens, H., & Wächter, B. (2000). *Internationalisation at home: A position paper*. Paper presented at the European Association for International Education, Amsterdam, Netherlands.

de Wit, H. (2013). The different faces and phases of internationalisation of higher education. In A. Maldonado-Maldonado & R. Malee Bassett (Eds.), *The forefront of international higher education*. Springer.

Dervin, F. (2011). A plea for change in research on intercultural discourses: A 'liquid' approach to the study of the acculturation of Chinese students. *Journal of Multicultural Discourses, 69*(1), 37–52.

Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of Educational Technology Systems, 49*(1), 5–22.

Dippold, D., Heron, M., & Gravett, K. (2021). International students' linguistic transitions into disciplinary studies: A rhizomatic perspective. *Higher Education*.

Fenton-O'Creevy, M., & van Mourik, C. (2016). 'I understood the words but I didn't know what they meant': Japanese online MBA students' experiences of British assessment practices. *Open Learning, 31*(2), 130–140.
Gayton, A. M. (2019). Exploring the widening participation-internationalisation nexus: Evidence from current theory and practice. *Journal of Further and Higher Education*.
Gemmell, I., & Harrison, R. (2017). A comparison between national and transnational students' access of online learning support materials and experiences of technical difficulties on a fully online distance learning master of public health programme. *Open Learning, 32*(1), 66–80.
Gu, Q., & Schweisfurth, M. (2006). Who adapts? Beyond cultural models of 'the' Chinese learner. *Language, Culture, and Curriculum, 19*(2), 74–89.
Harrison, R. A., Harrison, A., Robinson, C., & Rawlings, B. (2018). The experience of international postgraduate students on a distance-learning programme. *Distance Education, 39*(4), 480–494.
Hayes, A. (2019). "We loved it because we felt that we existed there in the classroom!": International students as epistemic equals versus double-country oppression. *Journal of Studies in International Education, 23*(5), 554–571.
HESA. (2021). Table 21 – Aggregate offshore students by HE provider and level of study 2014/15 to 2019/20. Available at: https://www.hesa.ac.uk/data-and-analysis/students/table-21
Jindal-Snape, D., & Rienties, B. (2016). *Multidimensional transitions of international students*. Routledge.
Jones, E. (2017). Problematising and reimagining the notion of 'international student experience' Problematising and reimagining the notion of 'international student experience'. *Studies in Higher Education, 42*(5), 933–943.
Kaufmann, R., & Vallade, J. I. (2020). Exploring connections in the online learning environment: Student perceptions of rapport, climate, and loneliness. *Interactive Learning Environments.*
Kesnold Mesidor, J., & Sly, K. F. (2016). Factors that contribute to the adjustment of international students. *Journal of International Students, 6*(1), 262–282.
Knight, J. (2004). Internationalization remodeled: Definition, approaches, and rationales. *Journal of Studies in International Education, 8*(1), 5–31.
Kudo, K., Volet, S., & Whitsed, C. (2020). Intercultural relationship development and higher education internationalisation: A qualitative investigation based on a three-stage ecological and person-in-context conceptual framework. *Higher Education, 80*, 913–932.
Kung, M. (2017). Methods and strategies for working with international students learning online in the U.S. *TechTrends, 61*, 479–485.
Lee, K., & Blight, B. (2019). Four narratives about online international students: A critical literature review. *Distance Education, 40*(2), 153–169.
Lillyman, S., & Bennett, C. (2014). Providing a positive learning experience for international students studying at UK universities: A literature review. *Journal of Research in International Education, 13*(1), 63–75.
Lomer, S., & Mittelmeier, J. (2020). Ethical challenges of hosting international Chinese students. In M. Natzler (Ed.), *UK Universities and China*. Higher Education Policy Institute.
Lomer, S., & Mittelmeier, J. (2021). Mapping the research on pedagogies with international students in the UK: A systematic literature review. *Teaching in Higher Education*.
Madge, C., Breines, M. R., Dalu, M. T. B., Gunter, A., Mittelmeier, J., Prinsloo, P., & Raghuram, P. (2019). WhatsApp use among African international distance education (IDE) students: Transferring, translating, and transforming educational experiences. *Learning, Media, and Technology, 44*(3), 267–282.
Madriaga, M., & McCaig, C. (2019). How international students of colour become black: A story of whiteness in English higher education. *Teaching in Higher Education.*
Migration Data Portal. (2021). *Types of migration: International students.* Available at: https://migrationdataportal.org/themes/international-students. Accessed 26 Feb 2021.
Mittelmeier, J., Rienties, B., Rogaten, J., Gunter, A., & Raghuram, P. (2019). Internationalisation at a distance and at home: Academic and social adjustment in a south African distance learning context. *International Journal of Intercultural Relations, 72*, 1–12.

Mittelmeier, J., Gunter, A., Raghuram, P., & Rienties, B. (2021a). Migration intentions of international distance education students studying from a South African institutions: Unpacking potential brain drain. *Globalisation, Societies, and Education*.

Mittelmeier, J., Rienties, B., Gunter, A., & Raghuram, P. (2021b). Conceptualizing internationalization at a distance: A "third category" of university internationalization. *Journal of Studies in International Education, 25*(3), 266–282.

Moosavi, L. (2021). The myth of academic tolerance: The stigmatisation of east Asian students in Western higher education. *Asian Ethnicity.*

Mwangi, C. A. G., Latafat, S., Hammond, S., Kommers, S., Thoma, H. S., Berger, J., & Blanco-Ramirez, G. (2018). Criticality in international higher education research: A critical discourse analysis of higher education journals. *Higher Education, 76*, 1091–1107.

OECD. (2021). *International student mobility.* Available at: https://data.oecd.org/students/international-student-mobility.htm. Accessed 26 Feb 2021.

Pumela, M. (2012). Mapping the interplay between open distance learning and internationalisation principles. *The International Review of Research in Open and Distributed Learning, 13*(3).

Raghuram, P., Breines, M. R., & Gunter, A. (2020). Beyond #FeesMustFall: International students, fees and everyday agency in the era of decolonisation. *Geoforum, 109*, 95–105.

Ramanau, R. (2016). Internationalization at a distance: A study of the online management curriculum. *Journal of Management Education, 40*(5), 545–575.

Reid, E., & Garson, K. (2017). Rethinking multicultural group work as intercultural learning. *Journal of Studies in International Education, 21*(3), 195–212.

Rienties, B., Héliot, Y., & Jindal-Snape, D. (2013). Understanding social learning relations of international students in a large classroom using social network analysis. *Higher Education, 66*, 489–504.

Shu, H., & Gu, X. (2018). Determining the difference between online and face-to-face student-group interactions in a blended learning course. *The Internet and Higher Education, 39*, 13–21.

Simpson, O. (2013). *Supporting students for success in online and distance education*. Routledge.

Song, J. (2020). Contesting and negotiating othering from within: A Saudi Arabian female student's gendered experiences in the U.S. *Journal of Language, Identity, & Education, 19*(3), 149–162.

Stein, S. (2019). Critical internationalization studies at an impasse: Making space for complexity, uncertainty, and complicity in a time of global challenges. *Studies in Higher Education.*

Stewart, W. (2017). Recognizing the expatriate and transnational distance student: A preliminary demographic exploration in the Republic of Korea. *Open Praxis, 9*(4), 463–481.

Stewart, W. (2019). The complexity of transnational distance students: A review of the literature. *Open Praxis, 11*(1), 23–39.

Subotzky, G., & Prinsloo, P. (2011). Turning the tide: A socio-critical model and framework for improving student success in open distance learning at the University of South Africa. *Distance Education, 32*(2), 177–193.

Tait, A. (2018). Open universities: The next phase. *Asian Association of Open Universities Journal, 13*(1), 13–23.

Tight, M. (2021). Globalization and internationalization as frameworks for higher education research. *Research Papers in Education, 1*, 52–74.

Tran, L. T., & Vu, T. T. P. (2018). 'Agency in mobility': Towards a conceptualisation of international student agency in transnational mobility. *Educational Review, 70*(2), 167–187.

UIS. (2021). *Glossary of statistical terms.* Available at: http://uis.unesco.org/en/glossary. Accessed 26 Feb 2021.

White, B., & Lee, J. J. (2020). The future of international HE in a post-mobility world. *University World News.* Available at: https://www.universityworldnews.com/post.php?story=20200417105255362

Yemini, M., & Sagie, N. (2016). Research on internationalisation in higher education – Exploratory analysis. *Perspectives: Policy and Practice in Higher Education, 20*(2–3), 90–98.

Zhang, Y. (2013). Power distance in online learning: Experiences of Chinese learners in U.S. higher education. *The International Review of Research in Open and Distributed Learning, 14*(4).

Zheng, Z., & Kenny, R. (2010). Learning in an online distanced education course: Experiences of three international students. *The International Review of Research in Open and Distributed Learning, 11*(1), 17–36.

International Partnerships and Curriculum Design

25

Tanja Reiffenrath and Angelika Thielsch

Contents

Abstract

In recent years, efforts to internationalize teaching, learning, and the curriculum using digital media have increased and (higher) education institutions around the world have embraced virtual communication and collaboration to foster and maintain international partnerships. This chapter surveys linkages between international partnerships and curriculum design. Based on concepts and designs that can help to establish virtual joint educational initiatives within the framework of international (institutional) partnerships, this chapter introduces different curriculum design models and their implications for international partnerships in order

T. Reiffenrath (✉)
Student and Academic Services, Internationlisation of the Curriculum, Georg-August-Universität Göttingen, Göttingen, Germany
e-mail: tanja.reiffenrath@zvw.uni-goettingen.de

A. Thielsch
Student and Academic Services, Teaching and Learning in Higher Education, Georg-August-Universität Göttingen, Göttingen, Germany
e-mail: angelika.thielsch@zvw.uni-goettingen.de

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_90

to enable readers to initiate new curriculum design processes or evaluate existing curricula with regard to the involvement of and virtual collaboration with international partners.

Keywords

International partnerships · Virtual mobility · Virtual exchange · Curriculum design models · Formal curriculum · Informal curriculum · Hidden curriculum

Introduction

Prior to the Covid-19 pandemic, discussions about international partnerships and the related curriculum design processes mainly focused on how physical mobility could be implemented in on-campus study programs. Not least due to the amount of experiences with online teaching, this focus seems to have changed now in higher education institutions (HEIs). Yet even before the pandemic reached educational settings worldwide, the value of distance education for internationalization processes had been recognized. For some time now, distance learning has been characterized as a relevant element to foster the international connection that underlies higher education in general, because it addresses collaboration and openness between international partners and invites the exchange of ideas without the necessity to travel (Coates, 2020, 41ff.). To better understand the benefits of distance education, it is vital to overcome the negative connotation of the term "distance" and to establish a better understanding of what it means to "be at university" (Bayne, Gallagher, & Lamb, 2014).

Current research on international partnerships draws from these reconsiderations of what it means to have international experiences in one's studies and allows international partnerships to transfer their insights into their study programs via curriculum design processes. This chapter begins by focusing on concepts and designs that can help to establish joint educational initiatives based on international partnerships. Thereafter, it invites readers to explore curriculum development approaches and thus provides a foundation to initiate new curriculum processes or evaluate existing ones with regard to the involvement of international partners.

Even though most of the examples and studies underlying this chapter derive from the context of higher education, their underlying concepts – especially on the level of curriculum design – are applicable to educational settings in general. Our focus on HEI mainly derives from the fact that more studies on realized international (online) programs exist in this field. Linking this research with findings on curriculum design allows us to focus on those aspects which seem most crucial in successful partnerships: to name and to understand the benefits that the partners wish to achieve together (cf. Eddy, 2010).

Educational Approaches and Concepts in International Partnerships

In a setting with international partners, curricula can be designed along different axes. Next to double and joint degree programs – with closely aligned curricula in closed consortia that rely on the physical mobility of students as they progress through the curriculum – a number of formats have emerged that situate teaching and learning in virtual, in parts collaborative, settings. These can complement pedagogical approaches to the international (on-site) classroom (Carroll, 2015; Gregersen-Hermans & Lauridsen, 2021) in the context of purposeful Internationalization at Home and thus make international experiences more widely accessible to students (Beelen & Jones, 2015).

This is becoming increasingly relevant, since there has been, as Helm, Guth, Shuminov, and van der Velden (2020) note, "growing recognition of the limited reach of mobility" (p. 92). The Erasmus+ Higher Education Impact Study (European Commission, 2019) observes both accessibility issues and limited diversity among the students who choose to study abroad. In their widely cited definition, Beelen and Jones (2015) refer to Internationalization at Home (IaH) as "the purposeful integration of international and intercultural dimensions into the formal and informal curriculum for all students within domestic learning environments" (p. 7). IaH measures thus explicitly target not only students in more exclusive double or joint degree programs but, most of all, students in rather nationally oriented degree programs. Through the integration of, for instance, case studies and literature from other cultural contexts, comparative angles, local community-based research projects, or service learning projects that touch on global issues, students may further develop their intercultural skills and build a well-founded knowledge of international issues in their discipline. IaH is explicitly not meant to substitute a study abroad but contribute to competence development regardless of mobility periods.

Virtual teaching and learning, especially in collaborative scenarios, have a particular appeal in this regard: They can provide for a more direct access to "other" perspectives and knowledge, enable students to gain insights into teaching and learning in other academic cultures, and foster intercultural teamwork. Moreover, virtual exchange formats hold the promise to boost the internationalization of so-called "underrepresented groups," i.e., students "who cannot or do not want to be mobile because of their socio-cultural background and status, disabilities and chronic diseases, family and parental obligations, financial issues or language proficiency" (European Students' Union & Erasmus Student Network, n.d.).

In this part of the chapter, frequently used formats will be surveyed and potential shortcomings as well as opportunities for international partnerships and curriculum design will be spotlighted.

Virtual Mobility

Virtual mobility (VM) offers – which may be understood as a loose form of international collaboration – have surged at institutions that would otherwise strongly identify as campus-based universities. In *Virtual Internationalization* (2020), Bruhn traces the development of VM: Already in 2002, she notes, Wächter anticipated the transformation of higher education toward flexible learning that could take place independent of time and location and "almost borderless" choices (qtd. in Bruhn, p. 24) and its potential for international activities, such as marketing and recruitment and transnational education, was soon recognized (ibid.). VM is a term commonly used to refer to students and academics in higher education studying or teaching at another institution outside their own country for a limited time without physically leaving their home. In practice, this entails following one or several online courses from a host university and acquiring credits that are recognized at the home university (van Hove, 2021, n. p.). VM therefore allows for access to perspectives and knowledge not available on the home campus, exposes students to another academic culture, as well as provides them with the opportunity to build a distinctive profile in their curriculum.

To this effect, VM can play an important role in international partnerships when it comes to aligning curricula more closely, sharing resources, and complementing each institutions' profile. This may be particularly interesting in the context of specialized degree programs or so-called "small subjects," such as classical archaeology or biostatistics, that only attract relatively small numbers of students and operate with limited resources. In the context of evolving partnerships, VM may also serve as a testbed for the development of international joint degree programs. Against the backdrop of the EU learning mobility benchmark of 20% mobile students as well as diverse national mobility benchmarks, VM is expected to play a significant role in the near future, since student taking part in VM offers can be formally enrolled as exchange or guest students (Joint Research Centre [European Commission], Sánchez Barrioluengo,, & Flisi, 2017). This status, together with the credit transfer from host to home institution, can prospectively count toward internationalization benchmarks (van Hove, 2021, n. p.).

However, it should be noted that virtual mobility hardly enables intercultural dialogue (Reiffenrath, de Louw, & Haug, 2020, n. p.). Van Hove (2021), too, stresses that the international dimension of the learning settings that emerge in the context of VM offers often remains untapped. He goes as far as to state that VM "is in no way guaranteed to be a useful internationalisation experience . . . [T]aking courses abroad and transferring credits are the traditional formal features of student mobility, and if you take the physical mobility out of the equation, this is what you are left with" (n. p.). He holds and argues that the emphasis on "mobility" is in this case misleading. During periods of physical mobility, students to a large extent develop competences not in the context of the formal curriculum they partake in at the host institution, but through immersion and the offers made available to them beyond the classroom (ibid.). What follows from van Hove's argument is that both HEIs and policymakers should be keenly aware of the limitations of VM when distributing funding and recognizing international activities and academics' engagement in international partnerships.

Virtual Exchange (VE) and Collaborative Online International Learning (COIL)

The intercultural dialogue that is missing from VM formats takes center stage in so-called virtual exchange (VE) scenarios. The most comprehensive and most commonly cited definition of virtual exchange is one that has emerged in the context of the EVOLVE project (https://evolve-erasmus.eu/) funded by the European Commission. Here, VE is referred to as

> "technology-enabled, sustained, people to people education programmes or activities in which constructive communication and interaction takes place between individuals or groups who are geographically separated and/or from different cultural backgrounds, with the support of educators or facilitators. Virtual Exchange combines the deep impact of intercultural dialogue and exchange with the broad reach of digital technology" (EVOLVE, 2021, n. p.).

Like VM, VE has attracted considerable interest during the Covid-19 pandemic. Yet virtual exchange is by no means a recent phenomenon. In his seminal paper *From Telecollaboration to Virtual Exchange*, O'Dowd (2018) traces the development of approaches to virtual exchange. Already in the 1990s, just a few years after the emergence of the Internet, international virtual academic collaborations were initiated in language learning classrooms in order to enable students to interact with native speakers and create semi-authentic communication settings. Incarnations of such international teaching and learning partnerships have commonly be referred to as telecollaboration (Belz, 2003), e-tandem (O'Rourke, 2007), telecollaboration 2.0 (Guth & Helm, 2010), or online intercultural exchange (O'Dowd & Lewis, 2016). These formats use technology to connect classes across borders and facilitate asynchronous and/or synchronous communication. Often, they are bilingual with language learners and native speakers, respectively, on each side of the partnership. Under the guidance of their teachers, who serve as languacultural experts (Belz, 2003, p. 2), the students engage in joint projects or tasks: They might produce a presentation, website, media campaign, or other product together based on a comparison of their cultural contexts, analyze parallel texts, or conduct ethnographic interviews followed up with reflective essays (O'Dowd, 2018). These virtual collaborations thus serve the purpose of fostering students' foreign language skills and increasing intercultural competences (cf. Belz, 2003, p. 2). As such, they are integrated into local foreign language programs that offer a room for preparation and reflection.

Yet also beyond the area of foreign language education, discipline-specific virtual collaboration formats have emerged. O'Dowd subsumes these under the category of the "shared-syllabus approach" (O'Dowd, 2018, p. 14). In 2004, Jon Rubin established the COIL – collaborative online international learning – methodology at the State University of New York (SUNY) and their network of international partners, which nowadays is one of the largest global VE networks (https://coil.suny.edu/global-network). COIL has become a widespread practice and the term is now used shorthand for the practice of "connecting two or more classes of similar course content in different countries" (O'Dowd, 2018, p. 14). As quite explicitly stated in the term, collaboration, and with this an exchange of ideas and perspectives from different cultural contexts, is at the heart of this practice. The intercultural exchange begins with the academics who at the onset of the collaboration need to negotiate what and how they are going to teach. Subsequently, they design units together that aim at "breaking the ice" (initiating contact between the two classes and enabling the formation of small, intercultural teams), comparing and contrasting perspectives, connecting and collaborating in the context of a joint group project (along with a presentation), and finally reflecting on the experience. Often COIL partnerships run for 6–10 weeks in order to accommodate differing semester schedules and are integrated into the context of a semester-long course at the respective institution. Their design principles have the potential to be extended to interdisciplinary contexts.

In order to be sustainable, all of these formats require strong international partnerships as their basis. Especially in the context of VE, frictions between bottom-up initiatives and top-down institutional visions emerge and can significantly affect how institutions can move forward with international virtual academic collaborations. Formalized, long-term international partnerships are central in creating a framework in which joint or shared online courses may be sustained and eventually upscaled. However, most international partnership agreements have been negotiated for the purpose of physical mobility of students and staff and may not as easily accommodate virtual collaboration. Moreover, the success of VE in particular hinges on mutual trust between the academics who facilitate it, who may have longstanding professional relationships established during joint research, previous employment, or mobility periods. The connections that individual academics harness for virtual collaboration may therefore not always be in line with their institutions' strategic international partnerships. HEIs need to be mindful of these frictions in their efforts to connect bottom-up activities and leadership agendas so as to recognize (and ideally award) individual efforts while at the same time strengthening institutional visions in internationalization.

Curriculum Design: The Backbone of International (Online) Programs and Partnerships

This chapter addresses the topics of curriculum and curriculum design on two levels: first, on the level of study programs, and second, on the level of single courses. The aim is to substantiate that collaboration and communication on both levels are crucial for international partnerships in higher education and especially so when the academics involved seek to implement virtual exchange or other distance education formats.

Before elaborating on this in more detail, it is necessary to stipulate some basic thoughts regarding the main terms in this section: the term "curriculum" and the term "curriculum development." Lau (2001, p. 31) stresses that both terms

> "[...] are problematic themselves as they imply two well-defined stages – the stage of development and the stage where the curriculum is completed. In fact, there is no line separating the two. Curriculum development is not an entity that stops before going into classrooms and curriculum is not a package that stops developing in the classrooms. It is a continuous process of constructing and modifying."

Therefore, in this chapter, curriculum and curriculum design are understood as overlapping and context-related educational frameworks that are continually changing due to social, physical, economic, and cultural environments (O'Neill, 2015, p. 12). Both require ongoing and detailed context analysis, not only regarding their inherent assumptions about how teaching and learning works (in higher education) but also concerning the roles that they attribute to those who teach, those who learn, and the relationship of both (Young, 2014, p. 7). Even though such an analytic perspective on curriculum (design) is advisable in all educational contexts, it seems even more relevant in international partnerships that seek to connect (elements of) their curriculum virtually or through student mobility.

Several theories and models of curriculum design can be used to approach this complex issue. In this chapter, the most prominent of them will be introduced and discussed regarding their ability to include context-sensitive aspects that might be relevant for (virtual) joint programs.

Curriculum Design on the Program Level: Common Models

Curriculum design models can help to develop a study program to structure and to fill it. Even though it is rather common that several models can be used to (further) develop a study program, it is relevant to understand their different perspectives as well as their benefits. All of these models can offer orientation to those involved in curriculum design processes, because they provide the common ground based on which programs' content, its outcomes, and its elements can be discussed and reflected. Apart from this benefit, these models may differ immensely in their approach and thus lead to different challenges for cooperatively planned (international) programs. Especially so when the joint programs are meant to be conducted online. In addition to the more content- and outcome-focused models that will be described below, curriculum design processes for distance and online education need to consider questions of how to provide students of another HEI access to one's virtual learning environment as well as the challenges caused by different time zones or varying data policies in the students' home regions. Hence, the levels of "technology, pedagogy, and learner community" (Chugh, Ledger, & Shields, 2017, p. 10) should be inherent part of a curriculum design process as soon as its main structure is set. Three model types to develop such a main structure will be introduced in the following.

The first model type presented here are the so-called process models (Kelly, 2004; Knight, 2001). These models follow the conviction that if you get the "ingredients" right in a curriculum (O'Neill, 2015, p. 29) the right outcome will follow. The focus while designing the elements of a study program lies on the possible learning paths of the students and on their study process.

In process models, orientation for the development of a (new) curriculum derives from the attributes and features which an institution marks as relevant for itself (Leask, 2001). For example, a process model can closely connect to the level of strategies and policies of each institution, hence it applies an *organizational perspective*. It also applies a *program perspective*, because it focuses on the level of academic activities that are possible and desirable in a specific setting. Such a context-sensitive approach holds possibilities for an individual HEI, as it might foster the effectiveness of internal strategies (e.g., a mission statement for teaching and learning or a virtual mobility policy). Yet, as Leask (2001, p. 101) points out, "although it is logical that what is embedded in policy and administrative systems should also be embedded in and integral to the academic practices of an institution, this convergence is not always easy to achieve." With regard to international partnerships seeking to implement virtual exchange programs or modules, the application of process models can be even more laborious. Here, not only assumptions about teaching and learning must be somehow aligned, but also the strategic orientations of the institutions involved. If such a model is applied, the desired learning journeys, which are possible in campus-based programs compared to virtual study programs, should be taken into consideration as well (Chugh et al., 2017, p. 7) and thus add another perspective in the development process. Since this can be challenging, international reforms in education (e.g., the Bologna reform in Europe) apply models that offer an easier starting point and allow for easier comparability: the so-called product models.

Product models focus on "developing and communicating transparent outcomes" (O'Neill, 2015, p. 28). They seek to define the intended outcomes of a study program and then use this focus to design necessary elements to reach these outcomes within the curriculum structure. Since product models closely relate to management ideologies – "planning, organising, leading and controlling" (Lau, 2001, p. 33) – they are being criticized despite their focus on comparability. Such critique (mostly by postmodern perspectives) emphasizes that these models suggest that the process of curriculum planning can be neutral (ibid.). Yet this is hardly possible, as becomes evident when characteristics of the outcomes of a study program are critically examined. Because, when talking about outcomes – or rather intended learning outcomes – it is necessary to differentiate between different levels of outcomes: individual courses, modules, and programs (Hussey & Smith, 2008). Moreover, and possibly even more relevant in the context of international partnerships, the desired outcomes among the individuals who are involved will differ. Those who design programs or modules might intend to reach other goals than the teachers who design the courses, and yet again, their intended outcomes most probably will differ from those of their students. Thus, when applying a product model, "care should be taken not to be overly prescriptive when writing learning outcomes" (O'Neill, 2015, p. 28; see also Hussey & Smith, 2003), especially so when a program addresses an international target group and aims at intercultural competence development in an online setting such as VE. With respect to international partnerships, however, the benefits of product models remain, since they offer an explicit starting point to discuss possible directions of a joint endeavor.

A third type of models that is particularly promising with regard to module-based international partnerships like virtual exchange are the so-called postmodern models (Doll, 1993). These seek to apply a less fixed and more relationship-based approach to designing curriculum and demand “that power needs to lie in the hands of teachers and learners” (Lau, 2001, p. 38). It focuses on the interactive and negotiating nature of educational processes and tries not to emphasize prescribed plans or fixed objectives. In doing so, postmodern models value the human aspects that influence curriculum design processes, such as attitudes, feelings, and values (Ornstein & Hunkins, 2018). Such approaches might be challenging when they are applied in the design of joint degree programs in higher education. Still, they can be exceptionally valuable for international online curricula, since they urge those who set up a study program to actively pay attention to the social contexts in which they will be realized and thus pay close(r) attention to the intended target group. Which students should be attracted with the program? Which motivations could drive their involvement in an online program instead of a campus-based program (e.g., family-related or financial aspects)? How might the social contexts of the students relate to the contexts of the institutions that offer the program? Postmodern models can help to integrate elements in the curriculum that address these aspects and thereby provide incentives for teachers and students to include these issues in their interactions.

As mentioned above, it is not uncommon to apply different models at different stages during a curriculum design process. When deciding on which model type international partners should start such a process, they might find it useful to consider the overarching characteristics of these models as introduced by Ornstein and Hunkins (2018). Will they prefer a more subjective and learner-centered approach (a so-called *nontechnical approach*) or rather an approach that focuses on structuring the learning environment and thus seeming more logical and efficient (a so-called *technical approach*) (O’Neill, 2015, p. 31)? Which will help them better to design a new program? Which might be more fruitful to evaluate it? Whichever model educational institutions (and partners) decide to use, it is crucial to keep in mind what each curriculum should focus at the following: to create a framework that fosters education by giving room for specific teaching and learning experiences to emerge. Table 1 offers orientation on the purposes and rationales for the application of these different models.

Introducing these models exemplifies why curriculum development in general is a complex issue, and even more so for international (online) programs. Furthermore, when preparing such a new distance curriculum “[i]t is important to keep in mind that a great deal of the work in teaching at a distance may occur prior to the start of the course” (Restauri, 2004, p. 32). Here, experiences from online distance education elucidate that institutional support is crucial when implementing such programs. Individual approaches, in which the responsibility to design and facilitate online courses solely lies with the teachers, may cause them to “falter,” if they do not have enough time to prepare the educational environment (Restauri, 2004, p. 33). In contrast to this, collaborative approaches (ibid.) are said to offer sufficient support structures from the HEI (e.g., through instructional designers or educational technologists) and thereby ensure that teachers can concentrate on designing course

Table 1 Focus, benefits, and challenges of different curriculum design models

Model type	Main focus	Benefits for international online programs	Challenges for international online programs
Process models	Focus on content and activities; seeks to rely on the inherent strengths of a HEI	Allows for discussions on institutional strategies and policies as foundation to develop a curriculum together	Finding a common ground can be harder, especially regarding expectations on where and how to conduct single modules or courses
Product models	Focus on outcomes; seeks to make the aims of a program transparent and achievable	Offers a starting point to enter discussions about future joint programs	Risk of disregarding the variety of motives and hope for outcomes that students and teachers bring to class
Postmodern models	Focus on relationships and human aspects; seeks to provide space for interactive and flexible educational processes	Impulse to consider the social contexts of the students and to integrate elements in the curriculum that address this	Partner institutions should be well aware of their respective contexts and reflect those; easier when following process model discussions

material and learning activities. Crowley, Chen, and Gisbert Cerver (2018) reason that these approaches are especially efficient in international online programs and their "particularly challenging" preparation (p. 3). In both approaches, time commitment proves to be the most relevant factor why international partners should work with transparent milestones yet flexible timelines while developing a new program.

Finding the right balance between time management, a guiding structure, and considerations of social aspects is equally crucial in curriculum design that addresses the program level as it is for actions on the level of individual courses. For the latter, research offers again valuable perspectives.

Curriculum Design on the Course Level: Valuable Starting Points

In each course or module, teachers should be aware that different curriculum dimensions overlap and interact constantly, especially in higher education. Such an approach might yield insights that can be valuable for the design of the curriculum of single courses and also as a foundation for the redesign of entire study programs. Leask (2015, p. 8 f.) describes these dimensions and their connections as follows: First, there is the formal curriculum, which refers to all the planned experiences that students will make during their studies. This includes learning activities and assessments, information that is provided, and the teaching approaches one applies. On the course level, the formal curriculum is closely linked to the syllabus. The second dimension is the informal curriculum, which comprises all the additional and – most of all – unassessed activities of students, in relation to and beyond a single course. These activities can focus on the social aspects of one's studies, like networking events, and often address currents learning needs (e.g., e-tutors supporting academic writing processes). Some of these activities are pre-organized or provided by the institution itself, others emerge thanks to individual initiatives of student groups. Even though unplanned for and sometimes unknown to teachers, the elements of the informal curriculum influence the learning experience of the students immensely. Sometimes they "[. . .] complement what happens in the formal curriculum" (Leask, 2015, p. 8), yet sometimes they may also be "inconsistent and opposed to it" (ibid.). However challenging these – at times conflicting – interactions between the formal and the informal curriculum can be for students, the real challenge lies in understanding the implicit elements within a teaching and learning context.

These belong to the third dimension that one should look out for while analyzing the curriculum. This dimension is called the hidden curriculum. The name implies that these elements of the curriculum include unanticipated expectations or unintended messages that students are confronted with during their studies. These implicit messages can be sent by their teachers, and also by their peers, via learning materials, the setup of a course management system, or through the mode of assessment (cf. Nahardani, Rastgou Salami, Mirmoghtadaie, & Keshavarzi, 2021; Thielsch, 2021). To better understand the complexity of the hidden curriculum, especially in distance education and virtual exchange contexts, Anderson (2001, p. 33; referring to Ahola, 2000) recommends to acknowledge that this dimension of the curriculum includes different subdimensions. Adapted to the context of higher education and international partnerships, this chapter suggests the following summary of these subdimensions:

- Learning to learn in *this* course (e.g., using the tools and collaborating with peers).
- Learning to be a student in *this* formal context (e.g., the role as student might differ in an asynchronous joint classroom compared to an on-campus, synchronous lecture).
- Learning to be an expert in this disciplinary context (e.g., knowing how to act meaningfully in the courses' disciplinary approach aka being socialized in this discipline).
- Learning "to play the game" (Anderson, 2001, p. 33) in *this* learning environment (e.g., how to address the teacher in emails and other invisible aspects).

In international teaching contexts and in online courses in particular, these subdimensions need to be carefully considered and reflected on by the teachers that are involved. This is of great importance, since "[t]he online environment is infinitely changeable [. . .]" (Nahardani et al., 2021, n. p.) due to its often (culturally) heterogeneous student group and the variety of educational technologies that can be applied to facilitate learning. This variety which allows selecting a suitable tool for a specific setting and/or target group can also cause challenges for those who are involved in a course. Related to this, Pedro, Barbosa, and Santos (2018, p. 10 f., referring to Gibson, 1986) argue that the use of a new technology or any other (pedagogical) element changes the "ecosystem" (ibid.) of the educational environment in a way that teachers and students alike must be prepared to integrate it in their educational practices.

This applies to the course level as much as to the level of study programs, their bureaucracy, laws, and regulations. But even though such administrative aspects influence the hidden curriculum (e.g., by using specific learning management systems), it is the teachers' behavior and their teaching approach that ultimately affect the students' learning in class (Nahardani et al., 2021). Keeping this in mind, teachers should methodically build the educational environment of their courses and discuss its characteristics with the students. Furthermore, they should reflect on their teaching environment preferences as well as their academic socialization, both of which add to the hidden elements of the curriculum in a course. Even though it can be assumed that there is never only one version of a hidden curriculum in one context, but rather multiple evolving versions (Thielsch, 2017), the students encounter these realities through the way a course is organized and facilitated. Being mindful and explicit in its design, therefore, should have highest priority in international as well as in online settings.

Based on these insights it becomes evident that curriculum design does not only depend on those who develop its frameworks, but on those who design and facilitate the courses as well. Regarding this, Beelen (2017) accurately points out that in fact teachers often are "the missing link" in higher education strategies. However well the strategies, its sustainable implementation depends on those who provide the bridge between the curriculum as framework and the curriculum as possible experiences for the students. As means to support the academic teaching staff, it is necessary to reach the relevant agents in a specific context – those who are involved in international modules – and to connect them with the "key stakeholders" (Beelen, 2017, p. 146) that can support such processes: specialists in internationalization, educational developers, and – in case of virtual exchange contexts – educational technologists. Furthermore, and especially in broader strategic partnerships, this should include possibilities to build relationships between faculty members of the different partners (Bordogna, 2018) and to initiate peer learning situations. Offering each other insights into one's teaching realities, their contexts, preferred approaches, and technologies, may not only prepare colleagues for their international teaching experiences, but also provide the reflective impulses needed to be explicit in one's own teaching.

Implications

As has been outlined in this chapter, curriculum design for digital learning offers in international educational contexts, especially in international higher education, is a multilayered and complex process. The resulting learning offers can be extremely rewarding experiences for both learners and teachers involved and have the potential to intensify institutional partnerships, but the process of designing such curricula may well be demanding. Educational policies – in Europe, for instance, the European Commission's Digital Education Action Plan (2021–2027) or the Communication on the European Education Area – influence HEIs strategic efforts in this domain. Here, currently more than 280 higher education institutions are part of so-called European Universities (EUNs), i.e., European HEI alliances that are piloted in two rounds of an Erasmus+ call. These aim at transforming the European Higher Education Area, a goal that will involve not only substantial efforts in linking campus (infra)structures but also a collective push to make curricula more flexible in order to allow for the "seamless mobility" – physical, virtual, and blended exchange opportunities – envisioned in the call.

Both VE and VM play a key role in European strategic partnership networks and are often conceptualized as steps toward physical mobility. More longitudinal studies such as Lee, Leibowitz, and Rezek (2021) could generate insights into how virtual opportunities for international and intercultural engagement affect physical mobility and potentially alleviate some of the perceived barriers to study abroad. In a similar vein, blended mobility (a combination of virtual and physical mobility) is to play a significant role in the Erasmus+2021–2027 program, with the first so-called blended intensive programs being funded in 2021. In the coming years, accompanying research might scrutinize success factors for intercultural exchange in blended programs.

Research in (online) distance education show that "[. . .] learning and teaching is seen as the result of careful design and orchestration of the learning environment, communication processes, learner support and use of learning materials" (Zawacki-Richter & Naidu, 2016, p. 249). From a curriculum design perspective, it seems advisable that future research explores the perception of the learning environment in (joint) international online programs in more depth, especially in COIL or VE courses. Analyzing these perceptions might be helpful for future academics who engage in the design of these programs. Even though each new course should be designed in a context-sensitive manner, such insights might exemplify the challenges and possibilities that can emerge in different educational environments for different groups of learners and therefore increase the awareness of what "context-sensitive" can imply in these settings.

When it comes to developing future curricula, the following points should be given special consideration: Along with other issues concerning international partnerships in higher education institutions, Internationalization at Home measures, such as curriculum development initiatives and virtual collaborations, frequently land on the desk of international officers. While international offices with their "helicopter perspective" involve in strategic processes and their good internal networks play an instrumental role (Brunner-Sobanski, Haug, de Louw, & Reiffenrath, 2021), internationalization activities as the ones outlined in this chapter strongly depend on the ownership of the academics, study program coordinators, and students involved. VE and VM in particular continue to pose a number of questions, ranging from legal implications and data protection compliance, technical solutions, and didactic scenarios to issues of intercultural communication. This urges a range of stakeholders across the institution to become involved in processes of internationalisztion, such as curriculum developers, instructional designers, and educational technologists. Building bridges inside the institution and enabling networking between these service units is thus key, as is an ongoing exchange of experiences and learnings. Interdisciplinary communities of practice inside the institution can foster such an exchange and reinforce the support structures that may already be available to teachers seeking to design a curriculum together with international partners. Making explicit that such a collaborative approach aimed for, instead of the exception, should be a strategical decision international partner institutions should make, to ensure the quality of their joint programs.

Part of such support structures should be to work with and critically reflect on the various curriculum design models, their benefits, and their limitations. This includes that HEIs should be well aware of their own approaches when (re)designing study programs or international modules and to communicate these approaches openly within their institution (cf. Hudzik, 2015). In addition to such a top-down impulse, emphasize should be put on implementing initiatives that support academic teaching staff to develop (additional) teaching competencies beyond the level of course design and active learning strategies. Such initiatives should focus on helping academics to become a reflective teacher (Ashwin et al., 2015) and to understand the hidden expectations in their own teaching practices (cf. Thielsch, 2021). Research in the field of educational and faculty development stresses that academics can best develop these (additional) teaching competencies to reflect and adapt their understanding of how teaching and learning *should work* in collaboration with their peers (Roxå, Mårtensson, & Alveteg, 2011), a finding that can be easily applied to situations in which teachers are getting used to designing and facilitating online courses well.

Considering the significant role of academic teachers for successfully implemented international modules and courses, the question arises how HEIs can recognize and acknowledge the efforts of this group. So far, structures to award faculty members for their participation on international endeavors and their achievements therein are seldom, if not missing in the educational sector (Eddy, 2010).

Conclusion

In discourses on internationalization (at Home), the notion of “Internationalization for All” has recently gained currency as HEIs strive to adjust or create measures in an effort to better include underrepresented groups in international activities. In 2021, for example, the Academic Cooperation Association (ACA) (2021) “prioritised learning more about and supporting inclusion in international higher education in the context of Europe.” At the same time, it is well worth to critically reflect on the nexus of internationalization and diversity and inclusion and invite the question of how partnerships can serve the purpose of making internationalization activities more inclusive, especially through the role they play in curriculum design processes. A joint and thorough reflection on the influence of the hidden curriculum on the formal curriculum may, for instance, help to uncover traces of colonial thought in the curriculum and help to foster decolonial approaches or the integration of indigenous perspectives and knowledge(s) into the curriculum. Along the different sub-dimensions developed above, teachers will need to probe the inclusiveness of the tools and learning environments used in VE and other joint teaching settings. It is not only in North-South partnerships, but also in partnerships between Europe and its southern and eastern neighbors that issues of in/equality and the question of how technology may reinforce or remediate these need to be addressed. With regard to VE and its potential for inclusion, O'Dowd and Beelen have recently voiced scepticism and have urged practitioners not to assume that "Internationalisation at Home and VE are inherently inclusive" (O'Dowd & Beelen, 2021, n. p.). While they note that many of the issues that factor into persisting inequalities in virtual collaborations are already known from physical classroom settings, more research into "how processes of inclusion and exclusion play out in virtual settings" (ibid.) is needed.

Barnett and Guzmán-Valenzuela (2021) stress that the "socio-economic-cultural spaces" in which HEIs exist are changing, widening, and becoming more porous. Educational institutions of the twenty-first century, which are maneuvering in these new contexts, should be aware of their social and epistemological responsibilities. Responsibilities involve developing a critical awareness of hegemonic ways of knowledge production and the will to challenge them (ibid.). To significantly engage in international partnerships and collaborate in teaching and learning situations can be understood as one step toward such responsibility. Not only because of the international perspectives involved in curriculum design processes, but mostly because of the diverse perspectives that students in international contexts will encounter.

Educational institutions can support these tendencies by inviting for openness in teaching and learning. Teachers who openly engage in discussions about their teaching practices might be better equipped to engage with differing perspectives in their own (international) courses and to support their students to be equally able to do so. Further research regarding the usage of open educational resources (Mishra, 2017) or open educational practices (Ehlers, 2011) in international partnerships might be a valuable means to foster such a notion of openness. Likewise, studies on how to establish and sustain communities of practice among the members of international partners are needed to emphasize their value in curriculum design processes. Because no matter how well established an international partnership is or how sensible curriculum design processes are being approached, it depends on the teaching competencies and critical openness of teachers to make both meaningful.

References

Academic Cooperation Association (ACA). (2021). ACA Think Pieces: Inclusion in International Higher Education: European Perspectives & Insights. Retrieved from ACA Website: https://aca-secretariat.be/post_other_pub/internationalisation-for-all-belonging-or-not-that-is-the-question/?yearPub=2021

Ahola, S. (2000, 08.-02.09). Hidden curriculum in higher education: Something to fear for or comply to. Paper presented at the innovations in higher education conference, Helsinki, Finland. August 30 to September 02. Gehalten auf der Innovations in Higher Education conference, Helsinki.

Anderson, T. (2001). The hidden curriculum in distance education an updated view. *Change: The Magazine of Higher Learning, 33*(6), 28–35. https://doi.org/10.1080/00091380109601824.

Ashwin, P., Boud, D., Coate, K., Hallett, F., Keane, E., Krause, K.-L., . . . Tooher, M. (2015). *Reflective teaching in higher education*. London, England: Bloomsbury Academic.

Barnett, R., & Guzmán-Valenzuela, C. (2021). The socially responsible European university: A challenging project. *International Journal of Sustainability in Higher Education*, ahead-of-print (ahead-of-print). https://doi.org/10.1108/IJSHE-03-2021-0100.

Bayne, S., Gallagher, M. S., & Lamb, J. (2014). Being 'at' university: The social topologies of distance students. *Higher Education, 67*(5), 569–583. https://doi.org/10.1007/s10734-013-9662-4.

Beelen, J. (2017). The missing link in internationalisation: Developing the skills of lecturers. *Zeitschrift für Hochschulentwicklung, 12*(4), 133–150.

Beelen, J., & Jones, E. (2015). Redefining internationalization at home. In A. Curaj, L. Matei, R. Pricopie, J. Salmi, & P. Scott (Eds.), *The European higher education area: Between critical reflections and future policies* (pp. 59–72). Cham, Switzerland: Springer International Publishing. https://doi.org/10.1007/978-3-319-20877-0_5.

Belz, J. A. (2003). Linguistic perspectives on the development of intercultural competence in telecollaboration. *Language Learning & Technology, 7*(2), 68–117. http://dx.doi.org/10125/25201.

Bordogna, C. M. (2018). Transnational higher education partnerships and the role of operational faculty members: Developing an alternative theoretical approach for empirical research. *Journal of Studies in International Education, 22*(1), 3–19. https://doi.org/10.1177/1028315317724555.

Bruhn, E. (2020). *Virtual internationalization in higher education*. Bielefeld, Germany: wbv Media. https://doi.org/10.3278/6004797w.

Brunner-Sobanski, E., Haug, E., de Louw, E., & Reiffenrath, T. (2021, April). Pathways to practice: Implementing Internationalisation at Home for international officers. Retrieved from EAIE website: https://www.eaie.org/our-resources/library/publication/Pathways-to-practice/pathways-to-practice-implementing-internationalisation-at-home-for-international-officers.html

Carroll, J. (2015). *Tools for Teaching in an Educationally Mobile World*. London: Routledge. https://doi.org/10.4324/9781315765433

Chugh, R., Ledger, S., & Shields, R. (2017). Curriculum design for distance education in the tertiary sector. *Turkish Online Journal of Distance Education, 18*(2), 4–15.

Coates, H. (2020). Higher education design. Big Deal partnerships, technologies and capabilities. Singapore, Singapore: Palgrave Macmillan.

Crowley, C., Chen, H., & Gisbert Cerver, M. (2018). A team-based collaboration used for the development of transnational online distance education courses. *International Journal of E-Learning and Distance Education, 33*(2), 1–22.

Doll, W. E. (1993). *A postmodern perspective on curriculum*. New York, NY: Teachers College Press.

Eddy, P. (2010). Partnerships and collaborations in higher education. In School of Education Book Chapters: Bd. 36.2 (pp. 1–15). Retrieved from https://scholarworks.wm.edu/educationbookchapters/38

Ehlers, U. (2011). From open educational resources to open educational practices. *eLearning Papers, 23*, 1–8.

European Commission. (2019). Erasmus+ higher education impact study. Final Report. Brussels. Retrieved from https://www.che-consult.de/wp-content/uploads/2020/07/Erasmus__Impact_Study_NC-02-19-323-EN-N.pdf

European Students' Union, & Erasmus Student Network. (n.d.). Bringing the student perspective to the debate on mobility, virtual exchange and blended learning. Joint position paper by the European Students' Union and the Erasmus Student Network. Retrieved from https://esn.org/sites/default/files/news/esn_esu_policy_paper_-_mobility_and_virtual_blended_activities.pdf

EVOLVE. (2021). What is virtual exchange? Retrieved from EVOLVE Project website: https://evolve-erasmus.eu/about-evolve/what-is-virtual-exchange/

Gibson, J. J. (1986). *The ecological approach to visual perception*. Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Gregersen-Hermans, J., & Lauridsen, K. M. (Eds.). (2021). *Internationalising programmes in higher education: An educational development perspective*. Abingdon, Oxon/New York, NY: Routledge.

Guth, S., & Helm, F. (Eds.). (2010). *Telecollaboration 2.0: Language, literacies and intercultural learning in the 21st century*. Bern, Switzerland/New York, NY: Peter Lang.

Helm, F., Guth, S., Shuminov, E., & van der Velden, B. (2020). Erasmus+ virtual exchange. In *Internationalisation of higher education* (Vol. D.2.20, pp. 91–109). Berlin, Germany: duz Medienhaus. Retrieved from https://www.handbook-internationalisation.com/media/02818d033e0d8e74995aed9e16e1bb8970060360/r7aklh/pdf_5e81ffb452439.pdf.

Hudzik, J. K. (2015). *Comprehensive internationalization: Institutional pathways to success*. London, England/New York, NY: Routledge.

Hussey, T., & Smith, P. (2003). The uses of learning outcomes. *Teaching in Higher Education, 8*(3), 357–368. https://doi.org/10.1080/13562510309399.

Hussey, T., & Smith, P. (2008). Learning outcomes: A conceptual analysis. *Teaching in Higher Education, 13*(1), 107–115. https://doi.org/10.1080/13562510701794159.

Joint Research Centre (European Commission), Sánchez Barrioluengo, M., & Flisi, S. (2017). *Student mobility in tertiary education: Institutional factors and regional attractiveness*. LU: Publications Office of the European Union. Retrieved from https://data.europa.eu/doi/10.2760/675338.

Kelly, A. V. (2004). *The curriculum: Theory and practice* (5th ed.). London, England/Thousand Oaks, Calif: Sage.

Knight, P. T. (2001). Complexity and curriculum: A process approach to curriculum-making. *Teaching in Higher Education, 6*(3), 369–381. https://doi.org/10.1080/13562510120061223.

Lau, D. C.-M. (2001). Analysing the curriculum development process: Three models. *Pedagogy, Culture & Society, 9*(1), 29–44. https://doi.org/10.1080/14681360100200107.

Leask, B. (2001). Bridging the Gap: Internationalizing university curricula. *Journal of Studies in International Education, 5*(2), 100–115.

Leask, B. (2015). *Internationalizing the curriculum*. London, England/New York, NY: Routledge/Taylor & Francis Group.

Lee, J., Leibowitz, J., & Rezek, J. (2021). The impact of international virtual exchange on participation in education abroad. *Journal of Studies in International Education*. https://doi.org/10.1177/10283153211052777.

Mishra, S. (2017). Open educational resources: Removing barriers from within. *Distance Education, 38*(3), 369–380. https://doi.org/10.1080/01587919.2017.1369350.

Nahardani, S. Z., Rastgou Salami, M., Mirmoghtadaie, Z., & Keshavarzi, M. H. (2021). The hidden curriculum in online education is based on systematized review. *Shiraz E-Medical Journal, 23*(4). https://doi.org/10.5812/semj.105445.

O'Dowd, R. (2018). From telecollaboration to virtual exchange: State-of-the-art and the role of UNICollaboration in moving forward. *Journal of Virtual Exchange, 1*, 1–23. https://doi.org/10.14705/rpnet.2018.jve.1.

O'Dowd, R., & Beelen, J. (2021, September 7). Virtual exchange and Internationalisation at Home: Navigating the terminology. Retrieved from EAIE Blog website: https://www.eaie.org/blog/virtual-exchange-iah-terminology.html

O'Dowd, R., & Lewis, T. (Eds.). (2016). *Online intercultural exchange: Policy, pedagogy, practice* (First issued in paperback). New York, NY/London, England: Routledge/Taylor & Francis Group.

O'Neill, G. (2015). *Curriculum Design in Higher Education: Theory to practice*. Dublin, Republic of Ireland: UCD Teaching & Learning. Retrieved from https://researchrepository.ucd.ie/handle/10197/7137.

O'Rourke, B. (2007). Models of telecollaboration: E-tandem. In R. O'Dowd (Ed.), *Online intercultural exchange: An introduction for foreign language teachers* (pp. 41–62). Bristol, England/Blue Ridge Summit, PA: Multilingual Matters. https://doi.org/10.21832/9781847690104.

Ornstein, A. C., & Hunkins, F. P. (2018). *Curriculum: Foundations, principles, and issues* (7th ed.). Harlow, England: Pearson Education Limited.

Pedro, L. F. M. G., Barbosa, C. M. M. de O, & Santos, C. M. das N. (2018). A critical review of mobile learning integration in formal educational contexts. *International Journal of Educational Technology in Higher Education, 15*(1), 10. https://doi.org/10.1186/s41239-018-0091-4.

Reiffenrath, T., de Louw, E., & Haug, E. (2020, Oktober 8). Virtual exchange and Internationalisation at Home: The perfect pairing. Retrieved from EAIE Blog website: https://www.eaie.org/blog/virtual-exchange-internationalisation-at-home.html

Restauri, S. L. (2004). Creating an effective online distance education program using targeted support factors. *TechTrends: Linking Research and Practice to Improve Learning, 48*(6), 32–39.

Roxå, T., Mårtensson, K., & Alveteg, M. (2011). Understanding and influencing teaching and learning cultures at university: A network approach. *Higher Education, 62*(1), 99–111. https://doi.org/10.1007/s10734-010-9368-9.

Thielsch, A. (2017). Approaching the invisible: Hidden curriculum and implicit expectations in higher education. *Zeitschrift Für Hochschulentwicklung*, 167–187. https://doi.org/10.3217/zfhe-12-04/11.

Thielsch, A. (2021). Dem Unbewussten auf der Spur Zur Wahrnehmung, Entstehung und Explikation verborgener Erwartungen in der Hochschullehre. *die hochschullehre, 12*, 100–105. https://doi.org/10.3278/HSL2112W.

van Hove, P. (2021, September 23). Words matter: Why we should stop talking about 'virtual mobility'. Retrieved from EAIE Blog website: https://www.eaie.org/blog/words-matter-virtual-mobility.html

Young, M. (2014). What is a curriculum and what can it do? *The Curriculum Journal, 25*(1), 7–13. https://doi.org/10.1080/09585176.2014.902526.

Zawacki-Richter, O., & Naidu, S. (2016). Mapping research trends from 35 years of publications in distance education. *Distance Education, 37*(3), 245–269. https://doi.org/10.1080/01587919.2016.1185079.

Conversations on Indigenous Centric ODDE Design

26

Jean-Paul Restoule and Kathy Snow

Contents

Abstract

In reviewing Indigenous approaches to open, distance, and digital education, the authors found that Indigenous people have been keen to adopt and adapt technologies for their own uses and purposes but are less successful in controlling and creating technologies that dominate the learning landscape. Given the scant literature available on this topic, using the methodologies of kitchen table talks, the authors dialogue their experiences working with Indigenous people and designs in open, distance, and online teaching and education. Through their storytelling, the authors elicit examples of experience in postsecondary education contexts in Canada including the use of talking circles, blended and inclusive learning, development of safe spaces and hubs, and challenges balancing home life and online learning. The importance of relationships, community connection, and validating self and identity in the learning experience were strong themes that emerged from the dialogue. Indigenous pedagogies and knowledges online is a relatively unexplored phenomenon and this initial foray into characteristics,

J.-P. Restoule
University of Victoria, Victoria, BC, Canada
e-mail: jpr@uvic.ca

K. Snow (✉)
University of Prince Edward Island, Charlottetown, PEI, Canada
e-mail: ksnow@upei.ca

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_92

successes, and challenges may be a starting point for future scholars to follow. By sharing highly contextualized narratives from Canada, we aim to increase the global dialogue around decolonizing ODDE and therefore end the chapter by examining our experience against ongoing international discussions.

Keywords

Indigenous pedagogy · e-Learning · Postsecondary

Introduction

Within Canada, reproduction of colonial systems and values is exhibited at all levels of education, so it is unsurprising to see the impacts of non-Indigenous values permeating online education, both in the development of the tools of learning and the ways in which they are adopted and used. Dron (2021) argues all technology fits into typology consisting of two categories. Hard technologies, he classifies as those which fall into predictable, anticipated patterns of use that cannot be changed by participants, while soft technologies are those whose use can be influenced by the user. The Dron (2021) characterization provides a lens for exploring the permeating values of digital learning tools predominating open, distance, and digital education (ODDE) in Canada, which can be identified as both hard and soft when the cultural values underpinning the design of the technology are evaluated. For example, most formalized education systems have adopted some form of Learning Management System (LMS) as a centralized and secure place for digital education. This tool determines how students and teachers behave and what can be shared and determines patterns of communication, based on the expectations of the designers. This is considered a hard technology and as this chapter will discuss is made considerably more impenetrable when the cultural values of the users are different from the designers of the technology. Many institutions in Canada from K-12 public education to postsecondary have made valiant efforts to soften technologies used, to increase accessibility, and to engage with more open educational resources adopting social media and more flexible tools than the aforementioned LMS. Some of these efforts will also be explored, through a discussion and analysis of the critical points, which make technologies culturally harder or softer to navigate. Numerous articles have been written from multicultural, social justice, and critical pedagogy perspectives outlining that online learning design is not culturally neutral (McLoughlin & Oliver, 2000; Myers, 2021; Öztok, 2019); however, very little has been written about the conflict between Indigenous worldviews and the biases inherent in educational technology. In the absence of a large body of evidence to draw upon, creating a reference work seated in third party research becomes challenging. Furthermore, to minimize the impact of pan-Indigenizing, or reducing the Indigenous experience to themes, we begin, as is common practice with research in Indigenous communities, with the highly contextualized stories and locations. From there, we move outward to international issues and themes, which have arisen from colonial contact globally.

Therefore, this chapter diverges from others in this series as the discussion progresses. It is first important to clarify through use of a generalized characterization of Indigenous world view as it relates to education, where the hardness or conflicts in values arise for Indigenous students and educators. Next, a traditional synthesis of the limited literature available is shared with critical themes impacting systemic and classroom-based ODDE adoption by and for Indigenous students. However, perspectives on the challenges and opportunities differ somewhat, depending on individual positionality. How colonial systems are experienced as an Indigenous person is very different from that of a non-Indigenous person. Therefore, to deepen discussion, the themes are unpacked through a process of storytelling, as the authors, from their alternative positions, share their research, struggles, and efforts in decolonizing, or softening education and technologies, respectively. The chapter closes with an invitation for further research and discussion on the role grass-roots, or microlevel interventions can play in beginning the process of dismantling systemic bias.

Framing the Landscape

Although each Indigenous people has a distinct expression of worldview developed over long periods of relation with land and community, there are many remarkable similarities across Indigenous peoples that contrast with Western (non-Indigenous) worldviews. Of course, there are individuals and subsections of both Indigenous and Western peoples who counter, resist, or differ from the norms ascribed to their culture, but the generalizations are nonetheless instructive. In creating a list of characteristics of Indigenous approaches to teaching and learning and knowing, for the sake of comparison for an international audience, it is necessary to make some generalizations.

Indigenous epistemology is characterized by Castellano (2000) as holistic, narrative, orally transmitted, experiential, and personal. Storytelling, which embodies these characteristics, is a central tool for teaching and learning in Indigenous contexts (Cajete, 2017). Everyone is a potential teacher, and the Land is the supreme teacher. How each person experiences their relationships with land and community, and contemplates and processes the meanings to be made from these relations, can lead to deep learning. "Ways of knowing and learning in an Indigenous paradigm are. . .profoundly personal and spiritual, based upon a journey into the inner metaphysical and spiritual worlds of the self" (Madjidi & Restoule, 2017, p. 167).

Equally important to Indigenous pedagogy are the various modes of experiential learning, such as modeling, observation, in-context learning, apprenticeships, learning games, and tag-along teaching as methods for "learning by doing" (Simpson, 2000, p. 257). "Through observation, experience, and practice children learned the skills, beliefs, values, and norms of their culture" (Swan, 1998, pp. 51–52). "Indigenous epistemology conceptualises education and learning as both life-wide (happening across formal, nonformal, and informal settings) and lifelong" (Lanigan, 1998, p. 106). Learning, in an Indigenous paradigm, tends to be experiential, personal, and highly contextual.

Arising from the tensions of worldview and the literature review, two complex themes emerged: contextuality of learning design and relationality, authenticity, and Indigenous identity online, both in and outside of education.

Contextuality in Learning Design

In some of the earliest discussions of contextual needs in website design, Collis and Remmers (1997) characterized websites in two typologies, those with low-level context designed for international or universalized navigation and understanding and those designed to be highly contextualized for very specific local needs. While critiquing instructional design practices specifically, Henderson (1994) identified most design for online learning at that time, fell into one of three approaches with respect to culture: inclusive, inverted, and unidimensional. Inclusive design, according to Henderson (1994), examined perspectives of minority groups but did not challenge dominant culture, while inverted designs began from the minority perspective first, but potentially failed to prepare learners with the cultural capital needed to succeed in mainstream society, and finally unidimensional designs ignored diversity entirely assuming cultural neutrality in learning. Henderson (1994) called for a fourth model, which reflected the multicultural realities of society, included multiple cultural ways of learning and promoted equity of learning outcomes. These two early works have been contrasted to highlight that it is not only the "hard" design choices of online learning structures, but also the "soft" pedagogical and teaching positionalities which need consideration. As early as 1999, Joo (1999) warned that the universal design of the Internet has the potential to impact microlevel student-teacher interactions as well as the macroculture of education and politics by enculturating students into universal expectations. Since that time, there have been repeated calls for systemic attention to culturally inclusive learning environments, through the adoption of local cultural context, values, and language (McLoughlin & Oliver, 2000; Myers, 2021; Öztok, 2019).

In Canada, despite the Truth and Reconciliation Commission's calls to action (2015) addressing systemic challenges in all areas of Canadian society, with specific calls for education, strategic change to support Indigenous centric digital learning has not yet been addressed. Digital infrastructure, for communities with low populations separated by large distances, has only become a recent concern of national funding initiatives (Kuersten, 2018). Remote learning, for these communities, which are predominantly Indigenous, has been dominated by correspondence models, with very few e-learning opportunities (Barbour, LaBonte, & Nagle, 2020). This appears to be a consistent challenge internationally as Reedy (2019) describing the experience of Indigenous students in Australia has reported parallel issues of unrealistic institutional expectations for technology infrastructure, access, and reliability as a key challenge to participating in online higher education.

In contrast, Internet and social media usage is as ubiquitous in Indigenous communities as it is in mainstream Canada, and while there are differing views regarding the acceptance and use of the Internet within Indigenous communities, its adoption by communities continues to be fundamental for the development of basic rights such as social security, cultural expression, and conservation (Castleton, 2018). Pfeifer (2019) described Inuit usage of social media as a tool for resistance of colonial oppression and amplification of cultural values. Pfeifer (2019) contrasted his observations of the usage of Facebook, by non-Indigenous users as a space for self-promotion, while Inuit usage was a space for community support and aid. Through this same discussion, he cautioned non-Indigenous researchers to critically examine their analysis of Indigenous social media usage, against their personal, potentially misplaced, and unacknowledged cultural bias. Unlike digital learning tools, Internet and social media have been quickly adopted and become important elements supporting community and contextualized learning (Bujold, Fox, Prosper, Pictou & Martin, 2021). In more examples from the north, social media and mobile devices have been used to ensure community safety through report conditions of the ice for hunters/travellers, disseminating traditional stories, teaching traditional skills, and recording a collective history of communities and experiences (Castleton, 2018; Cook, 2018; Hicks & White, 2000). Indigenous youth are avidly using digital technologies, which they have the ability to mold, to build relationships, and to support their learning, culture, and identity with the wider world (Bujold et al., 2021).

Relationships, Authenticity, and Identity

Bennett, Tanoa, Uinik, and van den Berg (2021) have discussed the need for online learning with Indigenous students founded in a relationship's first approach, concentrating on designing inclusive learning approaches and taking digital inequity into consideration. The development of authentic relationships in online learning is not solely a challenge for Indigenous students. However, Reedy (2019) identified Indigenous students face greater challenges to relationship building in online learning spaces because they had no safe mechanism to self-identify nor connect with other Indigenous students, which contributed to greater feelings of isolation in learning. Within this study, conducted pre-COVID-19, students also identified the feeling of being forced into online learning as the only option to continue study without having to physically relocate, which led to feelings of resentment which were amplified by the lack of Indigenous specific supports provided for distance students. Finally, students identified a conflicting values frame in the relationships they attempted to make with online peers, describing relationships as uncomfortable because they felt they were competitive rather than supportive connections. Arising from these findings, Reedy (2019) developed recommendations for online learning designs for Indigenous students, which included designing for social connection, facilitating interaction between Indigenous students, nourishing interaction via cultural interfacing, ensuring the teacher is present and plays a supportive role, ensuring content is diverse and ensuring materials are accessible through flexible ways of interacting.

As has been observed in multicultural learning environments, Reeves and Reeves (1997) argue that miscommunication and challenges in learning arise when cultural expectations differ, or the teacher shares a form of interaction/learning that is not universally accepted or understood by the students. The language of the learning and tools in Canada is predominantly English or French, while in person learning languages can be as flexible as the speakers in the room, work online is limited to the language of the tool, and the Roman orthography limitations of most interfaces. Beyond cultural misunderstandings, Moodley and Dlamini (2021), sharing examples from South Africa, describe the pragmatic challenges of incorporating less common African Languages in digital tool development in relation to issues of political recognition, translation of technical terms where no Indigenous term preexists, and accessibility of information when translation is not possible.

In short, scant literature could be found presenting rigorous analysis of the role and function of ODDE with Indigenous communities, but rather case examples of practices. Therefore, towards building a systematic analysis, the remainder of this chapter takes a parallel approach, as authors share our research and experiences as highly contextualized examples, as Indigenous researcher and ally in relation to describing decolonized approaches to online learning.

Kitchen table talks, a method identified by Tootoo (2018), was adopted as a methodology to describe and analyze issues of Indigenous ODDE while making the authors' positions apparent. This approach is founded in informal conversation and can also be considered a form of storytelling. Storytelling is an accepted means of knowledge gathering in Indigenous contexts, and as Smith (1999) discusses, a means to privilege Indigenous ways of knowing by shifting the balance of power from Western communication patterns to Indigenous. Our table talk sessions took place both asynchronously and through phone conversations as we worked together on opposite sides of the country currently called Canada.

The Conversation

JPR: My first foray into designing an online course was a MOOC (Restoule, 2013), the first MOOC ever taught at Ontario Institute for the Studies of Education (OISE) at the University of Toronto. The Dean felt it fitting that the first MOOC should be about Indigenous education and invited me to design it. My main concern when teaching face to face was fostering community in the classroom, building relationships with the students and ensuring they all could bring forward their gifts in our meetings as we discussed the readings and held circle. Translating this experience online, and to a MOOC no less, was going to be a challenge. An activity we held in face-to-face classrooms was to draw a place that holds special meaning that we then linked to one another and/or displayed on the wall while discussing the themes that emerged. Our technology translator helped convert the activity to online space where we could upload pictures or files about our special place before the thematic reflections.

One of the early hard (Dron, 2021) technological limitations of the MOOC platform I discovered was that video lectures anchored everything. If you wanted people to upload their special place and then discuss it, they could not simply do that activity. There had to be a lecture video that led them there. We created videos to explain the activity. I have to admit that this could be a useful tool to have the instructor discuss the activity in a friendly way but I abandoned scripts early on as they felt too rigid, unnatural. When I used a teleprompter I felt robotic (even if I wrote the words!!). I preferred to have a sketch of what to cover and then talk as it felt more direct, natural and like the classroom experience. But when it comes to activities and graded portions, precision and accuracy in expectations is significant, and videos, while useful, could sometimes seem to present a different nuance or weighting on parts of the assignment. The more content added and in different formats, the more potential for multiple meanings and for misunderstanding. As much as MOOC course design has this idea that you can wind it up and let it run on its own, I see this as one of the central tensions in designing online learning with First Nations approaches to learning in mind. Whereas First Nations learning is highly contextual, located in a specific community or context, where the teacher and the learner know each other and have a relationship, with online learning the teaching is transactional and generally designed to apply to a wider audience, assuming in the process there is a universal learner (Restoule, 2017). In the same way Western science knowledge assumes universality, much online learning assumes universality in the knowers and learners, rather than situating the learning in the relationship between them, not unlike Henderson's notion of inclusive design.

KMS: While JPs first experience designing online learning in higher education focused on relationality and context overcoming the limitations of the tools, my first experience was a partnership design with the Indigenous services department supporting pre-nursing students' transitions which sought to apply university adopted tools to a better purpose (Snow, 2016a). In this example, building on the literature of accessibility, which pointed to the need for flexible learning, community and authenticity (Shield, 2004). I worked with a nursing instructor to design online supports, such as recorded lectures, pre-lesson scaffolds (in the form of power point lecture notes), and an asynchronous discussion space. Over the course of 1 year, I interviewed students multiple times to determine what if any of the online scaffolding was useful. I learned, very little was. Looking back, it makes sense, we had applied our colonial deficit thinking to the "problem" at hand. The problem was content acquisition in a content, terminology dense subject, fundamentals of clinical biology for nursing. We didn't acknowledge the students position. While the pre-distribution of course materials offered flexibility, students found the discussion space onerous; if they had questions, they emailed the faculty member directly, or a friend. They didn't have time to read all the posts to discuss, they needed answers quickly. The recorded lectures were still lectures; they were useful if a student missed a class, they were useful for revision because students could fast forward and rewind, to review, but it was still a lecture, which shared compartmentalized, decontextualized biological concepts. The prepared notes faced similar challenges, designed to teach content, not students, but identified these as the most beneficial support because they enabled students to pre-read and freed them from the arduous task of taking detailed notes during lectures, but rather annotate the lecture notes with their understandings. The primary criticism of the supports was lack of context. Students told me, “I can’t see the forest for the trees.” In one of the most poignant conversations I had, a participant told me they entered the program to be a nurse but feared the disconnected knowledge shared in biology class could potentially cause harm to future patients. The connection between course content and nursing practice was not transparent and this lack of understanding was perceived as scary.

My second attempt at supporting Indigenous students in higher education came at the request of the program Manager for a First Nations community based Bachelor of Education program. My supervisor, again seated the challenge of the course in flexibility and accessibility offered by online learning design (Snow, 2016b). The concept was to offer a blended learning course during winter term to reduce driving for the students, most of whom lived more than 60 min of prairie highway driving away. The first critical lesson about the systemic barriers exacerbated by online learning controlled by the institution, for band and employer funded students, arose immediately. As the fee paying organizations worked on independent timelines from the university, many students were placed on “academic holds” and barred from online learning while the university waited for bills to be paid. Academic holds posed no problem in face-to-face courses where students could enter at the instructors’ discretion, and the working practice was to keep a department-created instructor register separate from the official register, until all the fees were paid. However, as we moved online, it became quickly apparent to me as instructor who had paid and who had not, because students with late fees were blocked from online systems in an automated and cascading process that no doubt was efficient for university systems, but from my perspective was an invasion of privacy. As instructor I did not want to know, who has paid and who has not. I just want to teach. Students were forced into the position of explaining, and asking me to develop workarounds for their courses, which I did readily, pulling material out of the university mandated tools, such as the LMS, and placing them in open access locations, such as google docs, where everyone could access. This forced me, in an effort to support all students, to abandon university provided technologies and to act as an advocate with the finance office, to allow the students into courses.

JPR: Observation, experiential learning and relationship are important aspects of Indigenous pedagogy (Simpson, 2000). I remember as an undergraduate that if I really liked a lecturer or a topic that I could sit in the room and learn from the lesson whether I had registered or not. I sat in on a number of lectures on Ancient Egypt that were fascinating but never appeared on my transcript as I was not formally registered. That is simply not possible with courses taught online at a university or college. Maybe that is part of the point with LMS–further institutional control. If you don’t pay you can’t play (learn) and it furthers neoliberalism of post-secondary education as a business rather than a public service. At first I thought this was a side comment but perhaps really it’s the point!

KMS: Beyond the limitations of flexibility and hierarchical institutional control of adopted technologies in post-secondary, there was a second fundamental learning I realized within this blended learning course (Snow, 2016b). Taking away scheduled in person class time, doesn't necessarily increase flexible learning time for students. Many of my students continued to make the 60 min drive to the city to meet with their cohort at coffee shops or in our abandoned classroom, because this was time negotiated away from home that families could understand. It was much harder to ask family to respect independent study time at home, and for many the space at home was not conducive to learning.

JPR: Relationality, and family and community responsibilities often take priority over learning and technology can support students. There was an occasion when a student taking her degree from Sudbury was attempting to select only online courses in order to get her M.Ed. She really wanted an Indigenous focused course but all the OISE offerings were in person. She asked whether she could come to some classes in person, monthly, yet be videoconferencing with the group other days. I decided to give it a try and it was very DIY. . .I literally called her on my laptop (using Skype) and put the computer on a table or chair within our circle. She could see everyone with the exception of the people seated on either side of her (the laptop). When we had group work, she would be assigned a group and her group members carried her to wherever they were meeting. We ensured she knew who was talking by introducing ourselves when we spoke and indicated when we were finished.

This student told me she always felt like part of the class and was not missing anything. The students in person told me they didn't feel put out by having her there on screen (I've participated in some courses where it is a little disconcerting. . .for instance when someone is on a large screen and their image is larger than life, or the volume settings make their voice boom over everyone's). This participation was relatively seamless.

I allowed some future students to do the same when a situation warranted it, including one student who had to be in Africa for a month during the course. So I suppose I had flirted with ways of doing Indigenous pedagogy (like circle) with modifications to allow distance learning and technological inputs for some years before the MOOC. My goal was inclusion and accessibility. How can we facilitate participation and learning for someone who is not always able to be there physically? And If we could adapt our processes to allow someone coming in via computer, what if everyone was on a computer? That was part of the thinking with the MOOC and something we'd adapt differently when doing our smaller private online course for principals (Tessaro et al., 2018).

KMS: Building on my first attempt at blended learning with Indigenous students, my second attempt was better positioned in Indigenous pedagogy to support transcultural learning through relationship and consensus building (Snow, 2020). As I started my first job, as an assistant prof in a faculty of education, I was faced with teaching two cohorts of students concurrently, the mainstream, predominantly non-Indigenous Cape Breton Island campus students and a second cohort in community on mainland Nova Scotia. Separated by about 350 km, a daily or even weekly commute was not possible during the winter months. However, we adopted a blended learning approach that saw lessons delivered face-to-face once a month, within the separate cohorts, while the majority of the work was completed online or in working and learning contexts where the students were located. From simple open ended tasks that allowed students to illustrate their perspectives and creativity through product creation (for example videos of lessons, lesson plan design, experiment development) L'Nu students were able to invite us into wider perspectives on education, learning and community life. The sharing of perspectives and spaces across the two cohorts allowed students a glimpse into one another's world that was discussed at length in the individual cohort face-to-face sessions. The challenge of this course, was building trust across the cohorts, though they were very open among themselves, discussion between the two groups in the online space was often reduced to affirmations "love your work!" or questions "how did you. . ., can you tell me more about. . .," if they acknowledged one another at all.

JPR: I'm struck by the description of how simple videos and sharing of spaces opened up possibilities for transcultural learning. When a team at OISE working with the Martin Family Initiative created a 200 hour online post-secondary course for principals working in First Nations schools, one of the design choices we made early on was reducing the amount of writing and journaling (Tessaro et al., 2018). A first pass through our draft 10 modules made us realize that we'd put a lot of additional writing assignments on principals who are already quite stretched. We decided to reduce writing requirements and demand on their time by using simple video uploading and sharing. The videos allowed participants to easily record their speech and upload for sharing. Additionally, they could show what they were talking about by recording their community and school contexts. While the full potential of this capability was largely untapped in practice, what emerged for me was the value placed on relationship building and being able to see one another. At the midpoint of the course, participants met synchronously to discuss the capstone project. Enjoying the synchronous meeting so much, the pilot course participants advocated to change the course so we would meet synchronously for each of the remaining modules (once monthly). This feature became standard in all subsequent offerings and demonstrated to the course design team the importance of relationship for learning in First Nations contexts (see Tessaro et al., 2018). Relationship was one of the foundational "Rs" we attempted to incorporate into each module of the course. The other R's were respect, relevance, responsibility, and reciprocity (Kirkness & Barnhardt, 2001).

KMS: Writing online in formalized tools, the discussion forum of an LMS for example can be problematic. The community based cohort, did something different. They took ownership of discussions and created a safe space for themselves using a Facebook group. They invited me in, for the duration of the course, but let me know, not all instructors are allowed in, so I was only permitted in because they felt I could contribute respectfully to their community without overwhelming the space. In other words, the rules for me were outlined as they welcomed me in, I wasn't to get too "teachery" in there. I participated there for the semester, observing student conversations about the courses, answering questions when I could, but mostly keeping quiet, unless directly asked. It helped me to understand some of the challenges students were facing both with the courses and balancing work, life and school. This is where the real conversations about the course happened, not in the artificial spaces created in discussion forum. They let me stay, after the course ended, for a while, but as the program ended I was removed from the group (Snow, 2015).

JPR: I remember when the MOOC was active in its first offering in spring of 2013, I was getting off the elevator when I saw a poster for people taking the MOOC. It read, “Meet up Tuesdays in the seminar room.” This was just down the hall from my office! Yet I knew nothing about it. The MOOC was designed to release new content weekly on Mondays. Apparently, this group was getting together after new content came out so they could discuss and work together on the assignments. Amazing! This group was gathering literally 30 steps from my office. But others were forming Facebook groups in cities across Ontario from London, Windsor, Sudbury, Kingston, Thunder Bay, and in Regina, Vancouver, Halifax. These were just the ones I became aware of (I’m not on Facebook, or other socials. . .word just got back to me). Jan Hare, designer and instructor of a UBC MOOC called “Reconciliation through Indigenous Education,” discussed with me the way hubs of learning formed around her MOOC. It’s something we noticed happened formally and informally as people gathered to create a space to meet in person about things they were learning online. In Toronto I was asked to meet a group of librarians who wanted to create MOOC hubs where people taking MOOCs could gather on a regular basis with peer learners to go through experiences together instead of being isolated sole learners at home.

KMS: Recognizing the limiting linear, hierarchical and instructor focused pattern of LMS construction, I tried again, to decolonize this space. In a class designed to examine global and Indigenous perspectives on online learning, rather than a discussion forum, I adopted a cobbled together asynchronous virtual “talking circle” using the LMS blogging tool and a wiki front page, to act as the circle. Students used an electronic talking stick to indicate who was the speaker, with their names (links to their personal blogs) arranged in a circle on the Wiki page. They were required to check back periodically, read the blogs of the people before them in the circle, and when it was their turn, move the talking stick to their name and respond to the issue being discussed by directly building on the thoughts shared by the people before them. From my perspective as the instructor, the conversations were better, but the students, in this case, predominantly non-Indigenous, complained the process was “too much work” and “too difficult to follow.” Danyluk and Hanson (2021), have written about Hanson’s techniques for bringing in talking circles to synchronous discussions. Their work focuses on the importance of recognizing the talking circle protocols, and respecting them in the face of tensions around cultural appropriation. I struggle with this too, as a non-Indigenous scholar, to what degree is it respectful to adopt Indigenous pedagogy full stop, but more so in an online space where misunderstandings are more likely to manifest both for me and my students.

This past 2 years has seen an incredible shift in my work, and not necessarily for the positive, brought about by COVID travel restrictions. The Certificate in Educational Leadership in Nunavut is designed as a co-taught face-to-face program where an Inuk practitioner and frequently a university based academic like myself work together to teach about and for Inuit centric leadership transformation. As this program moved online, we saw declining Inuit participation, challenges bridging between supported technology in schools and university, as well as infrastructure limitations. The content has always been highly contextual, but much of the learning was through dialogue and reflective practice. To accommodate technology limitations of the arctic and teachers' busy schedules we resorted to almost a correspondence model, with readings shipped in a paper based course pack, teleconference calls, in addition to virtual sessions. As we determined what technology could support, we increased synchronous sessions because reading and writing asynchronously was not sustainable for the teachers. Time to type responses, particularly if English was not first language, the LMS inability to support Inuktitut, time to read and time to process responses into writing was much more difficult than a live conversation. The live sessions, though we assumed would be the greatest challenge as we spanned 4 time zones in Canada, were the most appreciated by the students because that was time people could lock in and concentrate. Ultimately, we had to adopt a highly flexible approach to course completion, with timelines outside of the traditional course calendar and individualized.

JPR: During the pandemic, I noticed the challenges learners had with screentime taking up so much of their daily lives. Parents of young children were distracted having to take time to see to their children's wellbeing and own screentime expectations imposed by schooling online.

In 2020, one student dropped the UVIC Indigenous Education summer institute because he could not find time to plan care for two kids under 5 while taking an intensive when we shifted mode of delivery with only 8 weeks to spare. The summer institute in Indigenous Education at UVIC consists of 4 courses taken over 4 weeks in June. It means 6 h of class daily. (He enrolled the following year, once he had time to plan child care, and had a successful experience). One of the adaptations we made to our summer institute going online was reducing each class meeting from 3 h to 1.5 h synchronous. We made up the additional 90 min with activities, additional videos to be consumed at their own pace/time and other readings. But the focus was on activities that learners could do outdoors, on the land, with family. The idea being you need to get out and away from screens and if you're a parent, you need to balance student life with family responsibilities, so why not make an activity you can do together? We had such assignments as finding sit spots and reporting back on observations. What is a space like at different times? Or find a local plant and learn its Indigenous uses, medicinal, food, other. Share in a video upload. These activities could be done with young people. One of the courses is an arts-based course where the students made a drum and incorporated Coast Salish designs on it–another activity that can be done with children.

Concluding Thoughts

As we reach the end of our chapter, we realize there are more questions raised and starting points identified than conclusions. We began by noting that Indigenous infrastructures and approaches are largely ignored in writing about open learning and digital education. Indigenous people as always have adopted and adapted technology for their own uses and purposes (Pfeifer, 2019; Valentine, 1996), but are less successful in creating the technologies that dominate the learning landscape. In this way, there is continued cultural imperialism embedded in the dominance of the most prominent learning platforms, software, and management systems. They are culturally “hard.” Though we began with the specific example of Canada, this same colonial domination permeates LMS design internationally (Dreamson, Thomas, Lee Hong, & Kim, 2017). In the case of online learning delivered in postsecondary education contexts for Indigenous learners or about Indigenous topics, English dominates, and so do assumptions about the delivery of knowledge. In the authors’ experiences, platforms are designed largely to instill or reinforce hierarchies of knowledge while delivering content over geographic spaces and across time (asynchronous) as though they could be removed from contexts and the places and times people are located in. This is a frequent rationale for the adoption of ODDE in higher education internationally, simply a tool for access (Prayaga, Rennie, Pechenkina, & Hunter, 2017). But it fails to address fundamental assumptions underpinning ODDE design. When Indigenous learners or design teams are involved, relationships matter and influence the way learning takes place.

While relationship-building in learning is not exclusively an Indigenous domain, literature indicates it is a must for Indigenous students (Cueva et al., 2018). We saw this in the tension between content removed from relationship and tools that make communication between learners less immediate. Similarly, relationship was critical in large courses, whether fostered in activities linking learners to each other or with personalizing knowledge exchanged horizontally. Content that assumes a universal learner also requires a disembodied transactional approach, one that goes against the ways Indigenous learning has traditionally been done and methods that Indigenous learners prefer.

We witnessed technology in postsecondary education becoming a barrier to learning with students locked out if their tuition was unpaid. Rather than maintaining privacy in their account status, students have the potential shame of explaining their financial status to their professor. We talked about blended learning and how inclusion can be facilitated using adapted Indigenous pedagogies like circle and ways to adapt circle to online spaces. We talked about ways that Indigenous students use technology to connect and create safe spaces for themselves beyond the course, with social media platforms. We discussed additional learning hubs created by learners that create community in contrast to online learning that can feel isolating.

Future research could examine the technological and cultural determinism introduced by learning hardware and software and implications for Indigenous knowledge in online education. Adaptations and changes that bring Indigenous pedagogies and knowledges online can be further examined for their characteristics, successes, and challenges. And the ways learners adapt and interact in online learning spaces for their own benefits, particularly those from and in Indigenous communities would be welcome additions to the larger conversation on open, distance, and digital education.

References

Barbour, M. K., LaBonte, R., & Nagle, J. (2020). State of the nation: K-12 e-Learning in Canada. *Can eLearn*. https://k12sotn.ca/wp-content/uploads/2021/09/StateNation20.pdf

Bennett, R., Tanoa, A., Uinik, B., & van den Berg, C. (2021). Creativity in reactivity: Application of a "relationships-first" strategy in the rapid transition to online learning for indigenous university students curing covid-19. *Journal of Global Indigeneity, 5* (1), 1–13. https://www.journalofglobalindigeneity.com/article/19440-creativity-in-reactivity-application-of-a-relationships-first-strategy-in-the-rapid-transition-to-online-learning-for-indigenous-university-student

Bujold, R., Fox, A., Prosper, K., Pictou, K., & Martin, D. (2021). Etuaptmunk-two-eyed seeing: Bringing together land-based learning and online teachnology to teach indigenous youth about food. *Canadian Food Studies, 8*(4), 49–63. https://doi.org/10.15353/cfs-rcea.v8i4.466.

Cajete, G. (2017). Children, myth and storytelling. *Global Studies of Childhood, 7*(2), 113–130. https://doi.org/10.1177/2043610617703832.

Castellano, M. B. (2000). Updating aboriginal traditions of knowledge. In G. J. S. Dei, B. L. Hall, & D. G. Rosenburg (Eds.), *Indigenous knowledges in global contexts: Multiple readings of our world* (pp. 21–36). Toronto, ON: University of Toronto Press.

Castleton, A. (2018). Technology and Inuit identity: Facebook use by Inuit youth. *AlterNative: An International Journal of Indigenous Peoples, 14*(3), 228–236. https://doi.org/10.1177/1177180118782993.

Collis, B., & Remmers, E. (1997). The World Wide Web in education: Issues related to cross cultural communication and interaction. In B. Khan (Ed.), *Web based instruction* (pp. 85–92). Englewood Cliffs, NJ: Educational Technology Publications.

Cook, O. (2018). Don't fuck it up, Oliver! Creating the eNuk software: A case study of community-based participatory design with Inuit in Rigolet, Canada [Unpublished Masters thesis]. University of Guelph.

Cueva, K., Cueva, M., Revels, L., Lanier, A.P., Dignan, M. Vishwanath, K., Fung, T.T., & Geller, A.C. (2018). A framework for culturally relevant online learning: Lessons from Alaska's tribal health workers. *Journal of Cancer Education, 34*(4), 647–653. https://link.springer.com/article/10.1007/s13187-018-1350-8

Danyluk, P., & Hanson, A. (2021). Using indigenous talking circles in online environments (learning object). University of Calgary, Calgary, AB. http://hdl.handle.net/1880/113550learning object

Dron, J. (2021). Educational technology: What it is and how it works. *AI & SOCIETY, 37*, 155–166. https://doi.org/10.1007/s00146-021-01195-z.

Dreamson, N., Thomas, G., Lee Hong, A., & Kim, S. (2017). Policies on and practices of cultural inclusivity in learning management systems: Perspectives of indigenous holistic pedagogies. *Higher Education Research & Development, 36*(5), 947–961. https://doi.org/10.1080/07294360.2016.1263830.

Henderson, L. (1994). Reeve's pedagogic model of interactive learning systems and cultural contextuality. In C. McBeath and R. Atkinson (Eds.), *Proceedings of the second international interactive multimedia symposium*, 189–203. Perth, Western Australia, 23–28 January. Promaco Conventions. http://cleo.murdoch.edu.au/gen/aset/confs/iims/94/hj/henderson.html

Hicks, J., & White, G. (2000). Nunavut: Inuit self-determination through a land claim and public government? In J. Dahl, J. Hicks and P. Jull (Eds.), *Nunavut: Inuit regain control of their lands and their lives (No. 102)*. IWGIA.

Joo, J.-E. (1999). Cultural issues of the Internet in classrooms. *British Journal of Educational Technology, 30*(3), 245–250. https://doi.org/10.1111/1467-8535.00113.

Kirkness, V. J., & Barnhardt, R. (2001). First Nations and higher education: The four R's – respect, relevance, reciprocity, responsibility. In R. Hayoe and J. Pan (Eds.), *Knowledge across cultures: A contribution to dialogue among civilizations*. Comparative Education Research Centre, University of Hong Kong. https://www.uaf.edu/ankn/publications/collective-works-of-ray-b/Four-Rs-2nd-Ed.pdf

Kuersten, A. (2018). The arctic digital divide. In B. O'Donnell, M. Gruenig, & A. Riedel (Eds.), *Arctic Summer College yearbook: An interdisciplinary look into Arctic sustainable development* (pp. 93–105). https://doi.org/10.1007/978-3-319-66459-0_8.
Lanigan, M.-A. (1998). Aboriginal pedagogy: Storytelling. In L. A. Stiffarm (Ed.), *As we see: Aboriginal pedagogy* (p. 106). Regina: University of Saskatchewan.
Madjidi, K., & Restoule, J. P. (2017). Comparative indigenous ways of knowing and learning. In K. Bickmore, R. Hayhoe, C. Manion, K. Mundy, & R. Read (Eds.), *Comparative and international education: Issues for teachers* (2nd ed., pp. 155–182). Toronto, ON: Canadian Scholars Press.
McLoughlin, C., & Oliver, R. (2000). Designing learning environments for cultural inclusivity: A case study of indigenous online learning at tertiary level. *Australian Journal of Educational Technology, 16*(1), 58–72. https://doi.org/10.14742/ajet.1822.
Moodley, M., & Dlamini, R. (2021). Experiences and attitudes of Setswana speaking teachers in using an indigenous African language in an online assessment platform. *South African Journal of Education, 41*(Supplement 1), 10.15700/saje.v41ns1a2149.
Myers, J. (2021). Critical pedagogy online. In N. Osei-Kofi, B. Boovy, & K. Furman (Eds.), *Transformative approaches to social justice education: Equity and access in the college classroom*. New York: Routledge.
Öztok, M. (2019). To be or not to be: Social justice in networked learning. *Education sciences, 9*(4), 261. https://doi.org/10.3390/educsci9040261.
Pfeifer, P. (2019, October 6). *Inuit resurgence and resistance through social media*. 21st Inuit studies conference: Montreal, Quebec, Canada.
Prayaga, P., Rennie, E., Pechenkina, E., & Hunter, A. (2017). Digital literacy and other factors influencing the success of online courses in remote indigenous communities. In J. Frawley, S. Larkin, & J. A. Smith (Eds.), *Indigenous pathways, transitions and participation in higher education* (pp. 189–210). Singapore: Springer. https://doi.org/10.1007/978-981-10-4062-7_12.
Reedy, A. (2019). Rethinking online learning design to enhance the experiences of indigenous higher education students. *Australasian Journal of Educational Technology, 35*(6), 132–149. https://doi.org/10.14742/ajet.5561.
Reeves, T., & Reeves, P. (1997). Effective dimensions of interactive learning on the World Wide Web. In B. Khan (Ed.), *Web based instruction* (pp. 59–66). Englewood Cliffs, NJ: Educational Technology Publications.
Restoule, J. P. (2013). Massive open online courses and the future of adult education. In C. Kawalilak & J. Groen (Eds.), Proce*edings from Canadian Association for the Study of Adult Education 2013* (pp. 514–520).
Restoule, J. P. (2017). Where indigenous knowledge lives: Bringing indigenous perspectives to online learning environments. In E. A. McKinley & L. T. Smith (Eds.), *Handbook of indigenous education*. Singapore: Springer.
Shield, R. (2004). The retention of indigenous students in higher education: Historical issues, federal policy, and indigenous resilience. *Journal of College Student Retention: Research, Theory and Practice, 6*(1), 111–127. https://doi.org/10.2190/HWKH-8LC1-WP90-45K0.
Smith, L. T. (1999). *Decolonizing methodologies: Research and indigenous peoples*. New York: Zed Books.
Simpson, L. (2000). Anishinaabe ways of knowing. In J. Oakes & others (Eds.), *Aboriginal health, identity, and resources* (pp. 165–185). Winnipeg: Aboriginal Issues Press, University of Manitoba
Snow, K. (2015). Blending in while standing out: A case study of blended learning design for in-community indigenous teacher education. In *Proceedings of the Online, Open and Flexible Higher Education Conference*, Hagen, Germany, October 23, 2015.
Snow, K. (2016a). Opting in or opting out: The role of hybrid learning course design on student persistence decisions in an indigenous pre-nursing transitions program. *International Journal of E-Learning & Distance Learning, 32*(1), 1–14. https://www.ijede.ca/index.php/jde/article/view/948/1609

Snow, K. (2016b). Social justice or status quo? Blended learning in a Western Canadian Teacher Education Program. *Canadian Journal of Learning and Technology, 42*(3), 10.21432/T23K8T.
Snow, K. (2020). Different worlds same province: Blended learning design to promote transcultural understanding in teacher education. *The Canadian Journal for the Scholarship of Teaching and Learning, 11*(3). https://doi.org/10.5206/cjsotl-rcacea.2020.3.8303.
Swan, I. (1998). Modelling: An aboriginal approach. In L. A. Stiffarm (Ed.), *As we see: Aboriginal pedagogy* (pp. 51–52). Regina: University of Saskatchewan Press.
Tessaro, D., Restoule, J. P., Gaviria, P., Flessa, J., Lindeman, C., & Scully-Stewart, C. (2018). The five R's for indigenizing online learning: A case study of the first nations schools' principals course. *Canadian Journal of Native Education, 40*(1), 125–143. https://hdl.handle.net/1807/91087.
Tootoo, B. (2018). Strengthening young Inuit male identity. In F. Walton & D. O'Leary (Eds.), *Sivumut: Towards the future together* (pp. 121–140). Winnipeg, Manitoba: Fernwood Press.

Open, Distance, and Digital Education (ODDE): An Equity View

27

Laura Czerniewicz and Lucila Carvalho

Contents

Abstract

Understanding how equity manifests in open, distance, and digital education (ODDE) requires us to grapple with several coexisting trends, including the changing forms of teaching and learning provision, the advent of a post-digital society and education, the datafication of education, inequality in society at large, and digital inequities. Most of these trends are social in nature, yet they shape, and are shaped by, the educational sector. It is at the intersection of these coexisting trends that equity issues in ODDE are raised and become apparent, reinforced by the uneven distribution of technology in society, and with deep roots in economic

L. Czerniewicz (✉)
Centre for Innovation in Learning and Teaching, University of Cape Town, Cape Town, South Africa
e-mail: laura.czerniewicz@uct.ac.za

L. Carvalho
Equity Through Education Research Centre, Massey University, Auckland, New Zealand
e-mail: l.carvalho@massey.ac.nz

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_93

and social inequities. Current scholarship foregrounds these nested relationships and entanglements, as well as their intersection with power relations and contestations which play out across ODDE at macro, meso, and micro levels.

Keywords

Inequality · Equity · Datafication · Networked learning · Unbundling · Inclusion · Parity

Introduction

Open, distance, and digital education (ODDE) has long focused on removing barriers to access learning, providing flexibility in learning provision, being student-centered, supporting students, and designing learning programs with the expectation that students can succeed (Letseka & Pitsoe, 2012). With the advent of networked digital technologies, open and distance education has become more closely connected to the notion of "networked learning," which emerged in the 1990s to describe the growing influx of technologies in the context of higher education (Jones, 2015). Dependent on connectivity, networked digital technologies enable connections, community, and many-to-many relationships. Networked learning reflects principles of critical theory (Freire, 1972) as it emphasizes active social roles and individual agency of learners and teachers (Hodgson, McConnell, & Dirckinck-Holmfeld, 2012; Jandric & Boras, 2015; Jones, 2015). Over the years, networked learning has evolved, partly due to the changing nature of digital technologies, and the types of artefacts and tools involved in learning activities (Goodyear & Carvalho, 2014). More recent approaches to networked learning promote a holistic view of learning, foregrounding 'openness and flux', and acknowledge blurred boundaries between digital and physical, formal and informal (Fawns, 2019; Goodyear, 2014; Jones, 2015); contemporary studies explore networks beyond higher education contexts, such as those involving work-based scenarios, professional development, informal settings, schools and others (Hodgson, de Laat, McConnell, & Ryberg, 2014).

Despite the decades-long notion of networked learning and ongoing discussions by distance education scholarship about the blended future of education (especially in developed countries), in 2020 many reported that the pandemic brought about a major shift in education. After the "online pivot," a global view of a postdigital future emerged, shared by developed and developing countries alike, despite the latter's relatively limited access to technology (Estefogo, Fuga, & Vendramine-Zanella, 2021; Taimni, 2021; Jayakumar, 2021). Arguably, all future forms of education will have a blended or hybrid element; curriculum provision and course design will necessarily integrate digital technologies to a greater or lesser extent. How much, when and other finer details will be determined by context, discipline, and strategy. For example, only specific programs might be able to fully accommodate time and distant separation, while others might require space for co-action and hands-on activity. These may act as determining factors in course offerings, designs and uses. Nevertheless, there are some courses and programs that will likely (continue to) be offered as online distance education. Indeed, over the years, the online distance mode has been filling the needs of many groups of students, for example, for people living in rural areas (where they have sufficient connectivity), those studying while working or those with family commitments. The online distance mode provides opportunities of access to education to those who may find it hard to comply with physical attendance demands at a certain time and location.

Having access to education can significantly benefit both individuals and societies. Those who are well-educated have higher incomes and better health and report higher levels of well-being (OECD, 2007), but not everyone has the same opportunities to succeed or to meaningfully participate and learn. There are many complex wider issues to consider, beyond time, space or economic consideration, with multiple elements influencing the provision of equitable access to education. Educational institutions (such as schools and universities) have been historically designed to fulfil the needs of a small elite (e.g., male, white, and people of economic means), with structures, values, and practices set up to support some students while excluding and marginalizing others. Equitable societies call for more inclusive education systems, for learning environments that are designed to meet the needs of a more diverse student population, and for addressing barriers that may exclude and marginalize students from education (UNESCO, 2017). Personal and social circumstances should not prevent anyone from achieving their full potential, and so the notion of inclusive education is often used to highlight the importance of dismantling exclusion generated by inequality in society at large, particularly those related to disability, ethnicity, religion, gender, and poverty (Slee, 2011). But there are also other elements at play, such as emerging trends in education, which are changing teaching and learning practices, and the ways digital technologies are transforming living and learning in the modern world.

Equity issues in ODDE are complex and require that we locate the topic at the intersection of several overlapping dimensions. In this chapter, the analytical differentiation of these dimensions is foregrounded in Fig. 1. The figure highlights their relevance to equity on ODDE, while also expressing that these dimensions and ODDE are all largely entangled.

In relation to each dimension and its overlaps, a number of questions must be asked: which interests are served, who is advantaged, who is disadvantaged? How can educators best support students' equitable participation in networks? How can educators encourage all students to connect to others and to learning resources? How can educators and students fairly and productively contribute to knowledge building? And how can they both learn about, and embrace, wider opportunities for living and learning in postdigital societies?

Equitable participation in education means that ODDE is designed to address the challenges of co-existing issues in postdigital society which is itself inequitable, where education is being differentially datafied and digitized, and where new forms of provision are emerging.

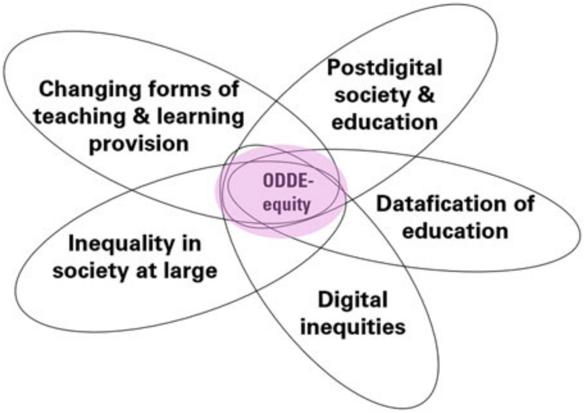


Fig. 1 ODDE equity at the center of intersecting trends

In this chapter, several terms are used including equity, equality, inclusion and justice; each derived from the literature drawn on. These terms are linked and all connote fairness but are distinguishable: equality connotes sameness or equal distribution with likely different outcomes; equity connotes appropriate or proportionate fairness; and justice is often defined as participatory parity (Fraser, 2005).

Postdigital Society and Education

There is a growing view that society can be characterized as postdigital. This does not mean that everyone has access to technology nor that people can fully participate. It rather means that technologies are so implicated in all aspects of life, that even the most disconnected are affected by the imbrication of digital practices into all aspects of society and the economy. The lines between what is considered analogue and digital are blurred (Sambuli, 2021a). Through a postdigital perspective, nothing is strictly digital nor non-digital, since anything digital is always tangled up in social and material activity (Fawns, 2019). Inversely, a non-digital life is near impossible to live, as human routines and practices involve mediation through technologies, even when people are unaware of the digital foundations and structures of life.

In this sense education can be seen as a subset of broader social practices, with the tendrils of the digital extending in different ways to different levels of the system. For universities, there is an additional layer because as knowledge producers, their roles include shaping society and influencing broader social, economic and cultural possibilities. For schools, there are tensions related to how to best prepare young generations for the future. Students need to learn skills and knowledge that will help them best address some of the complex problems facing the world, while at the same time, learn to cope with rapid technology development and to be safe amid new ways of processing and creating new knowledge (UNESCO, 2021).

A dominant framing of postdigital society has been characterized as the Fourth Industrial Revolution (4IR) represented through "a fusion of technologies that is blurring the lines between the physical, digital and biological spheres" (Schwab, 2016, p. 1). 4IR has been widely taken up by educationalists as an argument for reorganizing curriculum ranging from teaching coding in primary schools to recognizing the impact of Artificial Intelligence (AI) in education through AI literacies (Miao, Holmes, Huang, & Zhang, 2021).

While there is no disagreement about the digitalization of society (the foundation of the Third Industrial Revolution), 4IR has been criticized by reputable scholars as inequitable. Firstly, its history and very foundation is inequitable, "the first three industrial revolutions have not created a just and humane world, so why do we believe that the 4IR will do any better?" (Badat, 2020, para. 19); secondly it is predicted it will continue to contribute to ongoing inequalities "[u]nless something dramatically different is done, one of the continuities will be the perpetuation of inequality" (Gillwald, 2019, para. 11), and thirdly that 4IR will worsen inequality – "it is apparent then that a very real possibility is that advances in the 4IR could lead to an increase in . . . poverty, deepening inequalities" (Baijnath, 2021, p. 10).

To achieve equity in ODDE it is necessary to consider how to enable and support people's ability to successfully navigate and participate in a postdigital world. This dimension is also closely connected to, and impacted by, inequalities in society at large.

Inequality in Society at Large

Inequality has long been acknowledged as a major global problem clearly articulated in Sustainable Development Goal 10 (UN, 2015), which also acknowledges the extent to which the pandemic has deepened inequality both within and across countries. Inequality is relational and contextual rather than absolute; what counts as being disadvantaged will depend on what counts in a particular location. Inequalities are compound and intersectional (Helsper, 2021). This is relevant to technology because what determines access and participation is therefore fluid and changeable according to specific circumstances and needs.

Understanding the impact of broader social inequalities in ODDE is important, because historical, spatial and social positioning shape (although not determine) individual possibilities, including access to education and opportunities for digital capabilities. People without access to a range of capitals (economic, social, cultural, symbolic) are disadvantaged in ways which play out in different aspects of life including education. Inequalities also limit the opportunities that are available to people, enlarging and deepening the equity gap.

Social inequities have a profound impact on life opportunities and everyday living, therefore addressing digital inequalities in isolation can only be effective up to a certain point. This is a necessary reminder that education is a subset of broader society rather than separate from it. The pandemic exposed the extent of inequities in student bodies by removing a physical campus which could ameliorate differences through the provision of infrastructure such as residences and connectivity.

This dimension allows us to 'zoom out' to take a broader stance on equity in ODDE, much beyond the role of digital technologies in education, to look at wider issues that also influence people's ability to participate in a postdigital world. This dimension calls for a more nuanced view of how inequities are deeply ingrained in the social fabric, and how education is connected to, and impacted by, inequalities in society at large. Conversely, it is also important to 'zoom in' and to look closely at some of the ways digitization is impacting education practices.

Datafication of Education

Although measurements, audit and data have always been part of education, the embedding of networked digital technologies means the deepening of the datafication of education as all institutional, academic, staff, and student data becomes available as digital data. This has invoked serious concerns regarding the inequities of algorithmic bias, predictive policing and data harms (Marachi & Quill, 2020); the potential of AI being used for surveillance or for measuring the performance of teachers for punitive purposes (Selwyn & Gasevic, 2020); as well as the risks of datafied early-warning systems profiling students on the basis of indicators that foreground student deficits (Dhunpath & Subbaye, 2018).

In addition, digital innovations in education may cultivate hegemonic world views, thereby risking perpetuating colonialist ways of being (Sambuli, 2021b; Williamson et al., 2020; Kwet, 2019). This is achieved in several ways including through subtly delineating who makes up an ideal student or what the ideal teacher looks like. Indeed, there are no "roaming autodidacts" self-motivated, able learners simultaneously embedded in technocratic futures and disembedded from place, culture, history, and markets (McMillam Cottom, 2016); instead there are embodied humans in real lives with inequitable life chances.

Data is often understood to mean digital content, which is generally protected by privacy legislation such as South Africa's Protection of Personal Information Act (POPIA) and the European General Data Protection Regulation (GDPR). Receiving less attention is metadata, or "digital exhaust" (as per Zuboff, 2019) because it is less visible, less protected, and more opaque. Thus students' and academics' location, downloads, uploads, comments, clicks, likes, lingers, connections, logins, logouts etc. have financial value, further amplified when part of a tech company's broader ecosystem (think Google and all its products, for example). This data can then be mined and aggregated, and sold back to universities.

Questions about digital data pertain to how it is used, owned, shared, understood and made in/visible. The pandemic saw a massive growth in private companies becoming stakeholders in education; for many their business models are forms of platform or surveillance capitalism. Thus education has fed "a new elite, one based on computational power: ...as the division of learning in society shades toward the pathological, captured by a narrow priesthood of privately employed computational specialists, their privately owned machines, and the economic interests for whose sake they learn" (Zuboff, 2019, p. 190).

The confluence of these models of education, capitalism and the pandemic have brought new inequities into ODDE. Internationally, it is well-off countries which can afford to resist the power of big tech companies (see, for example, Pineau, 2021). In many nations, however, already stratified education systems become further unequal as those institutions with financial and cultural capital have more options regarding platforms, tools, and terms of engagement. These institutions are more likely to have the finances and expertise to own, build, and/or take charge of their own data and learning analytics systems. It is thus likely to be more disadvantaged institutions which have no choice but to use so-called free systems which exploit their data (see Avila, 2020 for how this can be a form of digital colonialism). Within these disadvantaged institutions, students may be categorized as “effective” or “deviant” (Selwyn, 2014, p. 52) by the pattern detection of data infrastructures, which brings about an additional form of discrimination. Finally, there is a danger in the capturing of data and how meaning can be derived from it for learning analytics because student data may not necessarily be representative of the potential of students but rather serve as an indication of the intergenerational legacy of economic and political exclusion (Prinsloo, 2018, p. 28).

Datafication in education can affect equity in ODDE, because of the vast amount of data that is constantly generated and the risk of education practices being influenced by algorithmic bias, predictive policing and data harms. It can also enable surveillance when used for measuring the performance of teachers or students for punitive or selective purposes. Datafication of education is also manifested through, and impacts on, new forms of teaching and learning.

Changing Forms of Teaching and Learning Provision

Types and modes of teaching and learning provision are both changing. Reasons for this include pressures and opportunities for flexibility, the need for cheaper studying options, reduced government funding, the digitization of society, massification with associated diverse student populations. These emergent forms of provision are explicitly linked to the 4IR, as in “With the demands and challenges of the 4IR, a move towards new flexible, often multidisciplinary curricula that move away from the traditional focus on predefined categories and types of learning is required” (Marwala, 2020, para. 13).

Unbundling

Unbundled forms of provision are generally supplied by private companies, using course curriculum content provided by (largely) public universities, with their self-described “stackable,” models of learning. Some companies offer specific services to educational institutions across the entire student experience (Czerniewicz & Walji, 2019) while others such as Coursera and EdX, provide a single platform to support inter-connected forms of services and credentials.

<table>
<tr>
<td>
</td>
<td>
</td>
</tr>
<tr>
<td>From Coursera's IPO Filing 5 March 2021 https://www.sec.gov/Archives/edgar/data/1651562/000119312521071525/d65490ds1.htm</td>
<td>From https://philonedtech.com/three-charts-that-help-explain-the-2u-edx-acquisition/</td>
</tr>
</table>

Such unbundled forms of provision are critiqued for forming more uneven spaces of higher education as well as facilitating new modes of selectivity that favor privatization and commodification (Robertson & Komljenovic, 2015). In short, they risk creating a dual education system, one for the haves and one for the have-nots.

Interested in whether stackable credentials reinforce stratification, one study found that there were noticeable racial disparities in the credentials students earned through stackable credentials implemented by a consortium of community colleges in the United States (Giani & Fox, 2017). As Helsper (2021) points out, such unbundled forms of provision have the potential to exacerbate class divisions as they focus on vocational and practical forms of education, leaving elites to benefit from classic (and with higher status) liberal arts education.

Any Time, Any Space?

Prior to the pandemic, education institutions had started to actively engage with strategies that incorporated digital elements in education (Becker et al., 2017). In most developed countries, there was also a trend to alter the built environment of schools and universities in order to accommodate pedagogical innovations in teaching and learning (Benade, 2019), and thus align the contours of physical spaces to pedagogical practices that encouraged collaboration, creative thinking, and students becoming critical users of technologies. As such, many traditional classrooms were being transformed into flexible learning environments, which often involved open spaces and breakout rooms, with flexible furnishings, and infrastructure to accommodate different types of technologies. But the use of digital technologies has not been restricted to education buildings. Instead, there has also been an emphasis on new pedagogical practices with opportunities to extend learning experiences across and beyond the boundaries of the physical spaces of schools and universities. Such a trend is in line with ecological perspectives in learning, which foreground learning activity within multiple contexts, social practices and tools (Damşa, Nerland, & Andreadakis, 2019; Vartiainen, Nissinen, Pöllänen, & Vanninen, 2018). In the past decade, the materiality of elements (e.g., materials in schools, universities, home, or elsewhere) started to be perceived as contributing to ways educators and learners interact (Woolner, 2010). Materials and their properties subtly influence learning activity, for example, through ways of arranging flexible furniture, and how the layout of open-plan classrooms and the technologies may support learning processes. All of these bring about different possibilities for how spaces can be (re) configured to accommodate different forms of curricula and social arrangements (Carvalho & Yeoman, 2018). Yet, as Thibaut (2020) remarks, internalized cultural models about how pedagogical practices ought to unfold in classrooms seem at times crystallized, encouraging the reproduction of old teaching models with new tools, and overall impacting on the creative adoption of new technologies and innovative pedagogical practices.

Recent debates surrounding flexible learning spaces also recognize that physical classroom environments may influence inclusion, as much as they may also contribute to actively excluding some students (Benade, 2019). Flexible learning spaces demand careful design, through deep considerations about the configuration of materials and spaces, pedagogical strategies, and social organization of learners that may best support the full participation and engagement of all students (Carvalho, Nicholson, Yeoman, & Thibaut, 2020). These debates have also been accompanied by new directions in policy discourse, which are shifting from issues connected to equality of access to equity of outcomes – where the focus is on preparing students for the knowledge economy. However, as Benade (2019) points out, such a shift to promotion of outcomes can also be seen as part of neoliberal agendas concerned with comparative performances under international rankings, which in turn, are more likely to symbolize a neoliberal individualistic and competitive spirit rather than express a disquiet about socially just inclusion (Kearney & Bevan-Brown, 2014).

During the pandemic, however, many of these debates on trends and innovations came to the fore in new ways. Students' attendance at schools and universities were restricted because of the need for lockdown periods, many of which were long-term. Distance learning, instead of being a choice for particular groups of students, then became the prioritized option. Discussions emerged on how to re-configure learning spaces in a world where teaching might be neither fully online nor fully on-campus, but might be able to take place in either or both modalities (Fawns, Markauskaite, Carvalho, & Goodyear, 2021). The uncertainty brought about multiple possibilities, some scenarios requiring a learning design that can accommodate both remote and on-campus students learning together. A design might also require coping with an abrupt change of location, if lockdown restrictions are suddenly imposed, and students need to stay at home for periods of time. In sum, the pandemic brought about multiple pedagogical challenges. These were felt acutely in professional education, where the learning of practical skills in collocated scenarios seems crucial (e.g., medicine), by those for whom social interactions within educational settings are most needed (e.g., primary school) and by students at all levels of the system with barriers to learning. It also brought to the fore the need for more inclusive forms of design and coherent values-based planning (see, for example, de Rosa, 2020). Universal Design for Learning (UDL) originally developed for students with disabilities rose to prominence to provide an effective framework for design which explicitly accommodates the needs and abilities of all learners in all disciplines (Arcellana-Panlilio & Dyjur, 2021).

Digital Inequities

Digital inequities are often characterized by the digital divide, commonly differentiated by order or level. The first order describes access while the second describes use. In recent years a third order describes the effects of use. Access to appropriately affordable and suitable technology and connectivity remains a major barrier, one made visible during the pandemic, when students were sent home to learn in extremely uneven conditions (Estefogo et al., 2021; Mawazo Institute, 2020; Fig. 2).

Second level divides reflect the kinds of economic, social and cultural capital which students have access to; this makes explicit the education with the barriers in broader social contexts. It is the third level which describes the impact and outcomes of access and use. Thus digital divides are not only digital but also social: "socio-digital inequalities are systematic differences between individuals from different backgrounds in the opportunities and abilities to translate digital engagement into benefits and avoid the harm that might arise from engagement with ICTs" (Helsper, 2021, p. 8).

Thus, it is clear that there are complex elements at play, connected to inequalities and social structures (Torabian, 2021).

When the COVID-19 pandemic began in early 2020, learning activities were suddenly redirected into a new mode, and concerns about people's personal circumstances were foregrounded. Access to digital devices and to connectivity for learning

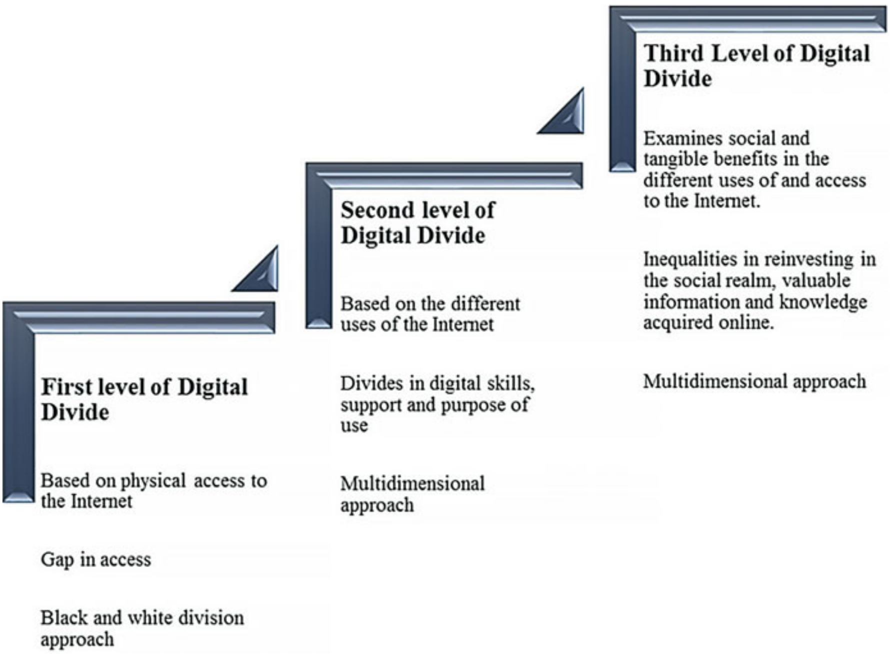


Fig. 2 The three levels of digital divide (Ragnedda, 2019, p. 35)

is extremely uneven. Across and within countries, many were disadvantaged, having no access or devices, travelling great distances for connectivity, sharing devices and being very imaginative at developing strategies for access. There were challenges associated with every level of the digital as well as a continuum of digital literacies and capabilities (Czerniewicz et al., 2020; Estefogo et al., 2021; Green, Burrow, & Carvalho, 2020).

Interdependencies Between Dimensions and Their Influence on Equity in ODDE

The six dimensions discussed above – postdigital society and education; inequality at society at large; datafication of education; changing forms of teaching and learning provision; and digital inequities each illuminate an aspect that impacts equity in ODDE. It is at the intersection of these dimensions that entangled digital inequities exist. While separating these dimensions provides a way to see a complex picture and the array of elements at play when considering equity in ODDE, their overlaps and intersections form the nexus of lived realities and opportunities for change.

The overlay of digital practices into all aspects of life, requires people's ability to navigate living and learning as part of the postdigital world. By considering ODDE as part of practices in a postdigital society and education, we invite the reader to reflect about the consequences of having digital technologies so imbricated in life and learning. We highlight the many forms of disconnection which exclude people and which are highly likely to affect those already marginal in society. However, it is important to also emphasize that this is not an isolated issue, and that inequalities in society at large also play a role. Historical, spatial and social positioning all influence people's opportunities to access education and develop the digital capabilities they need in a postdigital world.

These wider dimensions provide a backdrop for, and are connected to, a more nuanced discussion of how digitization is impacting educational practices and equity in ODDE. The digitization of educational practices have also created opportunities for, and influenced on, how educational data is used, owned, shared, understood and made in/visible. Educational data is constantly being generated and there is a risk that education practices can be negatively influenced by algorithmic bias, predictive policing, or by encouraging surveillance and performance measurement of teachers or students for punitive or selective purposes.

In addition, the increase of digitization of society, and the datafication of education, has also impacted teaching and learning provision, where an emphasis on flexibility, cheaper studying options, reduced government funding, and massification of student populations are coming to the fore. New education practices have also been linked to the 4IR, where the need to learn how to navigate the digital realm is foregrounded, including people's ability to create knowledge to solve complex issues of the contemporary world – e.g., climate change, people's displacement and refugees, to name a few.

These dimensions have also been discussed in relation to the pandemic, and its impact on recent debates on digital trends and innovations. Some perceived and referred to a shift in education practices, when students' attendance at schools and universities had to be mediated by ODDE, which instead of being a choice for particular groups of students, became the unique option during lockdown periods. Finally, a differentiation between digital inequities was discussed, going beyond physical and material means, to include digital literacy) and social aspects that are multidimensional, and yet influence how one lives and learns in postdigital societies.

In what follows we present a way of theorizing digital participation and initiatives to provide ways forward to address equity issues in ODDE through digital inclusion.

Theorizing Digital Participation

Having established that people's ability to digitally contribute and create knowledge is unevenly distributed in society, we now turn to two approaches, which can help researchers and practitioners understand and analyze these inequities: Bourdieu's theoretical framework and Sen's capability approach. Both are often used to explain and explore digital exclusion and digital participation.

Bourdieu's framework provides a way of describing digitally-mediated practices (of both educators and students) through the key concepts of "field," "habitus" and "capital." The field explains and defines the structures or systems within which individuals attempt to achieve their outcomes. It is "a structured system of social positions ... the nature of which defines the situation for their occupants" (Jenkins, 2002, p. 85). As are all fields, education is a site of struggle over resources: it is "a system of forces which exist between these positions. . . structured internally in terms of power relations" (*ibid*).

Access to all forms of capital is important because positions in the field occur in relationships of domination, subordination or equivalence to each other by virtue of the access they afford to the goods or resources (capital) which are at stake in the field. Bourdieu explains that ". . .the structure of the distribution of the different types and subtypes of capital at a given moment in time represents the immanent structure of the social world, i.e., the set of constraints, inscribed in the very reality of that world, which govern its functioning in a durable way, determining the chances of success for practices" (1986, p. 241).

There are four main forms of capital: economic, social, cultural and symbolic. Economic capital refers to assets either in the form of, or convertible to, cash. Social capital refers to the connections, social obligations and networks which advantage or disadvantage people. Who you know or don't know, and what assistance or leverage can be wrought relates to social capital. The next form, cultural capital, may occur in three states. For example, embodied cultural capital refers to "long-lasting dispositions of the mind and body" (i*bid*), expressed commonly as skills, competencies, knowledge and representations of self-image. Objectified cultural capital refers to physical objects as "cultural goods which are the trace or realization of theories or critiques of these theories" (Bourdieu mentions pictures, books, dictionaries, instruments, machines, *ibid*). And institutional cultural capital is the formal recognition of knowledge usually in the form of educational qualifications. Finally, symbolic capital is appropriated when one of the other capitals is converted to prestige, honor, reputation, fame; symbolic capital relates to recognition, value and status. These different forms of capital are different forms of power, but the relative importance of the different forms will vary according to the field. One form of capital can be converted into another.

An important concept in Bourdieu's theoretical framing, is the notion of 'habitus', as the way that all the different constructs come together, the dynamic and shifting relationship between a particular field and capitals. Bourdieu explains that habitus is a system of durable and transposable dispositions, developed in response to determining structures. An individual's habitus is both involuntary (outside of their control) and voluntary (changeable). Habitus is about identity, about being in the world, is the intersection between structure and agency.

It is therefore clear that while individuals are able to exercise agency, that agency is socially constrained and is exercised within existing social conventions, rules, values and sanctions, negotiated specifically within the rules of the fields in which they operate.

Within this broader context, learning activity is often associated with people's abilities to make choices about what they value and what they would like to pursue in life (Poquet & De Laat, 2021). Having such ability is especially important when one's choices might be seen as curtailed by personal or existential circumstances. As such, the "capability approach" offers a humanistic approach to educational scenarios involving ODDE, because it provides a rationale for extending educational opportunities to include human development, well-being, and equity (Sen, 1985, 1992, 1999).

The capability approach (CA) is a theoretical framework that emphasizes human development over human capital, proposed by economist Amartya Sen and philosopher Martha Nussbaum (Nussbaum & Sen, 1993; Sen, 1985, 1992, 1999) . The advancement of human capability is seen as strengthening governance, through civic engagement and citizenship. In short, CA foregrounds that the freedom to achieve well-being is morally important, and that such well-being is to be understood as related to 'doings' and 'beings', or to people's capabilities and functioning. As Sen's (1985) reminds us, people should be 'free to do and achieve in pursuit of whatever goals and values he or she regards as important' (Sen, 1985, p. 203). However, in order to fully account for people's well-being, we need to look beyond the amount of resources one may be able to access, instead considering what people are able to do and be, in relation to those resources.

Essentially, CA notions of "capability," "functioning," "freedom," "conversion factors," and "agency" offer interesting lenses to help researchers and educators frame initiatives in ODDE within an equity perspective. "Capability" emphasizes that people have individual "agency" and "freedom," but such freedom must be considered within a set of opportunities that are available to them. "Conversion factors" acknowledge that awareness of the resources available to a person is not enough in order to assess their well-being; rather, it is crucial to know more specifically about the person and their circumstances. In addition, "functioning" is seen in relation to the resources, activities, or attitudes that people may recognize as relevant or influential to achieving their goals (Comim, Qizilbash, & Alkire, 2008). Overall, CA reminds us that what people may be able to do needs to be considered within the constraints of what they have, while also emphasizing their moral right for well-being. In the context of ODDE, people need digital capabilities that go beyond access to technologies, towards being able to confidently communicate, problem-solve, maintain themselves safely online, so that they can fluently navigate our postdigital world.

Moving Forward: Foregrounding Digital Equity

Digital skills, literacies, and capabilities are undoubtedly essential for both educators and students in order to negotiate the teaching and learning experience, as well as to prepare for full social participation in a postdigital world. Enabling frameworks abound; two solidly theorized and practical frameworks are included here.

The Digital Capability Framework (JISC, 2018) was created to support discussions within organizations about the capabilities required in a digital world. There are six main elements in this framework which include (i) ICT proficiency, (ii) Information, data and media literacies, (iii) Digital creation, problem solving and innovation, (iv) Digital learning and development, (v) Digital communication, collaboration and participation and (vi) Digital identity and well-being. The first element is related to functional skills such as those connected to one's ability to use technologies (ICT proficiency) and to discern between technology use, like having fluency across various tools and understanding about their suitability to achieve given tasks (ICT productivity). The second element foregrounds the critical use of technologies through the notions of information, data and media literacies. It includes one's ability to find, evaluate, manage, curate, and share digital information; having capability to manage, access, and use digital data, and to critically use a range of digital media. The third element addresses creative production, through digital creation, research, problem-solving, and innovation. It includes capabilities connected to the design and creation of digital artefacts, the use of digital evidence to problem-solve and the ability to develop new ideas and opportunities through the digital. The fourth element is about participation through digital communication and collaboration. It includes the ability to communicate effectively in the digital realm, to contribute to group work and to participate in digital networks. The fifth element relates to one's ability to participate and benefit from learning opportunities, as well as the ability to support and facilitate other people's learning through the application of educational approaches in digitally-rich contexts. The sixth element relates to self-actualizing, through digital identity management and digital well-being. It includes one's ability to develop and project a positive digital identity and to manage one's digital reputation, to maintain personal health and safety in digital contexts.

Similar elements are also addressed in the Aotearoa New Zealand government Digital Inclusion Blueprint, a document drawing on the "Solving digital divides together" position paper (InternetNZ, 2018), which considers connectivity as a core necessity, similar to housing, sustenance, clothing, medical care, and necessary social services. The Digital Inclusion Bluebrint Te Mahere mō te Whakaurunga Matihiko (Department of Internal Affairs, 2019) provides a framework for promoting digital inclusion and equity, based on four core elements: motivation, access, skills, and trust. Motivation is about understanding why digital learning is important, the reasons for using digital technologies and the Internet and how these can be beneficial to people, helping them to connect, learn and gain access to a broad range of resources. Access involves ensuring that everyone has opportunities to use digital devices and software, as well as a reliable connection (e.g., WiFi) to access the Internet for learning, working, and everyday living. The notion of access involves affordability, connectivity, and accessibility. The development of skills relates to having the know-how to use digital media. It includes one's ability to purposefully and meaningfully use digital technologies and the Internet. This element is closely connected to the notion of information literacy in the JISC framework, but also to the idea that technologies should not only be consumed for entertainment, but instead for creating, communicating, problem-solving, socializing, in ways that are appropriate and beneficial to people and to society. The last element in the Digital Inclusion Blueprint – trust – is connected to digital literacies, foregrounding the understanding of how to manage personal information and stay safe from scams and privacy breaches, and to be confident and resilient in digital environments.

Conclusion

This chapter has revealed how equity in ODDE is at the heart of several interdependent dimensions and practices, which existed prior to the pandemic, but have now been unavoidably illuminated and more deeply entangled. It has become evident that there is a need for deeper considerations about how technology can be used to promote connections, collaboration and participation for all, as well as how to continue to encourage productive and active learning activity within varied modes, instead of reverting to "traditional" pedagogies and lecturing mode many of which were already unsatisfactory and exclusionary.

It has also become clear that there are multiple factors impacting on learning, requiring educators' ability to design flexibility for varied future scenarios, for several modes and for a diverse student body many of whom experience barriers to learning. The need for sophisticated design is non-trivial given that it is to be achieved by an educator precariat who are themselves insecure and unevenly treated in many places together with an emerging cohort of learning designers.

Students too are being called on to perform novel tasks and develop new capabilities as they figure out how to learn under new arrangements. Their ability to do so is enmeshed in heterogeneous personal and political contexts.

Digital technologies, and indeed ODDE, must be understood as tools and practices that evolve as part of sociocultural systems, which are reflected through complex and multi-layered dimensions. There is great potential for ODDE to bring people and different cultures together, to break down educational barriers and to foster greater participation in society. But there is also the potential for greater exclusion of those who have been already at the margins of society, deepening their lack of access to knowledge and information, making it harder for them to develop the digital capabilities they need, making it difficult for their voices to be heard, therefore perpetuating their social exclusion.

Even if educational opportunities in and around ODDE strive to promote equity through a solid grounding of values on inclusion, well-being, agency and capability development so that everyone has opportunities to contribute to our digital societies, these opportunities are also often battling other competing values, many of which reflect neoliberalism agendas that are grounded on free-market capitalism, with subtle mechanisms to maintain the control, power and status of some over others.

Researchers, educators, learners and policymakers need to come to grips with how the infiltration of technology, edtech services and new business models are leading to differentiated and inequitable systems and how institutions are reshaping the nature of what it means to be a "have-not" and a "have" in postdigital open and distance digital education. Understanding the complexity of these issues is a necessary step towards re-imagining education and building a more equitable and fair future for all.

References

Arcellana-Panlilio, M., & Dyjur, P. (2021). *Incorporating universal design for learning in disciplinary contexts in higher education*. Calgary: University of Calgary.

Avila, R. (2020). Against digital colonialism. In: Muldoon, J. & Stronge, W. (Eds.), *Platforming equality: Policy challenges for the digital economy*. Hampshire: Autonomy.

Badat, M. S. (2020, June 1). The 4IR super-highway: A dangerously technocratic Utopia. Daily Maverick. https://www.dailymaverick.co.za/opinionista/2020-06-01-the-4ir-super-highway-a-dangerously-technocratic-utopia/

Baijnath, N. (2021). Tertiary education and teaching and learning in the context of development in South Africa SARChi Chair T&L Research paper series No 2

Becker, S. A., Cummins, M., Davis, A., Freeman, A., Hall Giesinger, C., & Ananthanarayanan, V. (2017). *NMC horizon report: 2017 higher education edition*. Austin, TX: The New Media Consortium.

Benade, L. (2019). Flexible learning spaces: Inclusive by design? *New Zealand Journal of Educational Studies, 54*, 53–68. https://doi.org/10.1007/s40841-019-00127-2.

Carvalho, L., Nicholson, T., Yeoman, P., & Thibaut, P. (2020). Space matters: Framing the New Zealand learning landscape. *Learning Environments Research, 23*(3), 307–329. https://doi.org/10.1007/s10984-020-09311-4.

Carvalho, L., & Yeoman, P. (2018). Framing learning entanglement in innovative learning spaces: Connecting theory, design, and practice. *British Educational Research Journal, 44*(6), 1120–1137.

Comim, F., Qizilbash, M., & Alkire, S. (2008). *The capability approach: Concepts, measures and applications*. Cambridge: Cambridge University Press.

Czerniewicz, L., Agherdien, N., Badenhorst, J., Belluigi, D., Chambers, T., Chili, M., . . . Wissing, G. (2020). A wake-up call: Equity, inequality and Covid-19 emergency remote teaching and learning. *Postdigital Science and Education, 2*(3), 946–967. https://doi.org/10.1007/s42438-020-00187-4.

Czerniewicz, L., & Walji, S. (2019). *Issues for universities using private companies for online education*. Cape Town, South Africa: University of Cape Town. https://open.uct.ac.za/handle/11427/29813?show=full.

Damşa, C., Nerland, M., & Andreadakis, Z. (2019). An ecological perspective on learner-constructed learning spaces. *British Journal of Educational Technology*. https://doi.org/10.1111/bjet.12855.

de Rosa, R. (2020). Values-centered instructional planning insider higher education values-centered instructional planning values-centered instructional planning, May 13, 2020. https://www.insidehighered.com/digital-learning/views/2020/05/13/consistent-mission-aligned-instructional-framework-fall-and-beyond

Department of Internal Affairs. (2019). *The digital inclusion Blueprint, Te Mahere mō te Whakaurunga Matihiko*. Wellington, New Zealand: Department of Internal Affairs. Retrieved from https://www.digital.govt.nz/assets/Documents/113Digital-Inclusion-BlueprintTe-Mahere-mo-te-Whakaurunga-Matihiko.pdf.

Dhunpath, R., & Subbaye, R. (2018). Student success and curriculum reform in post-apartheid South Africa. *International Journal of Chinese Education, 7*, 85–106.

Estefogo, F., Fuga, V., & Vendramine-Zanella, D. (2021). As ingenrencias governamentais e o antidoto Freireano: Arquetipos de resistencia em tempos de necroeducacao. [Government Ingenuities and Freirean Antidote: Archetypes of Resistance in Times of Necroeducation] SciELO Preprints Collection. https://preprints.scielo.org/index.php/scielo/preprint/view/2868

Fawns, T. (2019). Postdigital education in design and practice. *Postdigital Science and Education, 1*(1), 132–145. https://doi.org/10.1007/s42438-018-0021-8.

Fawns, T., Markauskaite, L., Carvalho, L., & Goodyear, P. (2021). H2m pedagogy: Designing for hybrid learning in medical education. In E. Gil, Y. Mor, Y. Dimitriadis, & C. Köppe (Eds.), *Hybrid learning spaces*. Cham, Switzerland: Springer.

Fraser, N. (2005). Reframing justice in a globalizing world. *New Left Review, 36*, 69–88.

Freire, P. (1972). *Pedagogy of the oppressed*. London, UK: Penguin.

Giani, M., & Fox, H. L. (2017). Do stackable credentials reinforce stratification or promote upward mobility? An analysis of health professions pathways reform in a community college consortium. *Journal of Vocational Education & Training, 69*(1), 100–122. https://doi.org/10.1080/13636820.2016.1238837.

Gillwald, A. (2019). SA must be wary of big promises made about 4IR. Tech Central. Retrieved from: https://techcentral.co.za/sa-must-be-wary-of-big-promises-made-about-4ir/93052/

Goodyear, P. (2014). Productive learning networks: The evolution of research and practice. In L. Carvalho & P. Goodyear (Eds.), *The architecture of productive learning networks* (pp. 23–47). New York, NY: Routledge.

Goodyear, P., & Carvalho, L. (2014). Framing the analysis of learning network architectures. In L. Carvalho & P. Goodyear (Eds.), *The architecture of productive learning networks* (pp. 48–70). New York, NY: Routledge.

Green, J., Burrow, M., & Carvalho, L. (2020). Designing for transition: Supporting teachers and students cope with emergency remote education. *Postdigital Science and Education., 2*, 906–922. https://doi.org/10.1007/s42438-020-00185-6.

Helsper, E. (2021). *The digital disconnect: The social causes and consequences of digital inequalities*. London: SAGE Publications.

Hodgson, V., de Laat, M., McConnell, D., & Ryberg, T. (Eds.). (2014). *The design, experience and practice of networked learning*. New York, NY: Springer.

Hodgson, V., McConnell, D., & Dirckinck-Holmfeld, L. (2012). The theory, practice and pedagogy of networked learning. In L. Dirckinck-Holmfeld et al. (Eds.), *Exploring the theory, pedagogy and practice of networked learning* (pp. 291–305). New York, NY: Springer. https://doi.org/10.1007/978-1-4614-0496-5_17.

InternetNZ. (2018). Solving digital divides together: An Internet position paper. Retrieved from https://internetnz.nz/assets/Archives/Solving_Digital_Divides.pdf

Jandric, P., & Boras, D. (2015). *Critical learning in digital networks*. Cham, Switzerland: Springer. https://doi.org/10.1007/978-3-319-13752-0.

Jayakumar, N. (2021). *Why hybrid learning is the future of education community*. https://inc42.com/resources/why-hybrid-learning-is-the-future-of-education/

Jenkins, R. (2002). *Pierre Bourdieu*. London, UK: Routledge.

JISC. (2018). Building digital capabilities: Six elements defined https://repository.jisc.ac.uk/6611/1/JFL0066F_DIGIGAP_MOD_IND_FRAME.PDF

Jones, C. (2015). *Networked learning: An educational paradigm for the age of digital networks*. Cham, Switzerland: Springer International Publishing.

Kearney, A., & Bevan-Brown, J. (2014). Inclusive education: Addressing the challenge of equity in education. In A. St. George, S. Brown, & J. O'Neill (Eds.), *Facing the big questions in teaching: Purpose, power and learning* (pp. 97–103). Melbourne, VIC: Cengage Learning.

Kwet, M. (2019). Digital colonialism: US empire and the new imperialism in the global south. *Race and Class*. https://doi.org/10.1177/0306396818823172.

Letseka, M., & Pitsoe, V. (2012). Access to higher education through open distance learning (ODL): Reflections on the university of South Africa. In *Access to higher education: Under-prepared students or under-prepared institutions?* (pp. 219–34). Pearson.

Marachi, R., & Quill, L. (2020). The Case of Canvas: Longitudinal datafication through learning management systems. *Teaching in Higher Education, 25*(4), 418–434. https://doi.org/10.1080/13562517.2020.1739641.

Marwala, T. (2020, October 7). Covid-19, 4IR and the breakneck pace at which higher education is evolving. Daily Maverick. https://www.dailymaverick.co.za/opinionista/2020-10-07-covid-19-4ir-and-the-breakneck-pace-at-which-higher-education-is-evolving/

Mawazo Institute. (2020). *The impact of COVID-19 on Africa's higher education system*. Nairobi, Kenya: Mawazo Institute. Retrieved from https://static1.squarespace.com/static/57d0650220099eacd505d3fc/t/603cb57e39706e75825025fd/1614591374213/Mawazo+COVID-19+Survey+Report.pdf.

McMillam Cottom, T. (2016). Black cyberfeminism: Intersectionality, institutions and digital sociology. In *Digital sociologies*. Bristol, UK: Policy Press. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2747621

Miao, F., Holmes, W., Huang, R., & Zhang, H. (2021). *AI and education: Guidance for policy-makers*. Paris, France: UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000376709.

Moeketsi, L., & Pitsoe, V. (2012). Access to higher education through Open Distance Learning (ODL): Reflections on the University of South Africa. In *Access to higher education: Under-prepared students or under-prepared institutions?* (pp. 219–234). Cape Town: Pearson.

Nussbaum, M., & Sen, A. (1993). *The quality of life*. New York, NY: Clarendon Press/Oxford University Press.

OECD. (2007). *No more failures. Ten steps to equity in education*. Organisation for Economic Co-operation and Development. Retrieved from http://www.oecd.org/education/school/nomorefailurestenstepstoequityineducation.htm.

Pineau, E. (2021). France moves to shield its book industry from Amazon. Reuters, sec. Retail and Consumer. https://www.reuters.com/business/retail-consumer/france-moves-shield-itsbook-industry-amazon-2021-10-25/. October 26, 2021 4:53 PM SAST.

Poquet, O., & De Laat, M. (2021). Developing capabilities: Lifelong learning in the age of AI. *British Journal of Educational Technology, 52*(4), 1–14.

Prinsloo, P. (2018). Context matters: An African perspective on institutionalizing learning analytics. In *Learning analytics for the global south*. Quezon City, Philippines: Foundation for Information Technology Education and Development. http://dl4d.org/portfolio-items/learning-analytics-for-the-global-south/

Ragnedda, M. (2019). Conceptualising the digital divide. In B. Mutsvairo & M. Ragnedda (Eds.), *Mapping the digital divide in Africa. A mediated analysis* (pp. 27–43). Amsterdam, Netherlands: Amsterdam University Press.

Robertson, S. L., & Komljenovic, J. (2015). Unbundling higher education: When all that is solid melts into. . .profit! In *Comparative and International Education Society* – CIES, 2015, 2015-03-08 – 2015-03-13.

Sambuli, N. (2021a, July 2). Decolonising The Internet. How AI shapes our world. https://www.youtube.com/watch?v=FRCU43D8WFA

Sambuli, N. (2021b). Expert interview on digitalisation in Africa. In *Governance of the platform economy in developing countries and emerging economies*. GIZ. Retrieved from https://emsdialogues.org/wp-content/uploads/GIZ_Survey-publication_Governance-of-the-platform-economy-1.pdf.
Schwab, K. (2016). *The fourth industrial revolution: What it means, how to respond*. World Economic Forum Global Agenda. https://www.weforum.org/agenda/2016/01/the-fourthindustrial-revolution-what-it-means-and-how-torespond/
Selwyn, N. (2014). *Digital technology and the contemporary university: Degrees of digitization*. London, UK: Routledge.
Selwyn, N., & Gasevic, D. (2020). The datafication of higher education: Discussing the promises and problems. *Teaching in Higher Education, 25*(4), 527–540.
Sen, A. (1985). Well-being, agency and freedom: The Dewey lectures 1984. *The Journal of Philosophy, 82*(4), 169–221.
Sen, A. (1992). *Inequality reexamined*. Oxford: Oxford University Press.
Sen, A. (1999). *Development as freedom* (1st ed.). New York, NY: Knopf Press.
Slee, R. (2011). *The irregular school. Exclusion, schooling and inclusive education*. London, UK: Routledge.
Taimni, V. (2021). *How hybrid learning will shape the future of education*. Arabian Business, Economic Forum. Retrieved from https://www.arabianbusiness.com/468248-how-hybrid-learning-will-shape-the-future-of-education
Thibaut, P. (2020). El nexo entre literacidad y cultura digital: Una mirada docente en Chile. [The nexus between literacy and digital culture: A teacher's perspective in Chile.] Revista Electrónica de Investigación Educativa, 22, e06, 1–13. 10.24320/redie.2020.22.e06.2328
Torabian, J. (2021). The Cinderella syndrome: Revisiting access and widening participation in higher education. Presented at the Centre for Global Higher Education, London. https://youtu.be/ZTiBZQlS0rA
UNESCO. (2017). *A guide for ensuring inclusion and equity in education. United Nations Educational, Scientific and Cultural Organization*. Paris, France: UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000248254.
UNESCO. (2021). *Futures of education: Learning to become. United Nations Educational, Scientific and Cultural Organization*. Paris, France: UNESCO. https://en.unesco.org/futuresofeducation/initiative.
United Nations. (2015). *Sustainable development goals*. New York: United Nations.
Vartiainen, H., Nissinen, S., Pöllänen, S., & Vanninen, P. (2018). Teachers' insights into connected learning networks: Emerging activities and forms of participation. *AERA Open*. https://doi.org/10.1177/2332858418799694.
Williamson, B., Eynon, R., & Potter, J. (2020). Pandemic politics, pedagogies and practices: Digital technologies and distance education during the coronavirus emergency. *Learning, Media and Technology, 45*(2), 107–114. https://doi.org/10.1080/17439884.2020.1761641.
Woolner, P. (2010). *The design of learning spaces*. London, UK: Continuum.
Zuboff, S. (2019). The Age of Surveillance Capitalism. London, England: Profile Books.

Part IV

Organization, Leadership, and Change

Introduction to Organization, Leadership, and Change in ODDE 28

The Critical Importance of Institutional Leadership

Ross Paul

Contents

Abstract

This chapter provides an overview of the 11 other chapters in Section 4 of the handbook which address issues of Organisation, Leadership and Change. It pays particular attention to the impact of the Covid-19 pandemic on perceptions of ODDE, noting both the benefits of the greatly enhanced international interest in on-line learning and the negative perceptions associated with its misuse during the sudden demand for emergency remote teaching in conventional educational institutions. It envisions a blurring of distinctions between conventional and ODDE institutions with consequent opportunities for the latter. While these issues are pursued through various perspectives in the Section 4 chapters, there is a unifying theme of the critical importance of institutional leadership throughout and a concomitant focus on how leadership has to change in a rapidly evolving international context. The chapter envisions a bright future for ODDE but only if

R. Paul (✉)
University of British Columbia, Vancouver, BC, Canada
e-mail: rpaul@uwindsor.ca

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_86

critical issues of institutional leadership are addressed and if those leading conventional institutions are made aware of the research and experience emanating from the established ODDE sector.

Keywords

Covid-19 · Multifocal leadership · Emergency remote teaching (ERT) · ODDE research · Institutional culture · Iron triangle · Trust · Change

Introduction

The Covid-19 pandemic has dramatically raised the profile of online learning around the world with both positive and negative implications for ODDE. In requiring sudden pivots from face-to-face to online learning at all levels of education worldwide, the pandemic has contributed to a blurring of the distinctions between the two and put tremendous pressures on institutional leaders to respond in new and creative ways.

While the initial intention in Section 4 was to focus on "organization, leadership, and change" primarily in the ODDE sector, these developments have raised broader questions for all forms of higher education. Central to these is the pandemic's impact on perceptions of online and distance learning and the notion that new organizational models will necessarily emerge as it is unlikely that there will simply be a reversion to the status quo postpandemic for most conventional or ODDE-based institutions.

The importance of developing collective approaches to leadership runs throughout these chapters and highlights a widespread need for a complete rethinking of the roles and responsibilities of institutional leaders and how they are selected and assessed.

The Organization of Section 4

While the book editors suggested a preliminary list of topics, chapter authors were given considerable leeway to interpret them. The section editor selected the initial authors, some of whom engaged colleagues to assist them. The result was a deliberate mix of long-established leaders in the field, leading practitioners and emerging writers.

There was a conscious effort to represent different parts of the world in author selection while acknowledging a preponderance of writers based in Canada. Other nations represented are Germany, Ireland, South Africa, India, Australia, and New Zealand, although, as is typical in ODDE, most writers have experience in more than one national context. There was also a deliberate effort to gain developing country perspectives on three areas of research usually dominated by western writers – leadership, open and virtual schooling, and strategic planning.

Authors were encouraged to write from a global perspective but also to use their own local experiences to blend theory with practice. Unless otherwise stipulated, the discussion focuses on higher education although two of the chapters (Daniel* and

Jha & Ghatak*) explicitly address issues of open schooling in primary and secondary education (references to Section 4 authors are identified by the author's name followed by * to distinguish these from external sources which are cited in the usual way).

This chapter addresses key issues of leadership and change that emanate from the 11 authors in Section 4 and offers some personal perspectives on their implications for the future of ODDE.

The Impact of the Pandemic on ODDE

The Covid-19 pandemic has forcibly introduced online education to faculty and students in conventional (campus-based) universities to a dramatically unprecedented degree. Of particular interest is the impact of this phenomenon on how ODDE is perceived by faculty and students in these institutions and what impact this may have on its future. Tynan, Bossu, and Leitch* found Covid-19 to be incredibly disruptive to faculty and their approaches to teaching and learning, with many left unprepared and forced to pivot quickly to cope.

At the outset, it is important to be clear on definitions of key terms and concepts (Nichols*). This has been a long-standing challenge in ODDE research especially with the onset of online learning in both classroom and distance settings. For example, the move in conventional institutions has usually been to synchronous online classes (e.g., on Zoom), simply replicating the classroom experience, whereas traditional distance education has most often been about asynchronous student experiences catering to nontraditional, especially adult, learners.

It is important to recognize a clear difference between "emergency remote teaching" (ERT) and "online education" (Hodges, Moore, Lockee, Trust, & Bond, 2020). The former describes how campus-based universities, colleges, and schools the world over adapted very quickly in response to forced campus closures at the onset of the pandemic. Students suddenly were forced to learn online at home from professors or teachers who were scrambling to cope without the sort of institutional structures, instructional design, student support services, and ongoing training that characterizes ODDE institutions, the *raison d'être* of which is to cater to the needs and concerns of remote students. For Nichols*, ERT has demonstrated what happens when the so-called distance education is suddenly used without preparation or understanding of its basics to the detriment not only of program quality but also to the reputation of ODDE in conventional settings.

This distinction is particularly important in understanding the subsequent views of online learning held by faculty and students with limited experience in that mode. While many students appreciated the flexibility this model provided, undergraduates in particular resented the relative isolation and lack of community compared to the social aspects of on-campus life they had previously experienced or anticipated. However, while a 2020 American-Canadian survey found that 58% of the students found their online experience not worth tuition costs, almost 50% of the respondents wanted some aspects of online learning carried forward once campuses reopened (Top Hat, 2022).

The student and faculty experience was particularly challenging during the first year of the pandemic (2020–2021). Courses were not necessarily designed for remote delivery, faculty felt overworked and unsupported, and many students felt deprived of some of the key social elements of a successful university experience; 2021–2022 course offerings were significantly better as universities adjusted to the new realities, providing more professional development and technological support to faculty and as students became more comfortable with their experience of distance education. However, the overall provision still fell significantly short of many faculty and student expectations.

The latter conclusion is supported by research across the globe. The pandemic has offered an almost unique replication of personal experience regardless of country. For example, early research studies in Jordan (Almahasees, Mohsen, & Amin, 2021), Poland (Bączek, Zagańczyk-Bączek, Szpringer, Jaroszyński, & Wożakowska-Kapłon, 2021) and Indonesia (Nasution & Ahmad, 2020) all concluded that, despite identified advantages to online provision, students and faculty preferred classroom-based learning. Writing in the American context, Busteed suggests that "Although most students desire a return to in-person learning, the majority also want to continue having the option to take classes online" (Busteed, 2021, paragraph 4), affirming the permanence of online learning options in conventional institutions.

Further, Paul (2014) found clear examples of conventional university faculty, newcomers to online learning, developing their own research, writing, and practice without any apparent knowledge of or consultation with the established ODDE literature. The future of ODDE thus depends on concerted campaigns to promote the research results and experiences of practitioners in the field so that online learning is better understood and not tainted by the relatively poor results of ERT.

The challenges are greatest in developing countries. As Jha and Ghatak* have shown for primary and secondary schools in India, the pandemic-driven lockdowns had a devastating impact on student persistence as both teachers and students were woefully unprepared for the demands of online education. Indeed, the forced move to online education actually exacerbated existing inequalities in educational access, especially given the unavailability of communications devices or even a place to study among so many impoverished students. The authors suggest several paths to a better future for education in India, recognizing that, despite its well-established ODDE systems, India has a long way to go to extend true opportunity to the disadvantaged.

The Need for Change in Our Post-secondary Institutions

The challenges raised by the pandemic are not new but have simply amplified existing trends and concerns about higher education around the world. Among the most important issues identified by the authors:

- The costs of higher education, with governments the world over cutting budgets and leaving institutions to find their own economies (Hülsmann*)

- Pressures for institutional diversification to provide more equitable opportunities for access and success to all, regardless of race, gender, economic, or social standing (Jha & Ghatak*)
- Pressures for graduates to be well prepared for occupational success in the knowledge economy (Bates*).
- Grappling with the challenges of addressing all three components of the iron triangle of educational provision – cost, access, and quality (Daniel, 2016; Daniel*; Glennie & Paul*).

The pandemic has not been the only crisis directly affecting our postsecondary institutions. The Me-Too and Black Lives Matter movements combined with universal concerns about climate change have complicated expectations for higher education as has an increasingly polarized political environment in many countries that threatens to undermine public trust in government and, by extension, all public institutional leaders.

Much is written about the need for "transformative" change in our postsecondary institutions but Nichols* suggests this term is overused and that much of the achieved or envisioned change does little to alter predominant institutional structures and processes. Resistance to change is as common in ODDE institutions as it is in more conventional universities.

As Brown* emphasizes, higher education is "entangled with a complex constellation of change forces" (p. 1) and such change is difficult, requiring knowledgeable leaders with unique skill sets and, often, courage. He decries over-simplification of such concepts as digital versus face-to-face education or teacher-centered versus student-centered learning, emphasizing that these are not binary notions, but complex concepts requiring "multifocal" leadership.

Lessons Learned from ODDE Experiences of the Past Five Decades

ODDE has evolved with technology and the democratization of higher education to the point that it has much to offer colleges and universities of any kind. As the chapters in this section demonstrate, efforts to improve ODDE offerings over the past decades have yielded considerable knowledge about what works for distance learning at all levels of education.

Central to this challenge is the need to break through the iron triangle of accessibility, cost, and quality, especially through new technologies. Weakness in any of the three will undermine an institution's success, but ODDE offers the flexibility that can help leaders find ways to maintain or increase accessibility without compromising either cost or quality (Daniel, 2016; Daniel*, Glennie & Paul*).

Accessibility

The openness and flexibility offered by ODDE institutions has done much to extend accessibility to higher education in all countries, notably to previously disadvantaged learners and to working adults. While the global pent-up demand for college and university places has made it the easiest of the iron triangle components to address, accessibility cannot be taken for granted, especially given the negative impact of ERT experiences in many jurisdictions.

Marketing

Unfortunate ERT experiences have underlined the importance of publicizing and marketing the effectiveness of well-crafted ODDE programs, not only to the general public but to conventional university faculty and researchers so that they learn to appreciate such vital components of distance learning as course design and student support.

Jean-Louis* notes the persistence of public misperceptions of ODDE even after 50 years of distance education – that face-to-face is de facto better, that ODDE is for self-starting individuals who don't need student support, that online is easier with fewer resources so it must be cheaper and that it is easier to cheat online so quality must be lower. These are best addressed by consistent, effective, and evidence-based communications which place a premium on creative ways of getting the message across. Jean-Louis* offers a number of suggestions as to how this can be done.

Cost

The piece of the iron triangle most often out of institutional control is revenue, especially for those most dependent upon government funding in an era when cuts are frequent and often deep. Glib notions that ODDE is cheaper have been seriously challenged in many jurisdictions. As Daniel* demonstrates, this usually requires an institution to ensure enrolments (and completion rates) on a sufficiently large scale to take advantage of the cost benefits and efficiencies of ODDE.

While expanding enrolments and effective use of technology are key strategies for gaining cost efficiency, they usually require significant short-term investments and delayed benefits which can really test the fiscal stability of a given institution. This draws attention to the role and perspectives of governments and various funding agencies, an issue addressed in a provocative way by Hülsmann* who shows how Modern Monetary Theory (MMT) can work, driven by examples of a huge influx of government spending during the pandemic. MMT allows governments to see education increasingly as an investment and, ultimately, as a profit center.

Quality

Both accessibility and costs will be undermined if ODDE institutions are perceived to provide an inferior student experience compared to conventional institutions. This is perhaps the greatest ongoing challenge to ODDE, exacerbated by negative perceptions of ERT spilling over to online learning in general and also by a history of low completion rates in many jurisdictions. Many of the chapters in Section 4 include suggestions as to how ODDE quality can be improved and assured.

For example, Brown* urges reformers to recognize that digital education is not a single uniform entity and to avoid a "one provision fits all" approach. Instead, course offerings and delivery methods and even entire institutions should be customized to meet the needs of specific groups of learners.

Jha and Ghatak* note that open schools and open universities are not for everyone because younger people may not be ready to handle the degree of independence required. And Daniel* and Glennie and Paul* among others reaffirm the critical importance of careful course design and effective support services for the success of students studying at a distance.

Professional Development

Professional development of teachers and faculty is central to effective online teaching. Jha and Ghatak* relate increases in transactional distance between teacher and student to the relative lack of effective teacher training for online learning.

Writing about professional development in higher education, Tynan, Bossu, and Leitch* base their conclusions on scrutiny of a number of major research papers, emphasizing the importance of institutional context and related educational policies and teaching and learning strategies. Based on a couple of case studies, they offer eight recommendations for more effective professional development that is personalized and self-paced and accommodates individual learning styles. They conclude that just-in-time professional development opportunities enhance program participation and effectiveness. They also see a silver lining in the pandemic crisis in that previously indifferent faculty members, struggling to cope with the new realities, are increasingly welcoming professional development opportunities.

Strategic Planning

After a brief review of the literature on the strengths and pitfalls of strategic planning, Glennie and Paul* explore some of its practical challenges. The theories are strongly put to the test in a domain like South Africa where completion rates have been historically low. The authors underline the importance of defining and living up to open learning principles and diversifying to meet the needs of different groups of learners. They advocate a thoughtful and creative approach that emphasizes vision and strategy, especially for the long term, over more rigid and less effective planning exercises.

Partnerships

Brown* emphasizes the importance of strategic partnerships stemming from his experiences at Dublin City University. Porter and Perris* distinguish among three kinds of educational partnership – propositional, cooperative, and mutual service. They go into considerable detail to show how international partnerships in ODDE, notably through the Commonwealth of Learning, and nonprofit organizations like eCampus Ontario and BC Campus in Canada, advance the collaborative use of educational technology and digital learning environments. There are many effective models, but each partnership is unique, contextual, and subject to change.

Innovation

Governments over the world struggle to find ways to encourage and benefit from innovation. This has been the lifeblood of ODDE (Bates*) which has had to change often with the advent of each new learning technology and also to reduce per-student costs through economies of scale (e.g., large open universities, MOOCs).

Experience has shown how difficult this challenge is for governments and institutions alike. As institutions grow in size, they tend to become more hierarchical and bureaucratic, thus discouraging rather than encouraging innovation. And after making huge investments in a given technology, it is harder to change quickly in response to new needs and new technologies.

Bates* emphasizes focusing on learning needs rather than the technologies themselves and to distinguish between sustaining and disruptive technologies. He sees innovation as seriously under-researched in ODDE literature and points to the need to overcome what he terms its destructive myths: that it is difficult, that it just happens, that it happens in a vacuum, that only creative geniuses can innovate, and that it is always good. He suggests major strategies to overcome barriers to innovation and to support innovative teaching and learning.

Implications for Government and Institutional Leadership

The true test of leadership is the ability to change in the face of crisis and Covid-19 has been the perfect example of this challenge (Makoe*). The pandemic has raised issues that have seriously challenged government and institutional leaders, forced to take action and then often to pivot to a contrary one with very little notice. One of the most unfortunate outcomes of this in many sectors has been an undermining of trust in leaders.

Canada is an interesting case study because of its federal-provincial model which attempts to balance central national concerns with more local provincial priorities. Given that provinces have exclusive jurisdiction over most of education and health care, the net result during the pandemic has been a considerable variety of responses across the country, with provincial premiers changing positions frequently, spawning considerable confusion, and disillusionment with government among much of the populace. This, in turn, has resulted in much more political polarity than previously and an undermining of trust in leaders at all levels of society.

Similarly, the pandemic has forced academic leaders to pivot quickly from on-campus to online and back, often without the time or inclination to consult widely with faculty or give sufficient notice to students. While such authority might have been accepted initially in a time of crisis, there is already evidence that it will not be as easily accepted in the longer term. For example, a number of Canadian faculty associations have expressed concern that more autocratic approaches during the pandemic will become permanent, with related negative implications for future campus labor relations (Liddle, 2022).

Trust is a key requirement for effective leadership (Glennie and Paul*, Makoe*) and, as Brown* has shown, embedding digital education at the heart of an institution requires collaborative and multifaceted leadership no longer so reliant on a single CEO. This emphasizes the importance of trust both up and down an institutional hierarchy.

Leaders in developing countries have additional burdens to bear, given the ongoing need to confront outdated colonial forms of governance and decision-making. Makoe* is interested in the personality traits of leaders best able to deal with the weights of the past, the push of the present, and the pull of the future in forging a stronger higher education system for South and sub-Saharan Africa. She envisions a new class of leaders who are resilient and willing to take risks and to meet challenges in unconventional ways. This analysis rings true for wealthier nations as well.

Bates* also cites leadership as a crucial issue for fostering innovation. He suggests that diffused leadership is usually more effective than charismatic or hierarchical approaches and leaders must be prepared sometimes to confront the prevailing organizational culture. They need to think holistically while encouraging lower-level problem solving in developing institutional strategies for e-learning.

Where Do We Go from Here?

Higher education is facing unprecedented pressures for change at a time when institutional leadership is more precarious than ever.

Do the developments addressed in Section 4 possibly lead to more convergence between ODDE and conventional institutions or will they continue to develop quite separately with their own silos of research and practice? Will we see the development of new kinds of teaching institutions or a postpandemic reversion to the status quo? It will be fascinating to track differing reactions to these questions across national boundaries and by type of institution.

For Nichols*, conventional education is based on assumptions around educational practice that are incompatible with ODDE. For this reason, efforts to mainly layer educational technology over conventional practice do not usually result in much real change. What's more, adding online learning to standard face-to-face classroom teaching has mainly increased costs, placed greater burdens on faculty members, and provided an inconsistent approach to learning for the students. In contrast, ODDE can provide much more flexibility to meet the needs of individual student learners (Daniel, 2016).

Nichols* sees the transformation to new kinds of teaching institutions involving challenging and difficult redesign (educational operating model), redefinition (teaching roles), reengineering (processes), and realigning (practices under a new model of teaching and learning). All of these will require skilled, sensitive, and dedicated leadership.

In a world-wide climate of uncertainty, it is risky to predict developments in any field, including higher education. However, the following outcomes appear most likely from the writings of the Section 4 authors:

1. The opportunity, indeed the necessity, to forge responsive postsecondary institutions requires farsighted individuals with in-depth knowledge of all the vital components of teaching and learning for the twenty-first century. The new institutional leader will not only require the usual requisite knowledge, skills, and character, but the ability to share authority widely in building effective leadership teams and the courage and conviction to challenge even the most embedded characteristics of an institution's culture.
2. The iron triangle of accessibility, cost, and quality requires an ability to meet the challenges of all three, regardless of type of institution.
3. Through the global explosion of online learning, the pandemic has offered an unprecedented opportunity to the ODDE sector to practice and promote what has been learned from 50-plus years of research and experience in ways that both ensure higher levels of student success and offer important guidelines for institutional development.
4. Postpandemic, there will be a reversion to the status quo in the most prestigious research-intensive and teaching universities which will continue to thrive based on established reputations. But, in the long term, the most successful institutions of any type will be those that significantly challenge every aspect of their operating culture, including learning from both the successes and shortcomings of ODDE.
5. Notwithstanding negative perceptions emanating from the poor experience of many from pandemic-driven ERT, ODDE-based institutions have benefited from the pivot to online learning and will play an increasingly prominent role in the future of higher education.
6. There are important trends in many institutions to hybrid or blended approaches but, to the extent that they assume conventional operating models with no cultural change, these may constrain the potential reach toward accessible, cost-effective, flexible, open, and scalable education (Nichols*).

Notwithstanding all the challenges and uncertainties cited above, the next decade offers huge opportunities not only for the promotion, application, and refinement of ODDE, but for its impact on teaching and learning in conventional institutions as well. If publications like this one encourage the requisite reconsiderations of all facets of educational provision, the catalyst role of the pandemic may ultimately be seen as silver lining to what has otherwise been a devastating world-wide tragedy.

Cross-References

- ▶ Academic Professional Development to Support Mixed Modalities
- ▶ Institutional Partnerships and Collaborations in Online Learning
- ▶ Leading in Changing Times
- ▶ Managing Innovation in Teaching in ODDE
- ▶ Marketing Online and Distance Learning
- ▶ ODDE and Debts
- ▶ ODDE Strategic Positioning in the Post-COVID-19 Era
- ▶ Open Schools in Developing Countries
- ▶ Resilient Leadership in Time of Crisis in Distance Education Institutions in Sub-Saharan Africa
- ▶ Running Distance Education at Scale
- ▶ Transforming Conventional Education Through ODDE

References

Almahasees, Z., Mohsen, K., & Amin, M. O. (2021). Faculty's and students' perceptions of online learning during COVID-19. *Frontiers in Education, 6*, 638470. https://doi.org/10.3389/feduc.2021.638470.

Bączek, M., Zagańczyk-Bączek, M., Szpringer, M., Jaroszyński, A., & Wożakowska-Kapłon, B. (2021). Students' perception of online learning during the COVID-19 pandemic: A survey study of Polish medical students. *Medicine, 100*(7), e24821. https://doi.org/10.1097/MD.0000000000024821.

Busteed, B. (2021, May 2). Pandemic-to-permanent: 11 lasting changes to higher education. *Forbes*. https://www.forbes.com/sites/brandonbusteed/2021/05/02/pandemic-to-permanent-11-lasting-changes-to-higher-education/?sh=13cf0378452f

Daniel, J. (2016, September 8). Making sense of flexibility as a defining element of online learning. *Contact North/Contact Nord, TeachOnline.Ca*. https://teachonline.ca/fr/node/85357

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). The difference between emergency remote teaching and online learning. *EDUCAUSE Review*, *March 27, 2020*. https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning

Liddle, H. (2022, February 18). Frustration mounts among faculty amid return to in-person learning. *University Affairs*. https://www.universityaffairs.ca/news/news-article/frustration-mounts-among-faculty-amid-return-to-in-person-learning/

Nasution, A. K. P., & Ahmad, N. Q. (2020). Student perceptions of online learning during the Covid-19 pandemic. *Jurnal As-Salam, 4*(2), 195–204. https://doi.org/10.37249/as-salam.v4i2.219.

Paul, R. (2014). Organization and Management of Online and Distance Learning. In O. Zawacki-Richter & T. Anderson (Eds.), *Online distance education – Towards a research agenda* (pp. 175–196). Athabasca University Press.

Top Hat. (2022). *3052 college students on the good, the bad, and learning post-covid* [Report]. https://tophat.com/teaching-resources/interactive/3052-college-students-on-the-good-the-bad-and-learning-post-covid/

29 Running Distance Education at Scale

Open Universities, Open Schools, and MOOCs

John Daniel

Contents

Abstract

Distance learning accelerated and diversified during the Covid-19 pandemic, with the result that individual teachers working with their normal classroom groups now account for most of the courses offered online. However, this provision of "closed distance learning" will not suffice for the needs of the hundreds of millions of people who will seek secondary schooling, degree studies, and continuing education in the next 20 years. We describe how *open distance learning* can be conducted at scale through open universities, open schools, and MOOCs, which are all designed to cope with mass demand. Our focus is on how these organizations are run. This embraces institutional design and organization, governance, management and administration, and leadership. The three types of providers have various corporate and governance structures: public open universities, open schools under the aegis of government, and commercial MOOCs companies. However, the challenges of management and administration, which are to sustain operations at scale around the clock worldwide, are rather similar. Their leadership requires a genuine commitment to serving the disadvantaged, an

J. Daniel (✉)
Acsenda School of Management, Vancouver, BC, Canada

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_26

ability to secure the trust of governments, understanding of the opportunities that emerging technology offers for distance education, and thorough familiarity with the institutional dynamics of open and distance teaching and learning systems.

Keywords

Open universities · Open schools · MOOCs · SDGs · Scale · Management · Logistics · Leadership

Introduction: Distance Education Diversifies

Distance education facilitates access to successful study. It has the potential to teach at scale and reach large numbers of learners. Since the middle of the nineteenth century, various developments, notably postal services, radio/television broadcasting, and the Internet have brought opportunities for distance learning to more and more people.

During the 2020–2021 Covid-19 pandemic, most schools and universities, few of which had experience of distance education, closed their campuses and attempted to teach their pupils and students at home. However, although this emergency switch to remote teaching required school and university staff to adapt their skills and adopt new practices, they did not have to scale up their teaching and be open to more diverse learners. Emergency remote teaching was, in effect, closed distance learning.

Most schools opted for a return to classroom teaching after the pandemic. Their experience of Covid-19, when some governments closed classrooms for many months, had shown that remote teaching was ineffective for school education. With 90% of pupils out of school during the pandemic, decades of educational progress had been reversed (United Nations, 2021). Moreover, inequalities of learning achievement, within and among countries, were further exacerbated (Daniel, 2020; Kanwar & Daniel, 2020). Long before the pandemic, however, some developing countries had established open schools to offer secondary schooling to children not reached by the conventional school systems (Daniel, 2010, pp. 110–140). Open schools could play a major role in repairing the damage of the pandemic.

Post-compulsory institutions offering higher and continuing education rode out Covid-19 more successfully. They coped remarkably well with the transition to emergency remote teaching, and, since these institutions are relatively autonomous, they adopted a variety of practices. In 2020, most instructors used video technologies (e.g., Zoom) to teach their home-based students live, but in 2021 some began experimenting with asynchronous coursework. Gauging overall student reaction to remote teaching was difficult, because some surveys were slanted to confirm researchers' biases (see, e.g., Bates, 2021). Nevertheless, student attitudes were sufficiently positive for institutions to continue some use of digital distance learning methods when teaching mostly returned to the classroom in 2022. Practices now vary widely. Some institutions mandate the same combinations of distance and classroom teaching for all students in a group, while others offer a “hyperflex” choice of experience.

In sum, Covid-19 accelerated the diversification and expansion of distance education that had been under way since post-compulsory institutions first began to take advantage of the Internet in the 2000s. Prior to the pandemic, for example, 10% of all courses from Canada’s campus institutions were taken online. Nevertheless, within the current diversity of offerings, there remain two broad categories of practice: closed digital distance teaching by individual instructors to campus-sized classes and open distance education at scale by institutions designed to reach much larger groups.

Why Conduct Distance Education at Scale?

Here, we shall focus on distance education at scale. This requires teaching and learning systems that are radically different from the congeries of practices in classroom-based institutions post Covid-19. However, given the wider availability of distance learning at all levels following the pandemic, we must first ask whether specialized institutions that conduct distance education at scale are still needed.

Distance education at scale is necessary because a growing number of people worldwide, numbering in the hundreds of millions, have no access to the education and training that might help them lead more fulfilling lives. We examine three areas of need: post-secondary education, secondary schooling for the hard to reach, and new skills and knowledge for coping with the post-pandemic world.

Goal 4 of the UN’s Sustainable Development Goals (SDGs) for 2030 embraces all three areas. It states: “Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all” (United Nations, 2015). It includes seven targets—we note two in particular:

4.1 Ensure that all girls and boys complete free, equitable, and quality primary and secondary education leading to relevant and effective learning outcomes.

4.3 Ensure equal access for all women and men to affordable and quality technical, vocational, and tertiary education, including university.

Each of these targets covers hundreds of millions of people.

Target 4.1 continues and extends to the secondary level, the global campaign for universal primary education that was launched in 1990 and given fresh impetus at the World Forum on Education for All (EFA) in Dakar, Senegal, in 2000. Some targets from that Forum were incorporated into the UN’s Millennium Development Goals (MDGs), leading UNESCO, UNICEF, the World Bank, and national development agencies to coordinate their efforts to get all children into primary school by 2015. These efforts achieved some success (UNESCO, 2016). Primary school net enrollment rose from 84% in 1999 to 93% in 2015, but progress then stalled, with 58 million children still not in school and 100 million not completing their primary studies. Covid-19 exacerbated existing inequalities. In low-income countries, only

34% of children from the poorest fifth of households complete school, compared to 79% from the richest fifth.

The primary education campaign revealed, however, that universal secondary education would be a much more challenging goal. A 2006 estimate indicated that nearly 400 million children in developing countries between the ages of 12 and 17 did not attend secondary school (Binder, 2006, p. 35), a figure that remained at 258 million in 2019 (UNESCO, 2019, p. 1). Secondary schooling is more costly than primary schooling. Indeed, Lewin (2008) found that a country is very unlikely to achieve universal secondary schooling if the unit cost of secondary is more than twice that of primary. In sub-Saharan Africa, the disparity is usually much larger, with ratios of secondary to primary costs commonly between 3:1 and 6:1 (Lewin, 2008, p. 66).

In sum, schooling remains a huge challenge. The UN estimates that in 2030 over 200 million children will still be out of school (United Nations, 2021). We shall examine later how open schools operating at scale can help to address this challenge, as well as increasing the "number of youth and adults who have relevant skills...for employment, decent jobs and entrepreneurship," which is another Goal 4 target.

Target 4.3 is about access to tertiary education, which was absent from the MDGs. Its inclusion in the SDGs reflects governments' increasing understanding of the contribution of tertiary education to economic and social development. With larger numbers completing secondary school and societies becoming more complex, demand for tertiary education has grown steadily. Official estimates of future demand for tertiary education have usually proved to be gross underestimates. Nearly 30 years ago, in *Mega-Universities*, the present author wrote: "population growth is outpacing the world's capacity to give people access to universities. A sizeable new university would now be needed every week merely to sustain current participation rates in higher education. New institutions are not being created at this frequency. A crisis of access lies ahead" (Daniel, 1996, p. 4).

In this century, the demand for tertiary education has accelerated. Calderon (2018) predicts that global enrollments will grow from 250 m in 2020 to nearly 600 m in 2040. This assumes that enrollment ratios worldwide will rise from 2,700 per 100,000 population to 6,500. Moser and Ortiz-Ospina (2013) reach similar conclusions. Participation rates will grow everywhere, with the share of the 15+ population educated to degree level reaching around 50% in countries such as Canada, Finland, Singapore, and South Korea by 2050. Although these projections were made before Covid-19, its fall-out seems likely to increase demand further. However rapidly campus institutions grow in response, it seems inevitable that distance learning at scale will be a large part of the solution, not least because the global response to climate change will favor education systems that are less carbon intensive.

SDG Target 4.3 also includes post-compulsory continuing education. In this context, we shall examine MOOCs (Massive Open Online Courses), which are a twenty-first century example of conducting distance education at scale for a global audience. The number of MOOC learners worldwide was estimated at 180 million in 2020 (Class Central, 2020). They were studying some 16,000 MOOCs offered by nearly 1,000 universities. One-third of all learners who ever registered on a MOOC platform did so in 2020, which was evidence of a pandemic-induced surge of interest in free online learning. The UK Open University saw the number of visitors to its OpenLearn website of 1,000 free courses jumps from 8.9 to 13.6 million between 2019 and 2020. Surveys showed that one in seven UK adults started an online course during the pandemic (Blackman, 2020).

The pandemic has further stimulated an appetite for learning that was already widespread. Accessible opportunities for learning at a distance should be part of the global response. Here, we examine the operational challenges of three types of distance education at scale: open universities, open schools, and MOOCs. Our focus, summarized as "running distance learning at scale," is on three areas: institutional design and organization; governance, management, and administration; and leadership. Issues of curriculum, pedagogy, technology, and student support will be subsumed under those areas. We start by recalling the development of distance education, looking at the emergence of open universities, the concept of open schools, and the genesis of MOOCs.

The introduction of postal services led to education by correspondence in the mid-nineteenth century. This was offered mainly by commercial enterprises until the mid-twentieth century, although some public school systems (e.g., France, British Columbia) and post-compulsory institutions (e.g., London University) offered some correspondence courses alongside their classroom programs.

Open Universities

Awareness of distance education expanded dramatically with the creation of the UK Open University (UKOU) in the 1960s. The slogan articulated at its foundation, "open to people; open to places; open to methods; open to ideas" (Crowther, 1969), captured its high aspirations. For as well as teaching at a distance and being "open to places," the UKOU declared that it was "open to people" by removing all academic prerequisites for enrollment. The basis for admission was "first come, first served," up to the capacity that the institution could cope with.

In the inaugural address, the statement "open to methods" also reinforced the expansion of access, because broadcasting on the BBC's public radio and television channels was part of the UKOU's multimedia teaching strategy. For Harold Wilson, the UK prime minister who launched the idea of an Open University, which he first called the "University of the Air," openness and access were symbolized by enabling the general public to join students in watching the university teach. The UKOU was formally launched in the week of the first moon landing in 1969. Its first chancellor exhorted it to be "open to ideas" with these words: "What a happy chance it is that we start on this task in this very week when the Universe has opened! The word has a new meaning henceforward. The limits, not only of explorable space, but of human understanding, are infinitely wider than we have believed" (Crowther, 1969).

These lofty ambitions required the invention of new ways to offer tertiary education at scale, for scale was essential to the UKOU's success. In his entertaining account of its creation, the founding vice-chancellor, Walter Perry, records how the university stood firm on its intention to admit a first cohort of 25,000 students, despite pressure from the UK's cautious minister of finance to begin with a pilot project of only 5,000. During its planning phase, the UKOU had faced widespread scepticism, even downright hostility, in the press and the rest of tertiary education. Perry referred to "our overwhelming desire to achieve economy of scale. We felt that if our costs per student were as high as those of other universities, we would be very vulnerable" (Perry, 1977, p. 139).

Scale was an asset in many ways. In its second year of operation, with 40,000 students, the UKOU became the country's largest university. By broadcasting TV and radio programs into the nation's homes, it became a household word – and the butt of friendly jokes! Above all, the enthusiasm of the student body made the project politically unstoppable. Many early students were school teachers eager to convert their diplomas into degrees. Their high completion rates soon yielded large numbers of UKOU graduates who talked up, throughout the education system, the opportunity it offered. Within 30 years, enrollments had risen to 200,000, and when the British referred to "OU," they meant the Open University, not Oxford University!

In the following decades, concept was widely imitated. The term "open and distance learning" (ODL) began to replace "distance education." By 2010 some 50 tertiary education institutions around the world were called "open universities" (Daniel, 1996, 2019; Mishra, 2017). All were designed to operate at scale, and, even in low-population jurisdictions, they adopted the scalable organizational arrangements that we shall describe.

Open Schools

It was natural that India, which had struggled to give all children primary education, let alone access to secondary schools, should pioneer a different approach. India's gross secondary school enrollment reached 50% in 2005, rose to 75% by 2014, but then stalled (GlobalEconomy.com, 2021). The Central Advisory Board for Education suggested that 15% of the secondary population be served by open schooling. India had established a National Open School as an autonomous organization in 1989. Renamed the National Institute for Open Schooling (NIOS) in 2002, it became an apex body for distance learning with responsibility for facilitating the development of a network of state open schools (Daniel, 2010: pp. 116–122).

The NIOS is very successful. It has 2.2 million pupils enrolled and admits 350,000 annually. However, the situation of the state open schools is more patchy. In his study of their development, Rajagopalan wrote:

> Taking an overall view, one cannot escape the conclusion that with very few exceptions, the State Open Schools resemble atrophied limbs of the State Education Department. They are like rudderless ships set adrift in a sea of low morale. This is a poignant situation when one considers the immense potential of SOSs to bring about a sea-change in the social set-up and improve the economic well-being of the underprivileged people. (Rajagopalan, 2011, p. 4)

Earlier, the same author had reviewed the development of India's state open universities and concluded: "The State Open Universities in India reveal a picture of diversified growth. The first state OU, established in 1982 in Andhra Pradesh, started off well with many programmes and dynamic leadership during the first few years. Unfortunately, however, a situation of complacency and bureaucratic control has dominated the scene in the recent past" (Rajagopalan, 2007).

Rajagopalan's conclusions highlight an important challenge. Large-scale distance education operations are not easy to establish and run. Visionary and energetic leadership is needed to launch them, while their implementation and maintenance depends on first-rate management, efficient administration, and determined commitment to students, most of whom have more difficult lives than those able to go to school. The creation of distance education institutions intended to serve large underprivileged populations by top-down administrative fiat is not a route to success.

Massive Open Online Courses

MOOCs are our third manifestation of large-scale distance education. Around 2010, some university computing academics seized on the Internet to attempt computer-based teaching across the globe (Daniel, 2012). It recalled the moment in the mid-nineteenth century when the inventor of Shorthand, Isaac Pitman, decided to teach his new language by correspondence using the newly created postal service.

Although universities use information technology extensively, they realized that to offer MOOCs they would need outside help to maintain computer-based teaching systems that could operate worldwide, 24/7, with very large enrollments. New organizations, such as Coursera (USA) and FutureLearn (UK), were created for this purpose.

As enthusiasm for MOOCs burgeoned, the initiating universities realized that they could not satisfy the demand by relying solely on their own academics, some of whom were skeptical of MOOCs anyway. They invited other universities to join the enterprise, suggesting that offering short courses to large global audiences would be an attractive way to enhance their brand, even if the economics of the MOOCs themselves were—and still are—uncertain. A definition of a MOOCs is "a course of study made available over the Internet without charge to a very large number of people: anyone who decides to take a MOOC simply logs on to the website and signs up" (Oxford Dictionaries Online, 2021). This definition highlights the "easy-come-easy-go" nature of MOOCs. Nevertheless, although completion rates are usually dismal, the huge worldwide enrollments in MOOCs indicate that they are a useful part of the open distance learning ecosystem.

As more players jumped on the bandwagon, the definition of each word in the acronym MOOC lost precision, as nicely captured in a famous poster by Mathieu Plourde (2013) of Laval University. Our analysis of MOOCs will focus on FutureLearn, which was formed as a for-profit entity by the UK Open University in 2012, with the Australian employment marketplace company, SEEK, becoming a

50/50 joint owner in 2019. By 2021 FutureLearn counted 250 partner organizations and over 10 million registered users (FutureLearn, 2019).

Building on this background, we explore the challenges of running distance education at scale under three headings: institutional design and organization; governance, management, and administration; and leadership.

Institutional Design and Organization

Despite the different organizational arrangements required for open universities, open schools, and MOOC providers, they have the common feature of serving a mass clientele. Adam Smith, an eighteenth century economist and moral philosopher, pioneered modern thinking about designing for mass demand. In his classic, *An Inquiry into the Nature and Causes of the Wealth of Nations,* he described how the industrial revolution scaled up manufacturing. Taking the example of a pin factory, an early manifestation of the transition from cottage industries to mass production, he summed up the radical changes as follows:

> This great increase of the quantity of work which, in consequence of the division of labour, the same number of people are capable of performing, is owing to three different circumstances; first, to the increase of dexterity in every particular workman; secondly, to the saving of the time which is commonly lost in passing from one species of work to another; and lastly, to the invention of a great number of machines which facilitate and abridge labour, and enable one man to do the work of many.... (Smith, 1776)

The analogies to the provision of education at scale are clear. The "dexterity of every particular workman" translates to the creation of teaching systems that integrate a range of specialized functions in an effective manner. "The saving of time... lost in passing from one species of work to another" means that the various specialists and partners can make their inputs at different times, which speeds up the overall process. Lastly, contemporary information and communications technologies provide us with "a great number of machines" to facilitate the tasks of both teaching and learning.

These parallels led the German scholar-practitioner, Otto Peters, to describe distance education as an "industrial form of education" (Keegan, 1994). However, his work began to be cited in the 1990s, as the world entered a post-industrial era. For some, the industrial or "Fordist" era recalled faceless drones on soulless assembly lines, whereas the idealists of open and distance learning saw themselves as the dynamic pioneers of a new era of education. This provoked a robust debate in the scholarly literature about Fordist and post-Fordist approaches. An article by Raggatt (1993), "Post-Fordism and Distance Education: A Flexible Strategy for Change," was an example.

Comparing the course development and production methods used in distance education at scale to Model T Ford assembly lines may seem far-fetched, but authors like Raggatt had a point. The 1990s was a period of significant curriculum change in all areas of education. For some topics, it was no longer appropriate for large course teams to take many months to develop standardized distance learning materials and offer them for years with only minor revisions. More flexible approaches were needed to allow quick updates. Fortunately, making these in online courses was easier and cheaper than reprinting materials.

Nevertheless, division of labor, standardization, and partnerships are core strategies for distance education at scale. Open universities now offer shorter courses and develop them more quickly. Open schools closely track their countries' developing curricula and can rapidly offer newer areas such as vocational education (Daniel, 2010, p. 118). Their economies of scale are increasingly impressive. The cost per pupil of India's NIOS was less than one-twelfth of those at conventional schools (Rumble & Koul, 2007, p. 128).

For MOOC platforms, division of labor means having their partners' organizations develop the courses following centrally established guidelines for format and quality. This author has taken 20 MOOCs (from 12 partner institutions) of the 2,500 courses that FutureLearn has offered. A common format makes navigations of the courses easy, while allowing the character of each partner institution and the strengths of its academics to shine through. FutureLearn's social learning platform has attracted 35 million inputs.

These scale providers have remarkably lean core operations. India's NIOS has a central staff of 250 for over two million pupils. The tutors and mentors who support the pupils work in 11 regional centers and 3,260 study centers located in accredited institutions of various kinds (Daniel, 2010, p. 117). For ten million registered users, FutureLearn has a core staff of 130, relying on its 250 partner institutions for course development and academic support.

Although the open universities do not outsource academic tasks as much as open schools and MOOCs providers, they also operate efficiently. To serve its 200,000 students, the UKOU has 1,000 full-time academics, 4,900 part-time associate lecturers, and 2,500 support and administrative staff. For comparison, Oxford University, with 24,000 students, has 14,500 staff, of which 1,700 are academics.

The UKOU made an important innovation in academic organization. Perry (1977, p. 205) noted that:

> Universities in general do not have a hierarchical structure of government. They are essentially cellular in nature, each cell representing one academic discipline or department... The UKOU made a significant break from this normal system. Responsibility for individual teaching programmes... is vested in course teams, which are set up for the purpose. Nevertheless the course teams are, for their lifetimes, just as much cellular components of an overall structure, as are departments in other universities.

In open universities, the academic structure is a much smaller part of the total institution than on campuses. The large sections of open universities dealing with operations – regional structures, production processes, and student administration – are hierarchical rather than cellular. We discuss the challenges that pose for governance below.

Governance, Management and Administration

There are two reasons for treating these three functions together. First, they are less distinct in large-scale distance teaching operations than in classroom teaching institutions. Second, they are arranged differently in our three organizations of interest, which have different ownership structures.

With a few exceptions, open universities are public institutions, although without substantial government involvement in their day-to-day affairs. The UKOU's royal charter gives it the same legal status and protections as the older universities. Open schools, on the other hand, are mostly departments of national education ministries, with mixed results, as noted in the comment by Rajagopalan (2011, p. 4) that some "State Open Schools resemble atrophied limbs of the State Education Department." By contrast, FutureLearn and the US MOOC provider, Coursera, are for-profit commercial enterprises.

Distance education at scale can be conducted successfully under various corporate arrangements, provided that they give the organization enough autonomy to respond to the needs of its clientele and influence the selection of its leaders.

Open universities are usually governed by some variant of the bicameral structure of board and senate common in higher education. Perry (1977, p. 206) described the particular challenge that this posed for the UKOU, which occurred partly because its planning committee had anticipated that there would be relatively few full-time academic staff, with the university using specialists on secondment for much of the course preparation. On this assumption, the committee recommended that all full-time academic staff be members of senate. In the event, the university made little use of secondments for course development, so the full-time academic staff grew much larger than anticipated. When the author joined the UKOU as vice-chancellor in 1990, the senate had over one thousand members, although this was reduced to 100 in the 2000s. The larger body may have made decision-making a bit slower, but this was more than offset by faster implementation because of wider buy-in to the decisions. Furthermore, students and part-time tutors, who had significant representation on senate and attended assiduously, ensured that decisions usually reflected students' interests.

The governance of open schools is simpler. The eight open schools profiled by Daniel (2010, pp. 110–140) are all directly linked to state ministries of education, although their success seems to correlate well with the degree of independence in governance and operations that the reporting ministry affords them. India's NIOS has achieved a good balance. It follows government rules for the terms and conditions of staff but has the General Body of NIOS, chaired by the minister, to set policy, with an Executive Board to oversee operations. Ferreira (2009, p. 195) commented: "it is not coincidental the NIOS, the largest open school in the world, is not only the most autonomous of our case studies but also the most open in terms of academic regulations... and alternative vocational curriculum."

Botswana's open school, BOCODOL, is a parastatal body (i.e., a semi-autonomous public institution run on commercial lines). This is also a successful formula, and BOCODOL is embedded effectively in the national education system.

The open school in neighboring Namibia, NAMCOL, is also a parastatal body, but very subservient to the ministry of education, limiting its ability to plan its own future. However, the case of Papua New Guinea, where the open school started as part of the University of PNG but is now attached to the ministry of education, suggests that the ministry is a more appropriate home, because UPNG used to skim off part of the open school's fee income to spend on its own campus operations.

MOOCs providers operate as commercial operations for profit, although FutureLearn is 50% owned by the UKOU, which is a public university. MOOC providers have boards of directors in the normal commercial manner. The greatest challenge they face is to make money from learners and partners without straying too far from the original ideal of making courses freely available globally on the Internet.

The acronym MOOC originated in Canada in 2007 to describe an open online course at the University of Manitoba titled, "Connectivism and Connective Knowledge," (Downes, 2012). It was offered to 25 fee-paying students on campus and 2,300 members of the general public who took the online class free of charge. It aimed to follow Ivan Illich's injunction that an educational system should "provide all who want to learn with access to available resources at any time in their lives; empower all who want to share what they know to find those who want to learn it from them; and, finally furnish all who want to present an issue to the public with the opportunity to make their challenge known" (Illich, 1971, p. 75). In this spirit, "all the course content was available through RSS feeds, and learners could participate with their choice of tools: threaded discussions in Moodle, blog posts, Second Life and synchronous online meetings" (Daniel, 2012).

Most of the thousands of contemporary MOOCs are inspired more by Silicon Valley and Wall Street than by those pioneering approaches, although, as MOOCs diversify, learners may have more latitude to mold them to their own needs. The principal challenge is that MOOCs are costly to create and yet, according to a standard definition, "they are made available over the Internet without charge to a very large number of people." Providers have explored various ways of monetizing MOOCs, including all of the following:

- Certification (students pay for a badge or certificate).
- Secure assessments (students pay to have examinations invigilated (proctored)).
- Employee recruitment (companies pay for access to student performance records).
- Applicant screening (employers/universities pay for access to records to screen applicants).
- Human tutoring or assignment marking (for which learners pay).
- Selling the MOOC platform to enterprises for their own training courses.
- Sponsorships (third party sponsors of courses).
- Tuition fees.

As a result, MOOC companies can have viable businesses, although this list suggests that the organizations least likely to make money are their partner universities. This may not really matter, however, because campus universities offering a few MOOCs may be happy to treat them as “loss leaders” that burnish their brand and show off their liveliest academics, always assuming, of course, that their MOOCs are attractive and academically credible. From my own experience, FutureLearn’s development and quality assurance processes ensure this, and they sometimes have a transformational impact on the teaching strategies of the academics taking part.

While these three types of providers of distance education at scale have different governance structures, their management and administration have many similarities, largely because of the imperative of operating at scale. Large-scale learning systems are analogous to three-legged stools (Daniel, 2010, pp. 57–60). The legs are administration and logistics, course materials development, and student support. All teaching institutions have functions analogous to these, of course, but most classroom-based teaching can continue reasonably well if one—or even two—of the legs are weak. However, for distance education at scale, the stool is an apt metaphor, because if any leg is weak, the whole system may collapse and students will desert it.

Perhaps surprisingly, given their very different contexts, the practices of our three-scale providers are rather similar in the administration and logistics functions. This is because they all need to operate high-capacity IT systems for student records management and other functions. For example, in 2008, long before any widespread use of computers in its teaching, 30% of pupils in India’s NIOS were enrolling online, a facility now available through the common service centers in the country’s 600,000 villages (Daniel, 2010, p. 119). Moreover, when the heads of open universities from around the world met in Toronto in 2017, they agreed that: “IT can prove most useful in the administrative and student support functions. Speeding up these processes has positive impacts on student progression and retention” (Daniel, 2019, p. 203).

How are courses developed for distance education at scale? MOOCs providers delegate course preparation to their partner institutions, offering whatever support is necessary and quality assuring the result. Over a decade, FutureLearn and other MOOCs platforms have refined successful formulae for course presentation which integrate short (5–10 min) videos, podcasts, texts, research articles, simulations, quizzes, and interaction among students on the social learning platform. This decentralized approach is the key to offering thousands of subjects and, since each partner institution only contributes a small number of courses, it has an interest in making them engaging and impressing the learners.

Open schools also arrange for most course development to be done by external specialists and leading organizations in the field. NIOS has been a pioneer in developing vocational education and, to promote the concurrent development of the hand, head, and heart, offers life-enrichment courses such as music, painting, art, and yoga. It is determined to give an appropriate place to life skills and a focus on the world of work, hence its decision to enable students to combine vocational and academic courses (Daniel, 2010, p. 118).

Although some courses are shared among India’s state open universities, the tradition of developing open university courses in-house remains strong. Perry

(1977, p. 90) considered the course team to be the UKOU's most significant innovation, and this tradition continues:

Modules are developed by multidisciplinary course teams comprising:

- Academics, educational technologists, and media specialists contributing pedagogic and technical expertise.
- Respected academics from other universities working alongside OU colleagues.
- External examiners.

> This model has helped to build the University's reputation for innovation, rigour and quality and has been adopted by distance teaching institutions worldwide. (Open University, 2021)

The provision of student services and support is where the differences between providers of distance education at scale are most marked. As with course development, the open universities mostly keep this function under their direct control. The UKOU informs its students of these services on its website:

> The OU has a network of more than 5,000 tutors – the largest in the UK. Tutors mark assignments, provide detailed written feedback, and offer support to students by telephone, email, or computer conferencing. They also run group or online tutorials and day schools. Some are full-time members of staff, but most are associate lecturers: experts in their subject who combine their work as tutors with other academic or industry jobs. (Open University, 2021)

The organization of this tutorial network is a vital and sensitive function. In the early days, its administration was decentralized to 13 regional centers, where each program area located a full-time academic. As programs multiplied, however, more tutoring moved online and, when the UKOU encountered financial difficulties in the 2010s, only the UK's nation regions retained such centers, creating an internal controversy that became national news.

Most open school pupils are of secondary school age, although these institutions also attract adults who missed out on schooling for various reasons. Whether younger or older, however, these pupils require more intense and regular support than learners in higher or continuing education. India's NIOS conducts personal contact programs of 30 hours (35 for science subjects) at study centers on weekends, holidays, and convenient times during the week. These study centers, numbering over 3,000, are run by local institutions that NIOS accredits. Most are non-governmental organizations (NGOs) with missions to disadvantaged children or those with disabilities. This creates win-win partnerships, since NIOS has access to study centers that share its aims, while the NGOs can offer schooling to the children alongside their main mission.

For MOOCs providers, student support is entirely delegated to the partner institutions, except for regular electronic communications from the center to encourage learners to stick with their courses, enroll for new ones, or pay to convert them to formal qualifications. Each course in FutureLearn has an active social learning platform, where partner institutions monitor comments and intervene if discussions get off track or spread misunderstandings.

Leadership

We end with the challenge of leadership. Large-scale distance learning providers have corporate structures ranging from those nested in government through independent not-for-profit universities to commercial for-profit entities. Are there common qualities that the leadership of such diverse organizations requires?

In "Open Learning and Open Management: Leadership and Integrity in Distance Education," Paul notes the need for different sorts of leadership depending on the institution and the circumstances. While individuals with a strong vision and communication skills can respond to major change more effectively than those whose leadership qualities are less obvious, they may be less effective in coping with longer-term adjustments to the change (Paul, 1990, p. 20).

Effective leaders must have the flexibility to adopt the approach required by the particular situations they face. Anyone who has moved among senior posts in different institutions knows this. For example, the author recalls the sharp contrast between the challenges he encountered as vice-president of Canada's Athabasca University (AU) in the late 1970s and those he faced as vice-chancellor of the UKOU in 1990.

Established in 1970, AU was still finding its way gingerly into distance education by the end of the decade. Arriving in 1978, the author found a senate that wanted to change the direction of the academic program at every meeting. To slow this spinning wheel, he argued that determined implementation of a reasonable option would take AU further than waiting to conceive a perfect program. The staff, clearly relieved, set to work on implementing senate's most recent plan and AU took off, with enrollments doubling every year.

The situation the author found in the UK in 1990 was quite different. The UKOU was already an international icon conducting distance education at scale in a highly effective manner. However, energy was low and the staff were depressed after a decade of a Thatcher government, not because of cuts in funding but because the minister had launched a witch hunt for Marxist bias in UKOU course materials. Moreover, in the wider world, the honeymoon period of distance education inspired in by creation of the UKOU had ended. Critics began to ask how much of a revolution it really was. The Fordism debate captured the Zeitgeist of the times. The vice-chancellor's first task was to restore confidence and energy. Thatcher had just left the stage, so another imperative was to rebuild relations with the government, which was planning a major reform of UK higher education—although we were unaware of that in 1990.

In a later book, Paul (2015) takes an ethnographic approach to the leadership of Canadian universities in the period 1990–2010, with a good summary of the academic literature on leadership generally. In the light of this literature and his personal experience, this author considers that the leadership needed for distance learning at scale is determined as much by the conjuncture that the institution faces as by any personal vision that a new head brings. In particular, a leader needs these five qualities:

- *A conviction that the institution can be a catalyst for global change*

In ODL, such convictions often embrace openness, widening access, and using technology, but Perry came to the UKOU with a different ambition: "I had long been concerned at the pitiably inadequate standard of most of the teaching that went on in the established universities" (Perry, 1977, p. xv). He believed that if teaching at a distance could develop a better approach, "it should ultimately spread back into the established universities and raise the standards of teaching everywhere."

- *The skills and determination to sustain excellent relations with government*

This goes beyond the self-interested relationships that all executive heads of public institutions like to have with their government. Because they can roll out new programs nationwide with consistent quality, institutions operating at scale are natural partners to help governments implement their own objectives for education and training programs. This has been successful in jurisdictions as diverse as Indonesia (training of teachers and health-care workers) and Quebec (PERMAMA) (Daniel, 2010, p. 146).

- *Familiarity with the administrative and bureaucratic functions of the institution*

As our analogy with a three-legged stool illustrated, large institutions will underperform unless course development, logistics and student support all work well. Since these are scale operations, any changes must be carefully planned. The UKOU experienced a serious hiccup in the mid-2010s when it expanded online tutoring with insufficient pilot testing. Leading a large distance learning organization is a full-time job, which requires constant attention to multiple functions.

- *Ability to scan the environment and anticipate the implications of technological developments*

Using the most appropriate teaching and organizational technologies is central to the mission of a distance learning institution, but false moves will be costly, and needed changes take time. This is a huge challenge for open schools and open universities, where the speed of change is essentially determined by the equipment that students can access at home.

- *Persuasive advocacy for new initiatives*

Absent special funds to launch additional programs, new initiatives require temporary sacrifices of resources by existing units, which usually see the emergence of a new area as a threat. It is the leader's task to persuade colleagues of the institutional benefit. An example of success is the UKOU's law degree, now the most popular in the UK, which was a late addition to the university's programs.

Conclusion

The Covid-19 pandemic stimulated dramatic diversification and expansion in digital distance learning, as schools and universities around the world switched rapidly to emergency remote teaching. Although much teaching returned to the classroom as the pandemic receded, the new capabilities for distance education that teachers and institutions have acquired will be helpful in responding to the huge growth in demand for education and training foreseen in the coming decades. We have shown that even partial achievement of the UN's Sustainable Development Goal 4 will bring hundreds of millions of new pupils, students, and learners into secondary schooling, tertiary studies, and continuing education. The new capabilities for distance education that campus institutions have developed, although useful, will be insufficient to meet this demand. It will require organizations that can offer distance learning at scale in a spirit of openness. We have explored three examples, open universities, open schools, and MOOCs, focusing our attention on the operational challenges of running such providers, which already account for millions of learners worldwide. These organizations bring other important assets as the world recovers from Covid-19 and addresses three major challenges: reducing the inequalities within and among countries, helping those pushed back into poverty by the pandemic, and fighting climate change.

Our three types of scale providers of distance education all have the mission of offering ready access to learners of all types, an approach that the campus institutions switching to emergency remote teaching did not try to adopt. The term "*open* and distance learning" originated with the scale providers, and openness will be a crucial feature of educational provision in the twenty-first century. A primary element of openness in distance education at scale is to operate at lower costs than campus institutions. In doing so, it leaves a much smaller carbon footprint and can help the whole education sector combat climate change.

Although open universities, open schools, and MOOC platforms each have different ownership and governance arrangements, they present similar challenges of leadership, management, and administration. For institutional success, the three key functions of course creation, student support, and logistics must all function impeccably around the clock and on a large scale. This requires leaders and managers who are wholly committed to the ideals of openness and teaching at scale rather than the comforts of selective admission and small classes.

References

Bates, A. W. (2021). Tilting at windmills: Two research studies on students' views on Canadian universities' responses to the Covid-19 pandemic. https://www.tonybates.ca/2021/02/10/tilting-at-windmills-two-research-studies-on-students-views-on-canadian-universities-responses-to-the-covid-19-pandemic/

Binder, M. (2006). The cost of providing universal secondary education in developing countries. In J. E. Cohen, D. E. Bloom, & M. B. Malin (Eds.), *Educating all children: A global agenda* (pp. 455–491). American Academy of Arts & Sciences, Cambridge, MA.

Blackman, T. (2020). The Open University: A university for our times. https://www.linkedin.com/pulse/open-university-our-times-professor-tim-blackman/?published=t

Calderon, A. J. (2018). Massification of higher education revisited. RMIT University, Australia. https://www.academia.edu/36975860/Massification_of_higher_education_revisited

Class Central. (2020). By the numbers: MOOCs in 2020. https://www.classcentral.com/report/mooc-stats-2020/

Crowther, G. (1969). Chancellor's address at the inauguration of The Open University. https://www.open.ac.uk/library/digital-archive/pdf/script/script:5747089b4a53f

Daniel, J. S. (1996). *Mega-universities and knowledge media: Technology strategies for higher education*. Kogan Page, London.

Daniel, J. S. (2010). *Mega-schools, technology and teachers: Achieving education for all.* Routledge, New York & London.

Daniel, J. S. (2012). Making sense of MOOCs: Musings in a maze of myth, paradox and possibility. *Journal of Interactive Media in Education, 2012*(3), Art. 18. https://doi.org/10.5334/2012-18.

Daniel, J. S. (2019). Open universities: Old concepts and contemporary challenges. *The International Review of Research in Open and Distributed Learning, 20*(4). https://doi.org/10.19173/irrodl.v20i3.4035.

Daniel, J. S. (2020). Education and the covid-19 pandemic. *Prospects, 49*, 91–96. https://doi.org/10.1007/s11125-020-09464-3.

Downes, S. (2012). The rise of MOOCs. https://www.downes.ca/post/57911

Ferreira, F. (2009). The bright but challenging future of open schooling. In D. Abrioux & F. Ferreira (Eds.), *Open schooling in the 21st century* (pp. 193–204). Vancouver, BC: Commonwealth of Learning. https://www.col.org/resources/perspectives-distance-education-%E2%80%93-open-schooling-21st-century.

FutureLearn. (2019). FutureLearn reaches 10 million learners. https://www.futurelearn.com/info/press-releases/futurelearn-reaches-10-million-learners

GlobalEconomy.com (2021). Business and economic data for 200 countries: India secondary school enrolment. https://www.theglobaleconomy.com/India/Secondary_school_enrollment/

Illich, I. (1971). *Deschooling society.* London, UK/New York, NY: Marion Boyars.

Kanwar, A., & Daniel, J. S. (2020). *From response to resilience: Lessons from the COVID-19 pandemic. Report to the Commonwealth Ministers of Education*. Vancouver, BC: Commonwealth of Learning. http://oasis.col.org/handle/11599/3592.

Keegan, D. (1994). *Otto Peters on distance education: The industrialization of teaching and learning*. Psychology Press, East Sussex, UK.

Lewin, K. M. (2008). *Strategies for sustainable financing of secondary education in Sub-Saharan Africa* (World Bank working paper no. 136). Washington, DC: World Bank.

Mishra, S. (2017). *Open universities in the Commonwealth: At a glance*. Vancouver, BC: Commonwealth of Learning. http://oasis.col.org/handle/11599/2786.

Moser, M., & Ortiz-Ospina. E. (2013). Tertiary education. Published online at OurWorldInData.org. Retrieved from: https://ourworldindata.org/tertiary-education

Open University. (2021). Teaching and research: About the Open University. https://www.open.ac.uk/about/main/teaching-and-research

Oxford Dictionaries Online. (2021). Meaning of MOOC in English. https://www.lexico.com/definition/MOOC

Paul, R. H. (1990). *Open learning and open management: Leadership and integrity in open learning and distance education*. Kogan Page, London.

Paul, R. H. (2015). *Leadership under fire: The challenging role of the Canadian University President*. McGill-Queen's University Press, Montreal.

Perry, W. (1977). *The Open University: History and evaluation of a dynamic innovation in higher education*. Jossey-Bass Publishers, San Francisco & Washington.

Plourde, M. (2013). MOOC Poster. https://commons.wikimedia.org/wiki/File:MOOC_poster_mathplourde.jpg

Raggatt, P. (1993). Post-Fordism and distance education: A flexible strategy for change. *Open Learning: The Journal of Open, Distance and e-Learning., 8*(1), 21–31. https://doi.org/10.1080/0268051930080104.

Rajagopalan, T. (2007). *A study of the development of the state open universities in India*. Vancouver, BC: Commonwealth of Learning. http://oasis.col.org/handle/11599/240.

Rajagopalan, T. (2011). *A study of the development of state open schools in India*. Vancouver, BC: Commonwealth of Learning. http://oasis.col.org/bitstream/handle/11599/1014/2011_Rajagopalan_State-Open-Schools-India.pdf?sequence=1&isAllowed=y.

Rumble, G., & Koul, B. N. (2007). *Open schooling for secondary and higher secondary education: Costs and effectiveness in India and Namibia*. Vancouver, BC: Commonwealth of Learning. http://oasis.col.org/handle/11599/228.

Smith, A. (1776). *The wealth of nations, Book 1 Chapter 1 para. I 1.3.* http://www.econlib.org/library/Smith/smWN.html

UNESCO. (2016). *Education for all 2000–2015: Achievements and challenges: EFA global monitoring report 2015*. Paris, France: UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000232205.

UNESCO. (2019). New methodology shows that 258 million children, adolescents and youth are out of school. http://uis.unesco.org/sites/default/files/documents/new-methodology-shows-258-million-children-adolescents-and-youth-are-out-school.pdf

United Nations. (2015). Transforming our world: The 2030 agenda for sustainable development. https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf

United Nations. (2021). Department of Economic and Social Affairs. Sustainable development. https://sdgs.un.org/goals/goal4

Open Schools in Developing Countries

30

Virtual and Open or Distant and Closed?

Jyotsna Jha and Neha Ghatak

Contents

Abstract

This chapter examines the reach and experiences of virtual and Open and Distance Learning (ODL)-based education in the context of developing countries with high socioeconomic inequalities and highly uneven access to literacy and technology, through a study of the ODL experience in India. Using the perspective of inclusiveness, the chapter first examines the available evidence related to the virtual schooling experiences during the ongoing COVID-19 pandemic. The pandemic made virtual schooling suddenly a reality in the entire country, as has been the case in most parts of the globe. It then moves to analyze the available evidence with regards to the existing ODL-based system in India, which also happens to be one of the largest in terms of the numbers covered through this mode in the world. Based on these analyses, the chapter identified three kinds of thresholds: access related, learning related and systems related, to outline the prerequisites for the success of virtual or open schooling, especially from the

J. Jha (✉) · N. Ghatak
Centre for Budget and Policy Studies, Bangalore, India
e-mail: jyotsna@cbps.in; neha@cbps.in

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_27

perspective of those who belong to educationally disadvantages groups or locations and face marginalization of some kind. While arguing for making the ODL-based education far more inclusive and responsive to specific disadvantages, the chapter recognizes the need for the mainstream regular school system to become more flexible and open by learning form the ODL-based education system. Finally, the chapter argues for the need for adopting a proactive and layered learner support approach in order to ensure that virtual teaching actually leads to meaningful learning.

Keywords

Open and distance learning · Online education · EdTech · Pandemic · Access · India · Secondary education · Digital education

Introduction

“Those were the Days” is the title of a lesson in the Hindi language textbook for the fifth grade in India, published first in 2007 by the National Council of Educational Research and Training. This Hindi adaptation of a science fiction by Isaac Asimov visualizes children’s lives in the year 2155 when schooling is entirely in front of a “machine,” and is thrilled to see a printed book that they accidently discover. The book was from their grandparents’ time. This, however, became a reality much sooner than 2155, in 2020. The COVID-19 pandemic suddenly advanced and widened the use of technology in education in many parts of the globe, making the notion of virtual schooling far more common than anyone could have anticipated. This also led to the realization of both the potential and limitations of open and virtual learning in diverse contexts, including developing countries.

This chapter uses the research evidence from India to argue that the success of the open and virtual education initiatives or systems at the level of school education is dependent upon the presence of a number of structural, locational, educational and technological thresholds, especially in contexts that are highly socio-cultural-linguistically diverse and economically unequal. It argues that, in absence of these thresholds related to literacy and literate environment of the learner, affordability of the resources such as internet accessibility and the associated hardware, technological connectivity, and freedoms regarding time-use and access to phone or other tools, the reach and potential of open and virtual schools remain limited. What is true for India is likely to be true for a majority of developing countries in general, and for South Asia in particular. Therefore, this chapter provides an illustrative case for understanding the limitations and potential of Open and Distance Learning (ODL)-based school education in the developing world.

Using the Indian case as an illustration, it goes on to argue that exclusive open or virtual schools cannot and should not replace physical schools at the school-education stage because the learner in most cases is still not an adult and therefore does not have freedoms that one needs to access open schools, although the open-school approach and practices have something critical to offer to make the physical school system a less rigid, inclusive, and creative spaces for learning. Open and virtual schooling practices can play a complementary role by widening the experience range of the learner in addition to its potential for certification of those who cannot or do not want to be part of the regular schooling system.

The rest of the chapter is divided into three main sections. The following section discusses the evidence regarding the experience of virtual schooling during the pandemic and the next section uses the available evidence and feedback on the established system of ODL-based schooling structures and experiences. The final section presents the conclusions and prerequisites for making virtual and open schooling-based education more responsive and inclusive in developing countries.

The COVID-19 Pandemic Experience

As the world turned toward online education hailed as the only option left for education in this crisis, so did India, when it went into a sudden and complete lockdown from 24th March 2020 to curb the spread of the COVID-19 virus. The lockdown was a measure to protect an already fragile health infrastructure, causing the educational setup to go into an overwhelming shock when all schools were abruptly closed. It has been well documented that school closures and periods of long holidays tend not only to negatively affect learning and school attendance but also can push children to labor, trafficking, and long-term dropouts from the school (Dove, Wong, Gustafson, & Corneil, 2020; Denney, Gordon, & Ibrahim 2015; Selverbik, 2020; Santos & Novelli, 2017; United Nations Development Programme, 2015). Therefore, an unprecedented, long and sudden closure of schools witnessed during this pandemic is already showing clear signs of adverse impact on learning levels and increased rate of drop outs at the time of writing this chapter. UNESCO estimates that about 140 million students in primary and 130 million in secondary schools have been affected by the lockdown in India alone (UNESCO, 2020).

The New Education Policy (Ministry of Human Resource Development, 2020) in India had laid down the intentions toward greater use of online education into the regular teaching learning practices but the pandemic situation peddled online education as the "only solution." Almost overnight, it was expected that the entire school education system would be able to convert itself into a digital, distanced-based system ready to serve the masses, with no preparation, no infrastructure, no social motivation or culture for self-directed learning. While ODL-based education or virtual schooling provides a viable option for continuing education in times of crisis like these, especially because of its potential for avoiding crowding, it also calls for training and adequate preparation. Although India has a well-established ODL-based education delivery system through its network of National Institute of Open Schooling (NIOS) and state-specific State Open Schools (SOS), the mainstream schooling system has rarely taken advantage of it in terms of learning from its processes and experiences. Hence, when the challenge of suddenly shifting from physical to virtual came, most of the schooling systems in India stumbled, as evidenced from diverse feedbacks that have emerged from the field. Before discussing this experience, it is important to understand the kind and range of virtual schooling options that have been available in the country.

A perusal of the literature suggests that there are four kinds of online media and tools that are currently at use in India. The first is digital ed-tech content platforms like Byjus, Vedantu, and Topper. These platforms offer technologically assisted coaching, content delivery and assessments to learners at a moderate to high cost depending on the package purchased. The second kind are social media platforms such as YouTube, Facebook, Twitter, and Instagram, which offer content through videos, blogs, and links to papers that learners can access free of cost as per their need. Virtual meeting spaces are the third kind of medium used by learners which offers a community space for interaction between learners, teachers, and other stakeholders. The most widely used virtual meeting platforms like Zoom, Google Meet, WebEx, and Microsoft teams are mostly free or come at a nominal charge. The fourth kind, and probably the most accessible because of its low-tech nature and cost, are broadcasts of lessons for relevant classes in television by national and various state governments and portals like DIKSHA E-Vidya (Sharma, 2021). These mediums offer a combination of synchronous and asynchronous platforms for learning. There has been an unprecedented jump in the number of users for these media and tools during the lockdown (Mathivanan et al., 2021).

The flexibility of learning in the comfort of one's home and the option to learn at a time most convenient for the learner serve as the biggest advantages of online learning. Added advantage is that the learners can stay connected 24 h a day and have the flexibility to choose from a variety of content available online and also to explore various teaching aids such as videos, graphics, posters, recorded lessons, as per their learning needs. Therefore, it offers learners the autonomy and freedom to learn anytime and anywhere as per their own pace and requirements. These freedoms are also extended to the teachers who can choose from different kinds of content, course structures, teaching aids, and materials available online. Teachers can also opt for different kinds of innovative assessment systems that are easily available online to suit their teaching requirements and assessment parameters (Cojocariu, Lazar, Nedeff, & Lazar, 2014; Muthuprasad, Aiswarya, Aditya, & Jha, 2020).

Modern technology allows for a variety of customization that enables collaborative work and an interactive learning environment (Dhawan, 2020), giving rise to blended and flipped classrooms. Technological innovation in Educational Technology (EdTech) has now allowed for real life simulations that replicate multiple features of a classroom allowing for an alternate learning space that was hard to imagine a few years ago (Kumar, 2021). The neoliberal market structure also allows for greater competition between the various online platforms and helps keep prices in check. But in all this, to assume that the mere availability of reliable internet connectivity and a laptop or a smart phone would ensure schooling and continued learning for all has been proven wrong in a country like India, whether examined from the perspectives of physical or social access, or viewed from the angle of pedagogy and learning.

Access to Virtual Schooling

India is a country where diversity and disparity go hand in hand. With over 250 million learners who are currently in school and many more who are of school age but outside the schooling system, India has one of the largest school-going populations in the world (Statista, 2020; Unified District Information System for Education Plus, 2020). This population is spread across diverse landscapes, regions, ethnicities, and cultures. When intersected with multiple social structures of caste, class, region, religion, and gender clubbed with high regional disparities and disproportionate access to resources, online learning becomes not only unequal but also difficult to either execute or access. Access to virtual schooling can be divided into two broad categories – firstly, physical access to digital infrastructure – like computers, smart phones, and internet connectivity, and secondly, social access to online education like having the time, space, and negotiating power to learn. A perusal of various data sets and surveys conducted pre- and post-pandemic clearly shows that both kinds of access are available only to a small section of the population and those coming from the most marginalized sections remain excluded from virtual schooling.

The 75th round of the National Sample Survey Office (NSSO) in 2020 on social consumption of education conducted in 2017/18 pointed toward the persistent digital divide in India. The data showed that only 9% of the students within the age group of 5 to 35 who were surveyed had a computer with internet access. About 11% of the students reported having a computer at home, while 25% said that they had access to internet facilities. The data also showed a vast rural-urban divide where only 4% of students in rural India claimed having access to a computer with internet as compared to 21% of students in urban areas. Regional disparities in access were also stark especially when seen in connection with rurality. Only 1% of students from rural areas had access to digital infrastructure in five Indian states: Jharkhand, Karnataka, Odisha, Tripura, and Telangana. The presence of Karnataka in this list, which has relatively better economic and social indicators with its capital Bangalore known as IT capital of India, shows that the access to online media does not always follow a linear pattern of regional deprivation (Reddy, Jose, & Vaidehi, 2020).

The digital divide, nevertheless, strongly intersects with economic and social divide in a society. The students belonging to the top income quintile had the highest access to computers with internet in India. As per NSSO (2020), about 45% of students belonging to the richest 10% income quintile reported having essential digital infrastructure as compared to only 2% of students from the lowest income quintile reporting the same. This trend holds true for the socially marginalized sections of Scheduled Tribe (ST), Scheduled Castes (SC), Other Backward Classes (OBCs), and Muslim students who reported having very limited access to computers with internet (4% for SC and STs, 8% for Muslims, and 7% for OBC). These groups have traditionally been at the lowest end of educational development and are officially recognized as the same. These numbers, when compared to students from other categories where 21% reported access to digital infrastructure, reveal that the digital divide is deeply rooted in socioeconomic deprivation. These four groups form more than 70% of the population in India, and therefore it will not be wrong to assume that, without access to essential digital infrastructure, learners from these populations would largely remain outside the gambit of virtual schooling and would have been left behind in continuing their education during the COVID-19 pandemic.

The interconnectedness of gender with other social and economic marginalization makes girls and women the least favorable group when it comes to accessing online mediums of education. Social norms strictly guided by patriarchal practices prevent women from not just owning technology, but social idioms of nature versus nurture and values attached to women's domesticity makes access to technology and online learning almost impossible for women in general, but especially for those who belong to the most marginalized populations in India. India has the highest gender gap in access to technology of any country (Devara, 2020).

A survey conducted by the Centre for Budget and Policy Studies (Ghatak, Yareseeme, & Jha, 2020) to assess the impact of the pandemic on the lives and education of children where one child in the age group of 10–18 years and one adult was interviewed from 3176 households across four Indian states found that in more than 70% of the households, the phone belonged to a male member. The gendered access to technology was revealed when only 26% of the girls who responded to the survey said that they had unhindered access to phones at home in comparison to 37% of the boys. The number of children who reported unhindered access went up when the phone belonged to a female member of the family, possibly because the male members usually ventured outside for work, hence further restricting access. This access declined further with economic deprivation, where children from households reporting economic difficulties reported less access to phones in comparisons to households that were relatively better placed economically. Children from such households could not afford to recharge internet packages even if a phone was accessible to them.

Several studies conducted in the pandemic period showed similar results. For example, two studies reported that only 11% of the children watched educational programs tele/broadcasted by state or union government; this was despite the fact that more than half of the households had a television set at home (Ghatak et al., 2020; Rajgopal & Gupta, 2020). Furthermore, girls spent disproportionality longer hours on domestic chores as compared to boys, and as a result, they had less time for studies and found it difficult to match the time for television broadcasts of educational programs which often coincided with their domestic responsibilities.

The results of another survey conducted to gauge the early impact of the pandemic on children in 23 Indian states by interviewing school going children from classes 1 to 12 also showed that access to digital infrastructure was limited with only 43.9% of children having access to smart phones (Bahl, Bassi, & Arora, 2021). Only 30% of students enrolled in public schools from the state of Maharashtra used the government's digital online platform. Less than 1% of the students had a laptop or a computer at home. Further, the students came from backgrounds with limited online learning environment where more than 70% of the parents reported having no digital skills (Bahl et al., 2021). An online learning environment also requires a private space for learning which is often absent for children coming from marginalized sections as they mostly live in modest living conditions with shared spaces amongst multiple siblings and relatives. Private space for learning is a luxury in India available only to a small proportion of socioeconomically privileged populations (Shah, 2020).

What is clearly evident from these studies is that online education or virtual schooling, when seen as the only viable option for continuing education during situations of crisis like the current pandemic, led to further widening of the already existing inequality in access to schooling. These studies established three facts: firstly, the physical access to devices necessary for virtual schooling is very restricted; secondly, the mere presence of physical devises in the household does not guarantee real access; and thirdly, social structures posed major barriers to unhindered access to virtual schooling.

Challenges of Online Pedagogy

Online pedagogy in many ways is qualitatively different from pedagogies followed in regular face-to-face interaction-based classrooms and therefore requires alterations in teaching and learning processes. The nature of technologically mediated platforms demands that teachers and learners have a certain ease with technology, going beyond rudimentary technological literacy. Grasping the interest of the learner and maintaining it for the length of the classes in which learners and teachers interface through a small screen, and face constant interruptions due to power cuts and inconsistent internet are some of the most challenging aspects of online teaching and learning (Cherian, 2020; Dhawan, 2020; Song, Singleton, Hill, & Koh, 2004). In addition to these challenges, one must also note that the issues of access that the students face are true for teachers as well, especially female teachers.

Even though online virtual classrooms try to replicate features of regular physical classrooms, it could lead to various levels of alienation for the teachers and the students. With the collapsing of spaces, where there is no difference between the place of work with one's private space at home, female teachers are often faced with situation where they are expected to be attentive toward domestic responsibilities and work around the clock (Chandy, 2020; Economic Commission for Latin America and the Caribbean & UNESCO, 2020; United Nations, 2020). Thus, trapped into a chain of unending work exasperated by the challenges of using a medium for which most of them have received very little training and therefore seemingly foreign, it is understandable that the teachers themselves can feel quite alienated.

Under such circumstances, it is not unusual for transactional distance to be high. In simple words, transactional distance is a psychological and communication space between what was taught by the teacher and what the learner perceived and understood (Moore, 1997). Therefore, high transactional distance could add to a sense of alienation between teacher and student, which is multiplied by the physical distance between them. A survey based on the experiences of 212 teachers from rural and urban India found that most teachers perceived high transactional distances in online teaching, where they found themselves to be untrained to handle situations in dealing with students from varied learning capabilities (Singh, Satyavada, Goel, Sarangapani, & Jayendran, 2020). From the learner's perspective, another level of alienation is the limited space provided for peer learning, interactions, relationship building, and expression of feelings through online mediums of education. Unlike the physical classroom space, the online space provides very limited avenues for the students to laugh, fight, question, and develop a sense of comradery and community (Bhattacharya, 2020).

Studies trying to see if children have been able to retain their learnings that they had achieved prior to school closure reported significant "learning losses" during the pandemic despite potential access to virtual schooling. A study covering 16,067 children in 1137 public schools in India across classes 2 to 6 reported learning-loss for more than 90% of children in language and more than 80% in Mathematics for selected foundational abilities that are critical for further learning (Azim Premji University, 2021).

It is hence clear that virtual schooling experiences were not successful in sustaining the learning, which could be a result of both access and pedagogy related challenges, and the unpreparedness of all: institutions, teachers, and students. But what happens when there is a preparedness? The existing ODL-based schooling system delivered through the NIOS and SOS have evolved over a long period of time and should have developed mechanisms to address some of these access and pedagogy-related challenges that they too are likely to have faced. The next section discusses this in detail.

The ODL-Based Schooling System in India

Unlike virtual schooling that suddenly came into practice during the pandemic, the ODL-based schooling in India uses a combination of other modes in addition to technology such as printed learning resources as self-learning materials and contact classes with teachers. With more than three million enrolments, India's ODL-based schooling facilities are considered one of the largest in the world. This is something that the literature from the community of ODL professionals always like to highlight in the context of scale (Ferreira, Kanwar, & Daniel, 2008; Kanwar & Ferreira, 2012). However, the formal ODL-based education covers only 2 to 3% of the school going population in India. Although not meant for only the school going population age group, an overwhelming majority of the NIOS and SOS learners at secondary and senior secondary, especially the latter, come from the same age group that also attends regular schools.

The NIOS works through state-specific regional centers which manage all the local functions including conducting face-to-face contact classes and examinations. The NIOS system provides flexibility that the regular schooling system usually does not provide. This includes the provision for (i) a five-year time period to complete the courses such as secondary (grade 10) or senior secondary (grade 12), (ii) no maximum age specified, making it easy for older people who could either not attend or complete their schooling, and (iii) twice a year public examination with an additional provision for on-demand examinations. The question then is whether these provisions and flexibilities help those in accessing education who have otherwise remained excluded from school education? The existing research shows a mixed response to this question: while it is true that many individuals who have studied using this mode would not have accessed schooling in absence of the ODL system, it is also true that the representation of rural or educationally backward groups remains low (Jha, Ghatak, Minni, Rajagopal, & Mahendiran, 2020).

The three officially acknowledged, educationally backward social groups, rural areas, and remote locations that are relatively poorly provided with schooling facilities and girls remain under-represented in the NIOS as well. The SCs, STs, OBCs, occupying about 70% of the population have had only about 29–33% representation at the secondary stage, and 25–29% at the senior secondary stage, which also does not seem to be improving over time (NIOS Statistical Reports, Different Years). The same is true for girls; they represent only about 30–31% of total NIOS admissions at both stages and their shares have remained almost static during 2008–2015 (National Institute of Open Schooling, Different Years).

The question that arises in this context is why it is so? The available evidence shows that only a small section has been able to use the flexible elements successfully and the groups that are the most natural targets of the ODL system have not benefitted as much. The specific analyses leading to this inference are discussed below.

Using the multi-nominal logit regression to estimate the probability of completion where the dependent variables represent completion at varying time periods since enrolment (say 1 year, 1.5 years, and so on) and no completion and the independent variables included sex, age, caste, mother's and father's education, income level, while using the NIOS student's data for 5 years (2008–2013), Jha, Ghatak, Minni, Rajagopal, and Mahendiran (2020) estimated the probability of completion over the course of the stipulated 5 years and concluded that

> . . ..an average learner faced a higher probability of non-completion, of about 45%, even with the five-year flexibility. The probability of successful completion is highest in the first year of enrolment (about 25%). After that, the probability decreases to 17% at the one-and-a-half-year stage of enrolment and falls alarmingly to 7% in the second year of enrolment and then to 2% thereafter. In other words, the majority of those who are likely to complete the course do so in the first two years, implying that the use of the five-year time frame has been very low. (p. 146)

This implies that majority of learners who complete the courses do so in the very first year or at most the second year. The probability of those of completing who do not complete in 2 years is low. Could this indicate the presence of more of those who are substituting regular school with ODL just for certification rather than adding to the existing pool of in-school students? This question becomes important, as many view ODL-based education as an alternate mode to reach a higher number of out-of-school children as well as to provide an opportunity to those who have missed the bus (Ferreira et al., 2008; Kanwar & Ferreira, 2012).

Based on an in-depth study of the ODL system and experiences including an analysis of student data and a tracer study, (Jha et al., 2020) conclude that this is indeed the case. This argument is based on several evidence bases including the fact that: (i) the majority of the institutions for contact classes are located in urban and per-urban areas; (ii) technology that plays a major role in admissions, accessing learning resources and examination, remains inaccessible to most learners from marginalized backgrounds, aided by structural barriers faced by girls, as discussed in the earlier section; and (iii) information/literacy gaps including poor English language skills necessary for accessing technology-enabled resources and services make learners more vulnerable to exploitation by middlemen, which also makes the cost of accessing the system unaffordable. Consequently, they argue that ODL-based education, which also serves as an examination board, is being used largely for certification alone rather than learning. The users include: (i) experimental schools and NGOs that are either looking for creative combinations and flexible arrangements, not offered by the regular school boards; (ii) "high-performing" institutions that push students who are not likely to be high achievers in the regular examination boards; and (iii) institutions which primarily coach students for entrance to engineering and medicine courses, alongside providing senior secondary stage education.

What emerges is that while each learner is treated as an individual learner by the NIOS, in reality, a good proportion is using it only for certification while their learning is mediated by other institutions. This means that these learners do not depend upon the NIOS resources and services for their learning, performance, and completion. The available statistics, however, do not tell us about the distribution of NIOS learners across different kinds of learners. Research also indicates that there are wide deviations in the NIOS delivery "as envisaged" and "as practiced" at all stages: pre-admission, admission, academic support, and examination. Awareness drives about ODL-based education and assistance for technology rarely take place in rural and remote locations; contact classes are infrequent or nil in certain states and facilities like examination on-demand are available only in regional centers located in the state capital or other prominent cities (Minni, Pancharatnam, Rajagopal, & Jha, 2016). In absence of any support and mediation, it is difficult for the individual learners facing various constraints and living in remote areas to learn on their own. Even though online spaces can potentially allow collaborative learning, the absence of access to facilities coupled with lack of agency and freedom of learners makes it almost impossible for this to be practiced (Jha et al., 2020).

What becomes apparent is that the barriers to virtual schooling that have recently been exposed on the face of the pandemic have also been at play in limiting the reach of the already-existing ODL-based schooling systems. While many, including those who faced individual barriers such as early marriage or early labor market entry have used the system to further their schooling (Mahendiran, Ghatak, & Jha, 2016), those who are at the margin do not make it to thresholds needed to access the open schooling. Only better-informed and more privileged take advantage of the openness and flexibilities to get away from the otherwise rigid system of schooling. The final section discusses how the ODL-based system can be made less distant for the vulnerable, and how the rigid schooling system would benefit by borrowing a few principles and processes from the ODL system of education.

Inclusive ODL-Based Education and Flexible Schools: Developing Countries Potential Pathway

The discussion so far clearly reveals that while ODL-based education needs to be become more inclusive and accessible, the mainstream system of schools that push away students who do not completely "fit," needs to become more flexible. Developing countries need to make all learning spaces, either based on ODL or face-to-face schools, more open, inclusive, and creative. The lack of flexibility and preparedness of the existing schooling systems was a major reason for the near failure of virtual schooling in helping children from marginalized groups access learning opportunities that otherwise should have been accessible to them. Here, the ODL system has a lot to offer. However, the ODL system itself needs to be more aware of the needs the learners form educationally disadvantaged groups and the barriers they face to be able to make its delivery more inclusive and meaningful.

The above discussion can be summarized in the form of three kinds of threshold that the success of the ODL-based school level education is dependent on: access, learning, and system-related thresholds (Fig. 1).

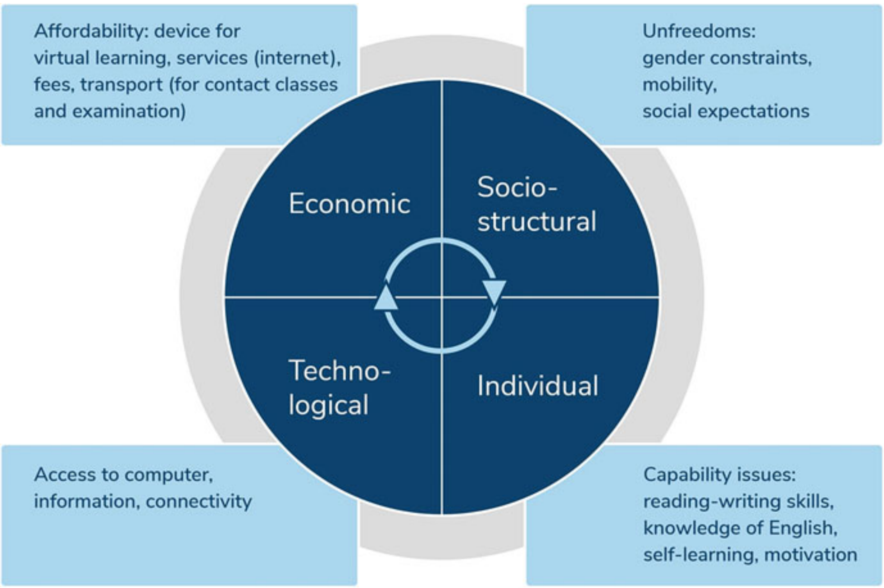


Fig. 1 Constraints that learners need to overcome for reaching the access threshold required for ODL

Threshold 1: Issues of Access

The following diagram presents the access related constraints faced by learners to reach a threshold allowing them to access ODL-based education in its present form. These are somewhat similar yet distinct from what one faces to access the regular school. For instance, knowledge of particular levels of reading-writing skills, practice of self-learning, and high motivation are not as essential in a physical classroom, as the teacher is expected to mediate the process and help in filling these gaps. Similarly, girls face even greater restrictions as at times the choice itself is determined by the fact that the family does not want them to be mobile, and they even restrict their access to devices such as phones (Ghatak et al., 2020; Jha et al., 2016). Greater dependence on technology in the ODL system makes the issue of connectivity and affordability far more important there.

Threshold 2: Issues of Learning Support

The effectiveness of learning through virtual means is highly dependent on the presence and effectiveness of the access related thresholds discussed earlier. While economic, socio-structural, and technological thresholds are critical for accessing the process of teaching, individual barriers are crucial for using the process for learning to happen. In other words, the delivery design and system need to take all these constraints into account. For instance, if both connectivity and affordability are a major issue for a group of children in accessing internet/computer-based virtual classes, it is important to think of and include alternatives such as textual learning resources. Similarly, if girls are known to be engaged in household chores during morning hours in their households, the TV/radio broadcasts can be scheduled for the afternoon, when a higher number is likely to attend.

However, even when all these barriers are overcome, individual barriers may continue to play a major role in learning: the learner may still be unable to make sense of the connections between what is being taught and shared learning resources because of the absence of mechanisms that allow teacher-learner interactions, mediation, questioning, and a deeper engagement through peer interactions. The literature on the ODL-based education has been engaging with this issue and a "Self and Strength" based learner support approach (Simpson, 2008) seems to be particularly relevant in developing countries where children from marginalized groups face poverty, low self-image, absence of a literate, and supportive home environment and gender-based discrimination.

A learner support system that uses elements of Dweck's Self Theory to help students believe in their own innate ability to learn, and also from the Strength Approach by having a continuous relationship with students through proactive means such as phone (or letters if phone and internet are not available) to ask about their well-being, strengths, and need for support shows evidence of having a positive impact on learning levels of ODL learners coming from marginalized backgrounds (Simpson, 2008). The schooling system, which continues to be heavily dependent on virtual means due to the pandemic, can pay attention to these elements not only now but also for building its general preparedness for any such shocks in the future as well as for better integration of children from disadvantaged backgrounds in regular schools. For ODL systems this would mean a shift from the current approach where the learner rather than the system is supposed to be proactive; the near absence of a “teacher” or an advisor or mentor in ODL systems at school-education stage prevents any kind of learning from becoming central as learners are still largely young and hence not necessarily highly independent, motivated, and skilled.

Threshold 3: Issues of Systems

The evidence from Indian case clearly shows that the current system of ODL-based school education is working well for those learners who are self-motivated and proactive, especially for certification. This means that, though the flexibilities (number of years, on-demand examination, combination of subjects/discipline to be selected) have been very useful for those who had learned enough to complete the stage and get a certification, this is something that the regular systems normally fail to accommodate. However, the ODL-based system has neither been successful in having contextual and diverse approaches to be able to expand the reach for educationally disadvantaged groups nor in enabling learning for those who are not supported by other institutions as mediators.

Conclusion

The above analysis points toward the need for three critical shifts to make the ODL-based school education inclusive, flexible, and effective for those learners who come from disadvantaged contexts. Although drawn from the analysis of its experience in India, these are likely to be a common issue across the nations at similar stages of economic development and having similar levels of heterogeneous or unequal societies. These are: (i) ODL systems adopting more inclusive measures for better access, for example, using diverse means to reach potential learners taking specific disadvantages into account; (ii) encouraging the mainstream systems of schooling – schools and the examination boards, to think of adopting a few flexible measures by learning from the ODL systems, such as allowing for a flexible time frame for completing a level without any stigma of completing it over a longer time-frame, and making space for creative combinations in subjects in schools using hybrid modes if teachers are not available for all subjects; and (iii) both the regular school system and the ODL-based school education systems need to pay much greater attention to adopting layered and responsive approaches for supporting learners proactively in any virtual learning space.

References

Azim Premji University. (2021). *Loss of learning during the pandemic.* Field studies in education. Bangalore, India: https://cdn.azimpremjiuniversity.edu.in/apuc3/media/publications/downloads/Field_Studies_Loss_of_Learning_during_the_Pandemic.f1622994202.pdf

Bahl, D., Bassi, S., & Arora, M. (2021). *The impact of COVID-19 on children and adolescents: Early evidence in India*. New Delhi, Delhi: Observer Research Foundation.

Bhattacharya, S. (2020). What is so wrong with online teaching? *Economic and Political Weekly, 23*, 19–21.

Chandy, A. (2020, September 5). Concerned about child's online classes? First worry about how teachers are coping with COVID. *The Print*. Retrieved from https://theprint.in/opinion/concerned-about-childs-online-classes-first-worry-about-how-teachers-are-coping-with-covid/496366/

Cherian, R. (2020). The odd one is out: Voices from virtual classrooms. *Economic and Political Weekly, 56*(13) https://www.epw.in/engage/article/odd-one-out-voices-virtual-classrooms.

Cojocariu, V. M., Lazar, I., Nedeff, V., & Lazar, G. (2014). SWOT analysis of e-learning educational services from the perspective of their beneficiaries. *Procedia-Social and Behavioural Sciences, 116*, 1999–2003. https://doi.org/10.1016/j.sbspro.2014.01.510.

Denney, L., Gordon, R., & Ibrahim, A. (2015). *Teenage pregnancy after Ebola in Sierrra Leone: Mapping responses, gaps and ongoing challenges*. London, UK: Secure Livelihoods Research Consortium.

Devara, R. (2020). Broadband internet access – A luxury or a right? *Economic and Political Weekly, 48*, 21–25.

Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of Educational Technology Systems, 49*(1), 5–22. https://doi.org/10.1177/0047239520934018.

Dove, N., Wong, J., Gustafson, R., & Corneil, T. (2020). *Impact of school closures on learning, child and family well-being during the COVID-19 pandemic*. British Columbia: BC Centre for Disease Control & BC Children's Hospital.

Economic Commission for Latin America and the Caribbean-United Nations Educational, & Scientific and Cultural Organisation. (2020). *Education in the time of COVID-19*. https://repositorio.cepal.org/bitstream/handle/11362/45905/1/S2000509_en.pdf

Ferreira, F., Kanwar, A., & Daniel, J. (2008January). Life after universal primary? Scaling schooling for the secondary surge. Presentation at World Bank Brown-Bag Seminar, Common Wealth of Learning, Washington DC. Retrieved from http://oasis.col.org/handle/11599/1320

Ghatak, N., Yareseeme, S. Y., & Jha, J., (2020). *Life in the time of Covid-19: Mapping the impact of Covid-19 on the lives of school-going children especially girls in India*. Bangalore, India: Centre for Budget and Policy Studies (www.cbps.in) and India Champions for Girls' Education.

Jha, J., Ghatak, N., & Mahendiran, S., (2016). Tracing the education and employment status of open school graduates in India. Paper presented at Pan-Common Wealth Forum 8, Kuala Lumpur. Retrieved from http://oasis.col.org/handle/11599/2629

Jha, J., Ghatak, N., Minni, P., Rajagopal, S., & Mahendiran, S. (2020). *Open and distance learning in secondary school education in India – Potential and limitations*. London, UK: Routledge.

Kanwar, A., & Ferreira, F. (2012). *Scaling schooling for the secondary surge: What are the options?* New Delhi, India: Silver Jubilee Lecture at the National Institute of Open Schooling. Retrieved from http://oasis.col.org/handle/11599/1033.

Kumar, A. (2021). The architecture of online classrooms. *Economic and Political Weekly, 14*, 65–66.

Mahendiran, S., Ghatak, N. & Jha, J. (2016). Examining the efficiency and reach of open and distance education for secondary education in India: Econometric analysis of student Data from

National Institute of Open School (NIOS). Paper presented at Pan-Common Wealth Forum 8, Kuala Lumpur. Retrieved from http://oasis.col.org/handle/11599/2599

Mathivanan, K. S., Jayagopal, P., Ahmed, S., Manivannan, S.S., Kumar, J. P., Raja, T. K., Dharinya, S.S., & Prasad, G. R. (2021). Adoption of E-learning during lockdown in India. Int J Syst Assur Eng Manag. Springer. Retrieved from https://doi.org/10.1007/s13198-021-01072-4

Ministry of Human Resource Development, Government of India. (2020). *National Education Policy*. New Delhi, India: Author.

Minni, P., Pancharatnam, P., Rajagopal, S., & Jha, J (2016). How "open" is open School in India? A learners' perspective. Paper presented at Pan-Common Wealth Forum 8, Kuala Lumpur. Retrieved from http://oasis.col.org/handle/11599/2563

Moore, M. G. (1997). The theory of transactional distance. In D. Keegan (Ed.), *Theoretical principles of distance education* (pp. 22–38). New York, NY: Routledge.

Muthuprasad, T., Aiswarya, S., Aditya, S.K., & Jha, K. G., (2020). Student's perception and preference for online education in India during COVID-19 pandemic. Social Science and Humanities, Open 3 (2021) 100101, 1–11. https://doi.org/10.1016/j.ssaho.2020.100101

National Institute of Open Schooling (Different Years) *NIOS Statistical Report.* Ministry of Education. New Delhi, India: Government of India. (downloaded from the website: https://nios.ac.in/statistical-report.aspx)

National Sample Survey Office, (2020.) Household social consumption on education in India – NSS 75th round. New Delhi, India Ministry of Statistics and Programme Implementation.

Rajagopal, S., & Gupta, M. (2020). *COVID-19: Navigating digital learning in government schools in Rajasthan: Voices from the field*. Jaipur, India: Institute of Development Studies.

Reddy, A. B., Jose, S., & Vaidehi, R. (2020). Of access and inclusivity – Digital divide in online education. *Economic and Political Weekly, 36*, 23–26.

Santos, R., & Novelli, M. (2017). The effect of the Ebola crisis on the education System's contribution to post-conflict sustainable peacebuilding in Liberia. University of Suzzex: UNICEF.

Selbervik, B. H. (2020). *Impacts of school closures on children in developing countries: Can we learn something from the past?* Bergen, Norway: CHR. Michelsen Institute.

Shah, K. (2020). Online teaching during COVID-19. *Economic and Political Weekly, 21*, 6.

Sharma, K.. (2021, January 26). How government portal Diksha with 3cr hits/day has become key tool for teachers during COVID. *The Print*. Retrieved from https://theprint.in/india/education/how-govt-portal-diksha-with-3-cr-hits-day-has-become-key-tool-for-teachers-during-covid/591678

Simpson, O. (2008). Motivating learners in open and distance learning: Do we need a new theory of learner support? *Open Learning: The Journal of Open, Distance and e-Learning, 23*(3), 159–170. https://doi.org/10.1080/02680510802419979.

Singh, K. A., Satyavada, S. R., Goel, T., Sarangapani, S., & Jayendran, N. (2020). Use of EdTech in Indian school education during COVID-19- A reality check. *Economic and Political Weekly, 44*, 16–19.

Song, L., Singleton, E. S., Hill, J. R., & Koh, M. H. (2004). Improving online learning: Student perceptions of useful and challenging characteristics. *The Internet and Higher Education, 7*(1), 59–70.

Statista Research Development. (2020). *Number of enrolled students in India as of 2018, by school type*. New Delhi, India: Author. Retrieved from https://www.statista.com/statistics/1175285/india-number-of-enrolled-students-by-school-type/.

UNESCO. (2020). From COVID-19 learning disruptions to recovery: A snapshot of UNESCO's work in education in 2020. Paris, France: Author. Retrieved from https://en.unesco.org/news/covid-19-learning-disruption-recovery-snapshot-unescos-work-education-2020

Unified District Information System for Education Plus. (2020). *Report on UDISE+*. New Delhi, India: Department of School Education and Literacy, Government of India.

United Nations. (2020). *Policy brief: The impact of COVID-19 on women*. New York, NY: Author.

United Nations Development Programme. (2015). *Assessing sexual and gender-based violence during Ebola crisis in Sierra Leone*. New York, NY: Author.

Leading in Changing Times

Building a Transformative Culture

Mark Brown

Contents

Abstract

This chapter reflects on the challenges and opportunities of leading educational change in today's digitally connected world. It offers personal insights and critical reflections on learning leadership framed by a wide-angle, multifocal lens that helps zoom in and out to visualize preferred futures. Before outlining a collection of leadership touchstones and critical questions for guiding institutional transformation and then reporting their application in the practice of digital education, the chapter begins by illustrating how the new learning ecology is complex and entangled in competing images of the future. Efforts by educational leaders to build agile and sustainable transformative organizational cultures need to be guided by a clear sense of direction and anchored in a living institutional mission. The role of the National Institute for Digital Learning (NIDL) hosted at Dublin City University (DCU) in Ireland is central to this story, as harnessing the transformative potential of new digital technology is at the heart of its change

M. Brown (✉)
National Institute for Digital Learning, Dublin City University, Dublin, Ireland
e-mail: mark.brown@dcu.ie

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_28

agenda. After briefly introducing DCU, the chapter reports how the NIDL's commitment to leadership development and active engagement in global networks are helping to reshape the higher education landscape with a critical digital edge. However, forging a future-focused mission based on multifocal criticality and transformative leadership is not something for the faint-hearted; it requires agency, relational capital, and strategic foresight to move from digital in part to digital at the heart of your organizational culture.

Keywords

Leadership · Organizational culture · Digital learning · Learning transformation · Human capacity · Strategic partnerships

Introduction

The need for leadership has never been more apparent. Even before the global pandemic, the demand for more flexible models of higher education was growing worldwide. In most countries, there has been a significant COVID bump adding to the drive for greater flexibility, with online education having never been more in focus. Indeed, it remains high on the agenda as educational leaders grapple with the forces of digital disruption and how to respond to the "great onlining" of higher education (Bozkurt et al., 2020).

Steering a path from being a COVID fixer to visionary future-maker with a compelling narrative for learning transformation is challenging work, especially as digital higher education is entangled within a complex constellation of change forces. The current language of reimagination set against the legacy of the pandemic needs problematizing as it reflects a kaleidoscope of competing perspectives with different images of the future. A unique type of multivision is required to critically "read" these images and help paint your own preferred learning futures, combining strategic big picture thinking with local foresight. This type of wide-angle, multifocal lens enables those in leadership roles to view different perspectives and navigate a path between the language of opportunity, set against the need for deeper criticality.

The chapter begins by challenging one-sided distorted images of the future. Importantly, it rejects sweeping generalizations of the field as digital education is not a single uniform entity. Indeed, Singh and Thurman (2019) reveal 46 different definitions of the term "online learning" alone. Without adding fuel to the definition wars, the chapter argues that binary debates and polarizations of the field are unhelpful. They do little to critically untangle the tensions and many different threads of digital education as educational leaders attempt to craft their own counter narratives. Instead, higher education needs to be understood as a wider social practice. The future is rarely black or white, as leading change usually requires trade-offs, blurring of boundaries, and the weighing up of alternative options guided by longer-term desired outcomes.

From this multifocal perspective, educational leaders need to focus on the big ideas they want to achieve as well as the smaller details of how they plan to put them into practice. To this end, building a culture of learning transformation depends on developing leaders throughout an organization with a strategic mindset and agile implementation playbook. To help shift current thinking away from higher education being in a state of change to the enabling language of higher education for change, a collection of leadership touchstones and critical questions is described to help frame future thinking. The chapter situates this leadership perspective in an institutional context by reporting several examples of learning transformations in action. Through the DCU/NIDL experience, it illustrates the value of cultivating critically, growth minds and strategic networks, and partnerships to support organizational development. However, leading transformative change in such uncertain times is not for the faint-hearted. Promoting learning transformation that places the ever-changing digital world at the heart of your mission depends on untangling competing futures, a strong sense of agency, and the actions and relationships forged with many different people.

Competing Images of the Future

New models of digital education are often portrayed on a binary axis rather than reflecting a far more messy and complex reality. This false binary operates on several dimensions. The most obvious form is across delivery modes (i.e., online vs. off-line). Pedagogically, the binary is often framed in terms of the distinction between acquisition and participation metaphors of learning (Sfard, 1998), or put more simply, teacher-centered as opposed to student-centered learning. This distinction rarely acknowledges:

> Because no two students have the same needs and no two teachers arrive at their best performance in the same way, theoretical exclusivity and didactic single-mindedness can be trusted to make even the best educational ideas fail. (Sfard, 1998, p. 11)

Ideologically speaking, the discourse surrounding digital education is usually framed within one of two basic worldviews: the tradition of the Learning Society; and the influence of the Knowledge Economy (Brown, 2016). Although overly simplistic, these worldviews serve as a metanarrative that simultaneously infuses and funnels the competing languages of persuasion which seek to establish the common sense, define what counts as legitimate areas of agreement and disagreement, and shape the future choices and opportunities facing educational leaders.

To better illustrate this binary, new flexible models of digital learning provide a real opportunity to reduce costs, enhance quality, and address increasing global demand for higher education. They provide the opportunity to break the so-called "Iron Triangle" (Daniel, Kanwar, & Uvalić-Trumbić, 2009) and realize the vision of "universities without walls" (EUA, 2021). In the future, it will be almost impossible to meet the projected growth in demand for higher education worldwide through traditional "bricks and mortar" models. Despite well-documented inadequacies of emergency remote teaching (Hodges, Moore, Lockee, Trust, & Bond, 2020), the COVID response has demonstrated three key points.

First, online learning was able to successfully facilitate access to higher education for those affected by campus closures. Learning did not stop during lockdown. Second, it highlighted the potential of new digital models of learning to help expand access to higher education for people unable to study through more traditional methods. Third, online learning is now a viable and increasingly mainstream alternative for people wishing to upskill and earn as they learn. Even before the pandemic, Gallagher (2021) reports that about half of all corporate learning in the United States was being delivered in an online or mobile mode, and that this figure has increased significantly over recent years. Notably, in the 30 days prior to June 2020, the major MOOC platforms attracted almost 500 million visits from learners around the globe, up 2.5 times from January (HolonIQ, 2020). Thus, online delivery is now an established feature of the learning landscape and is key to meeting increasing global demand for higher education.

On the other hand, new digital models of education inhabit the contested terrain of marketization, platformization, and commercialization (Brown, 2021a). In many countries, delivery of online education often "…involves public universities partnering with, or using the services of, private companies" (Morris, Ivancheva, Coop, Mogliacci, & Swinnerton, 2020, p. 3). COVID appears to have accelerated this trend with Teräs, Suoranta, Teräs, and Cruncher (2020) claiming that the pandemic has "…created a sellers' market in ed-tech" (p. 863). Williamson, Macgilchrist, and Potter (2021) argue that a key characteristic of the educational response during the pandemic has been the growth of new commercial platforms and public-private partnerships promoting the use of Ed-Tech for profitable market returns. There are also growing concerns about the automation of education (Selwyn, Hillman, Bergviken Rensfeldt, & Perrotta, 2021a), the rise of platform pedagogies (Perrotta, Gulson, Williamson, & Witzenberger, 2021), and the surrender of control to surveillance technology (Selwyn, O'Neil, Smith, Andrejevic, & Gu, 2021b). The rise of "big tech" is often linked to powerful neoliberal forces such as the unbundling movement, which is arguably creating a new learning economy (Ralston, 2021). According to this line of critique, higher education is taking the form of a commodity, a product, or service, marketed and sold to customers like any other commodity.

While these are important concerns, despite such broad generalizations, the pandemic has also reopened old debates about whether traditional ways of teaching are better than online learning. By analogy, imagine for a minute that following the lifting of COVID travel restrictions, two tourists have flown to Ireland (Brown, 2021b). On the same day, they are standing on the famous Ha'penny Bridge on the river Liffey in the center of Dublin looking upstream into the future. While they are both standing at the same vantage point, what they see is quite different. One sees sparkling water reflecting off the bright sunshine. In contrast, only hours later, the second tourist sees dark shadows and a dirty, polluted river, as the tide has turned and the sun has disappeared. The Liffey does not look very attractive. However, both are accurate reflections of the Liffey.

The two images illustrate how the good, the bad, and the ugly of new models of digital education coexist simultaneously. They also serve to illustrate how digital education is part of a complex learning ecology and why such binary positions are unhelpful. The reality of the hope and the hype of digital education is far more muddied as the current flows both up- and downstream with increasing leakage across the different places and spaces of learning. This point is illustrated in Fig. 1. It shows four quadrants of learning where students can learn on campus in formal classroom settings, on campus in informal out-of-class contexts, off campus in formal in-class settings, and off campus in informal beyond class contexts (Brown, 2015).

In summary, digital education is polylithic with many different faces. While the benefits of new flexible models of education do not disappear on the tide, nor do they magically transform more traditional or impoverished forms of pedagogy. For that matter, on-campus, in-class education also has many different faces and not all of them warrant “Gold Standard” status. Therefore, little can be gained from naïve comparisons or sweeping generalizations of both off-line and online delivery modes, without sufficient consideration of the educational context. Returning to the above analogy, a complex mix of factors add the sparkle to the Liffey, including the role of leadership. Therefore, a multifocal view of leadership is crucial to better understanding these factors and reframing one-sided distorted images of the futures.

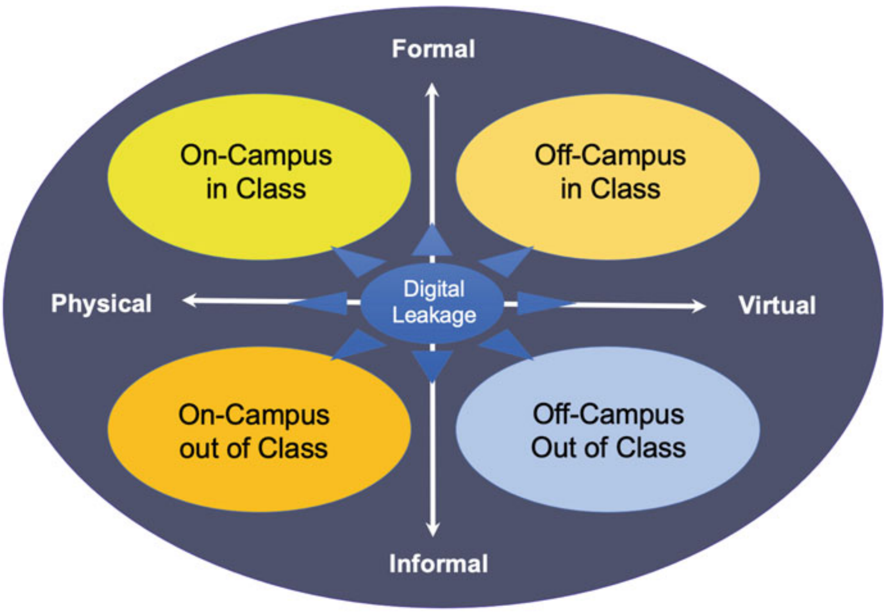


Fig. 1 Representation of the new digital learning ecology (Brown, 2015)

Developing Multifocal Leadership

Good leadership matters. While the interpretation of "good" is open to debate, a wealth of literature exists on impactful approaches to leadership (Fullan & Scott, 2009) and leadership development (Dopson et al., 2019) in higher education. A growing body of literature is also emerging on leadership in the overlapping fields of e-learning (Miller & Ives, 2020), online learning (Fredericksen, 2017), digital transformation (Miller, 2019), and educational technology more generally (Arnold & Sangra, 2018). Moreover, there is evidence of border crossing between this literature and key lessons for leadership in higher education arising from the COVID crisis (Laufer et al., 2021). A detailed review of this literature is beyond this chapter, but there has been a general trend over the past two decades to placing greater attention on microleaders, the role of middle-out leadership, and developing more distributed models of institutional leadership. In theory, gone is the day of the 'lone ranger" leader charging ahead from the front. If the goal is to implement lasting educational change, then leadership depends on the big and small actions of many different people (Childs et al., 2013).

While it is important to intentionally craft your own leadership style, learning to lead is messy. There is no simple manual as educational change is contextual and rarely follows in a straight line. Thus, a wide-angle, multifocal lens helps educational leaders to better see the curves, complexities, inter-dependencies, and underlying tensions of the choices they face in rapidly changing times. Such a lens in one's leadership toolkit helps to reveal possible, probable, and preferred future scenarios that steer a path through tricky political and slippery ideological terrain. This type of lens also helps to examine images from many viewpoints and go beyond false binaries. The ability to zoom in and out and see the challenges and opportunities facing the sector from many viewpoints is central to the concept of multifocal leadership. As Kanter (2011) writes:

> To get a complete picture, leaders need to zoom in and zoom out. A close-in perspective is often found in relationship-intensive settings. It brings details into sharp focus and makes opportunities look large and compelling. But it can have significant downsides. Leaders who prefer to zoom in tend to create policies and systems that depend too much on politics and favors. They can focus too closely on personal status and on turf protection. And they often miss the big picture. When leaders zoom out, they can see events in context and as examples of general trends. They are able to make decisions based on principles. Yet a far-out perspective also has traps. Leaders can be so high above the fray that they don't recognize emerging threats. Having zoomed out to examine all possible routes, they may fail to notice when the moment is right for action on one path. They may also seem too remote and aloof to their staffs. The best leaders can zoom in to examine problems and then zoom out to look for patterns and causes. (p. 112)

A commitment to being a learning leader and leader who learns is foundational to developing multifocal leadership. This perspective recognizes leadership as inherently a cognitive process and involves cultivating an adaptive learning organization. From this perspective, the following personal touchstones characterize the qualities of multifocal leadership:

- Being ambitious, developing a growth mindset, and staying at the forefront of the literature to identify new and emerging trends
- Valuing debate, alternative viewpoints, and understanding how the language chosen to use really matters
- Sharing one's own mistakes and creating a culture of openness where making mistakes is a normal part of the leadership process
- Being personally accountable and ensuring open and transparent communication in decision-making
- Understanding that resistance is a valuable source of insight and that the real light comes through the cracks
- Leading with both the head and the heart and helping other people feel the passion and personally walking the talk
- Promoting diversity within one's team, with a particular emphasis on developing agency, supporting emerging scholars and distributed leadership
- Making explicit plans that are fully owned, on mission with achievable goals and sharing regular progress updates with key stakeholders
- Recognizing the power of the network by building strong professional relations and strategic partnerships
- Developing strategic foresight through self-review and scenario planning tools to identify major change forces and preferred futures

While striving to implement these touchstones remains a personal work in progress, the ability to zoom in and out is framed around seven critical questions. The following questions adapted from a seminal book on *Educational computing as a social practice* (Bromley & Apple, 1998) have influenced the author's leadership over more than two decades:

- Who is telling the story?
- What are we being told?
- Why are they telling the story?
- How are they telling the story?
- Who has the most to gain from the story?
- What is missing from the story?
- Whose story is not being told?

These questions recognize that leading any change involves "crucial struggles" over competing futures and who should control the curriculum, indeed the very meaning of education itself (Apple, 2019, p. 277). More recently, Facer (2021) adds an even deeper level of analysis to these questions:

> What and whose knowledges are being used to create these ideas of the future and where are the absences? What processes were used to make these ideas of the future, and why? How does this work address the necessity of decline as well as the possibilities of the new? What are the injustices upon which futures are being envisaged and how are these being addressed? How do principles of intergenerational justice inform the practice? Who will

> attend to the consequence of these ideas of the future being put into the world and how? What is the role of these futures in creating hopeful politics and practices in the present? Might these futures be used for pathological and extractive speculation, if so, how might this be prevented? How can the distinctive temporality of education be preserved not subordinated to the futures proposed? (p. 2)

The challenge when zooming out to such big and confronting questions is to steer a path with a strong moral compass that avoids being a leader caught in the headlights. Asking critical questions is one thing but going from critique to action is another. A sense of personal agency is required to develop local actions that move beyond paralysis and the risk of being overshadowed by the pedagogy of the depressed. In this respect, the above characteristics of multifocal leadership are framed in the language of hope and opportunity. Striking this balance is not easy as it requires educational leaders to untangle competing futures, carefully pick their priorities and achieve short-term victories without losing sight of the long view. As Scott, Coates, and Anderson (2008, p. 73) remind us:

> Developing and implementing desired change is not an event but is a complex and subjective learning/unlearning process for all concerned.

Talking about leadership theory is one thing, but translating it into practice is quite another. At this point, therefore, attention shifts to how one university with a tradition of expanding access to higher education responds to the challenges and opportunities of the new digitally connected world. This final section reports how DCU endeavors to be a future maker. It briefly describes the strategic architecture and then outlines several recent efforts to harness the potential of new digital technologies to deliver on its core mission of *Transforming Lives and Societies*. In telling the DCU story, the intention is to illustrate multifocal leadership in practice and how the above questions have helped to implicitly guide the actions of many different people in developing a transformative learning culture.

The DCU Story

DCU is a relatively young university. It offers over 200-degree programs to almost 20,000 full-time equivalent students across five faculties. DCU hosts Ireland's only Faculty of Education and one of the largest in Europe, with more than 4,000 students. In 2020, DCU was ranked 84th in the world in the Times Higher Education (THE) Impact Rankings which capture societal impact based on success in delivering the United Nations' Sustainable Development Goals (SDGs). DCU is consistently ranked by THE in the top 100 young universities and was named as Ireland's 2021 "University of the Year."

While DCU is a dual-mode university, it has 40 years of experience in the provision of distance education. In 1982, the National Distance Education Centre was established at DCU to provide higher education to adults all over Ireland (MacKeogh, 2003). The National Centre became "Oscail – DCU Online Education" in 2004 to reflect the University's early leadership in new models of online delivery. The term "Oscail" translates to "open learning" in the Irish language. Since its inception, DCU has demonstrated a strong commitment to widening access to university education. Thousands of adult learners have obtained their qualifications through DCU's online distance education courses.

Over the past 20 years, DCU has developed significant expertise in the design of high-quality online education. It is widely recognized in Europe as a leader in the area and is Ireland's only member of the European Association of Distance Teaching Universities (EADTU). DCU's leadership is further evidenced by its active role in the International Council for Open and Distance Education (ICDE) and, notably in 2019, hosted the World Conference on Online Learning. DCU is also a foundation member of the European Consortium of Innovative Universities (ECIU). A strategic partnership with Arizona State University (ASU) in the United States is another powerful innovation accelerator.

Strategically Embedding Digital Learning

DCU's Strategic Plan, *Talent, Discovery, Transformation 2017–2022* (DCU, 2017) was launched in September 2017. Notably, the development of the Strategic Plan included a fully online brainstorming and open public consultation event known as DCU Fuse (Brown, 2017). Over a 24-hour period, coinciding with Open Education Week, in March 2017, almost 7,000 contributions were posted by staff, students, and the wider DCU community in a customized open-source platform. The DCU Fuse conversation in which the author played a leading role trended as No 1 in Ireland on Twitter for much of this period. DCU Fuse was a significant initiative to support critical questions, provide a forum for alternative viewpoints, and promote a culture of openness, accountability, and shared ownership. Also, the initiative advanced digital ways of working and learning as an organization and the power of the network. DCU Fuse is tangible evidence of embracing debate, criticality, and open decision-making along with "walking the talk" of digitalization.

The Strategic Plan reiterated a strong commitment to harnessing the potential of new digital models of higher education. Importantly, it sought to infuse digital transformation throughout DCU's policy architecture rather than develop a separate stand-alone plan. The intention was to embed digital learning as the "new normal" at DCU and thereby avoid the risk of a "bolt-on" approach. Key actions to achieve this goal included establishing the National Institute for Digital Learning (NIDL) and the appointment of Ireland's first Chair and Professor of Digital Learning.

The NIDL as an Innovation Incubator

In November 2013, the Minister of Education officially launched the NIDL with a remit to "support pioneering, technology enhanced learning and revolutionise the learning experience both for Campus-based Education and Distance Education" (DCU, 2012). Institutionally, the NIDL was seen as a key enabler of DCU's transformative mission. It established a vision to be recognized as a world leader at the forefront and leading edge of new **B**lended, **O**n-**L**ine, and **D**igital (BOLD) models of education. More specifically, its mission is to design, implement, and research new BOLD approaches to teaching, learning, and assessment which help to transform lives and societies.

While the NIDL team consists of several internal service units, its strong external focus helps to foster a growth mindset. Active engagement in European funded projects and a wider community of learning innovation allows new and emerging digital technologies to be piloted and tested locally and mainstreamed within DCU. The NIDL's underlying ethos is that new knowledge exists in the network. No university can afford to be an isolated island if it wishes to foster a rich transformative learning culture. Accordingly, it is no accident that since its inception, several members of the NIDL team now serve on the executive committees of many leading professional bodies. This has been a deliberate strategy consistent with the above touchstones to support leadership development and influence what questions are being asked about digital education.

As further evidence of its commitment to a growth mindset, since 2014, the NIDL team has produced over 1,000 scholarly outputs and key staff play active roles on the editorial boards of leading journals. As a strategic editorial partner of the *International Journal of Educational Technology in Higher Education*, published by Springer, the NIDL walks the talk of being at the forefront of the literature and makes a significant contribution to the research and professional community. Notably, this Q1 journal is now the number one ranked open access publication in the field and has quickly risen in rankings to 6th place (out of a total of 1,531) in the Scopus list of all education journals.

To further support its growth mindset and thought leadership, the NIDL has a high profile International Advisory Board. This Board, coupled with a full professor leading new developments, helps to keep DCU at the leading-edge of digital learning. In response to the first COVID wave, for example, in March 2020, NIDL team members launched a free online course on Teaching Online as part of the externally funded #OpenTeach project (Farrell, Brunton, & Costello, 2020). The course attracted nearly 500 participants. It demonstrates the type of agency and distributed leadership that has grown over time in the NIDL as the author was not centrally involved in this initiative. However, a willingness to lead with the head and the heart in the face of a crisis and help shape the stories being told is evident in the NIDL's wider contribution to the rapid design of *Learning How to Teach Online* offered through the FutureLearn platform (Brown, Nic Giolla Mhichil, & Costello 2021). By the time this course began in early April 2020, over 30,000 educators from more than 130 countries had registered, with this figure quickly increasing to over 90,000 by December 2020. A further example of walking the talk was the NIDL's rapid design, in September 2020, of a FutureLearn course to help promote student readiness for online learning (Beirne, Nic Giolla Mhichíl, & Brown, 2021). Notably, this free course, *A Digital Edge: Essentials for the Online Learner*, was cofacilitated by students. By the time of its third facilitated offering in September 2021, the course had attracted more than 10,000 learners.

In summary, the NIDL has made significant progress in realizing its vision to be recognized as a world leader in digital education. Building on the principles of multifocal, distributed leadership, and the belief that the function of leadership is to develop more leaders, not more followers, the NIDL team has developed its collective capacity and relational capital by intentionally engaging in a wide range of professional networks. Both individually and collectively, the team has moved from being consumers of research to producers, asking critical questions with a growing collection of scholarly contributions. Moreover, through externally funded projects, the NIDL has become an innovation incubator at the forefront of research, thought leadership, and innovative practice in fostering a high performing digital education ecosystem. While the appointment of a senior institutional leader was an important catalyst to these activities, they arise through the efforts of a diverse team.

Shaping the Discourse

A key aspect of multifocal leadership is understanding the power of language. This aspect of the NIDL's leadership is evident in two internal examples.

First, in 2014, *DCU Connected* was launched under the author's leadership as a major new initiative to promote the University's fully online courses. Importantly, the term "connected" was deliberately chosen to shift the focus away from a particular mode of delivery to the transformative nature of the online learning experience. The intention was to encapsulate how in today's digital world learners can be *connected* wherever they study. Distance should not be a barrier to learning as class can come to the learner, thus enabling DCU to widen its outreach. The "connected" metaphor was also intended to avoid the type of deficit language that became part of the COVID discourse around emergency remote teaching. Thus, being connected to fellow students and excellent teachers, wherever students choose to live, is at the heart of DCU Connected.

DCU's 2018 Institutional Review included the following commendation:

> "The Team commends the operation of DCU Connected, its strategic and dynamic approach, and its alignment with the Institutional Mission in terms of opening access and delivering online learning" (Quality and Qualifications Ireland, 2019, p. 34).

The second example relates to DCU's virtual learning environment (VLE), a core feature of the digital architecture. In 2014, DCU launched *Loop* as an overarching "term" to promote the goal of developing a twenty-first-century digital campus. The term "Loop" was intentionally chosen under the NIDL's leadership as a metaphor to help move the thinking away from a techno-centric focus on Moodle. Loop was chosen as a term to place greater emphasis on bringing people together through technology to create a loop of learners and rich digital learning communities. The aim was to put people and learning at the core of the "loop" rather than technology. The loop metaphor also served to illustrate the idea of a rich digital learning ecology, with a variety of different tools in the loop rather than just Moodle at the core. While at the risk of overtheorizing loop, the metaphor was intended to support an innovation culture where staff and students were encouraged to push boundaries by using new *edge* technologies to help transform the learning experience.

Loop is now deeply embedded in DCU and is also at the heart of the DCU connected learning experience. DCU has continued to add enhancements to Loop on a regular basis and is widely recognized as a global leader in the Moodle community, having hosted the annual "Ireland UK Moodle Moot" on three occasions. This is further evidence of how being in the network is part of the NIDL's ethos. Additionally, DCU has made a significant investment in the Mahara open-source ePortfolio platform. Known as Loop Reflect, the platform is routinely used by over 14,000 students. DCU is now a leader in the Mahara community, which illustrates how the NIDL's leadership through the work of many different people extends to shaping the international discourse. The key point is that internal transformations are supported by actively engaging in these external communities.

Leveraging Strategic Partnerships

The role of strategic partnerships is another key feature of DCU's efforts to promote digitalization and build a transformative culture. Consistent with the characteristics of multifocal leadership, strategic partnerships have acted as a catalyst for DCU to progress internal transformation. Two strategic partnerships continue to be particularly influential.

First, the decision to invest in MOOCs, and specifically Futurelearn, was not taken lightly. It followed a lengthy process of asking critical questions and identifying the key institutional drivers (Brown, Costello, Donlon, & Nic Giolla Mhichil, 2015). The overriding consideration at the time was to what extent could an MOOC agenda help to advance DCU's commitment to a strong culture of innovation and the goal of a transformative learning experience. Thus, the primary driver was to use MOOCs to support a step change that DCU was aiming to achieve through the NIDL by increasing capability in new digital pedagogies. Consistent with the value of networks, considerable weight was placed on the potential collaborative opportunities arising from joining a global consortium. Since the launch of Irish 101 in 2018, over 140,00 learners from more than 135 countries have taken one of DCU's Irish language and culture courses. While MOOCs continue to polarize the education community, there is no doubt that the FutureLearn strategic partnership has helped to mature DCU's understanding of learning design for online as well as blended delivery.

The second strategic partnership is ECIU University. In 2019, DCU was successful as a member of the ECIU in securing €7 m under the new European University Initiative. Each of the 12 partner universities has a proven track record of innovation, and the ECIU University's vision is to develop smart new transformative learning pathways. To this end, ECIU University has already developed a suite of online micromodules across the partners where students can collaborate to address major societal challenges. On completion of assessment and proof of learning, some of these short courses will earn verified ECIU microcredentials. While the field of microcredentials is rapidly growing, the NIDL's leading role in both critique (Brown

& Nic Giolla Mhichil, 2021) and shaping new developments in this area (Brown, Nic Giolla Mhichíl, Mac Lochlainn, Pirkkalainen, & Wessels, 2021) is uniquely positioning DCU to transform its traditional credential ecology.

Toward a Culture of Continuous Improvement

The above examples demonstrate DCU's strong appetite for learning transformation. However, the future often lives in the past, and so an important aspect of multifocal leadership in a learning organization is critical self-reflection. To this end, in 2020, DCU undertook a comprehensive review of digital learning framed around the following questions:

- To what extent are DCU delivering on their strategic intent in relation to digital learning, as envisaged in the 2012–2017 and 2017–2022 strategies?
- How is (and how can) digital learning contributing to transforming both formal and informal learning at DCU?
- To what extent are DCU staff and students prepared to embrace digital approaches to learning, and to what extent are these approaches effective as part of the DCU learning experience?
- How is DCU's approach to supporting and developing digital learning aligned to national and international best practice and research?
- What aspirations should the University have for digital learning over the next 5 years?

Notably, in Europe only 12% of institutions report they have engaged in critical self-assessment in digital higher education (Gaebel, Zhang, Stoeber, & Morrisroe, 2021). The self-assessment exercise was shaped by the NIDL's leadership in contributing to the Digi-HE project and, more specifically, a critical review of 20 different tools for self-assessing the development of a high performing digital education ecosystem (Volungevičienė Brown, Greenspon, Gaebel, & Morrisroe, 2021). The internal self-assessment process culminated in an external review panel visiting DCU and producing their own independent report, which concluded:

> The extent to which DCU has built and developed digital learning partnerships in an internal, national and international landscape is commendable. The learning associated with these practices is evident right across the organisation and will prepare the university well for the next wave of digital learning development and strategies. (Peer Review Group, 2021, p. 5)

Conclusion

This chapter began by exploring the false binaries, muddied waters, and competing images of the future. The lesson for leading in changing times is that digital education needs to be better understood as part of a wider social practice and transformative change agenda. In the second part, the importance of multifocal leadership with a wide-angle lens and the ability to zoom in and out was illustrated by drawing on the literature as well as several personal touchstones and critical framing questions. Steering a path through many complexities, inter-dependencies, and underlying tensions without losing sight of the end destination is a key multi-focal leadership quality emerging from this discussion. The final part offers a glimpse into how one university with a tradition of expanding access to higher education is responding to the new digitally connected world. Although the story is filtered and potentially distorted by the author's own lens, it illustrates how the notion of multifocal leadership has been influential in a range of digital learning innovations.

It would be naïve to claim that DCU has all the answers. However, many of the touchstones of multifocal leadership and the NIDL's wider remit have been crucial to helping DCU deliver on its transformative mission. This point returns us to the central thesis. A transformative change agenda where digital education is at the heart of the institutional mission is enabled by educational leaders capable of zooming in and out and untangling competing futures. It requires criticality, a strong sense of agency, and the ability to forge strategic alliances and relationships with many different people. A related point is that leaders must be prepared to invite difficult questions and have the courage to walk the talk of learning transformation with their colleagues as it does not happen by leaving institutional plans in the boardroom.

Cross-References

► Resilient Leadership in Time of Crisis in Distance Education Institutions in Sub-Saharan Africa

References

Apple, M. W. (2019). On doing critical policy analysis. *Educational Policy, 33*(1), 276–287.

Arnold, D., & Sangra, A. (2018). Dawn or dusk of the 5th age of research in educational technology? A literature review on (e-)leadership for technology-enhanced learning in higher education (2013–2017). *International Journal of Educational Technology in Higher Education, 15*(24), 1–29. https://doi.org/10.1186/s41239-018-0104-3.

Beirne, E., Nic Giolla Mhichíl, M., & Brown, M. (2021). *"I feel like a guinea pig": Emotional responses to the online pivot*. Paper presented at the Annual EDEN Conference, 23rd June.

Bozkurt, A., Insung, J., Xiao, J., et al. (2020). A global outlook to the interruption of education due to COVID-19 pandemic: Navigating in a time of uncertainty and crisis. *Asian Journal of Distance Education, 15*(1), 1–126. http://asianjde.org/ojs/index.php/AsianJDE/article/view/462.

Bromley, H., & Apple, M. (Eds.). (1998). *Education/technology/power: Educational computing as a social practice* (pp. 1–25). New York, NY: State University of New York Press.

Brown, M. (2015). Looking over the horizon: New learning platforms, old technology debates. In B. Mooney (Ed.), *Education matters: Shaping Ireland's education landscape* (pp. 40–48). Galway, Ireland: Education Matters.

Brown, M. (2016). MOOCs as social practice: A kaleidoscope of perspectives. In E. De Corte, L. Enwall, & U. Teichler (Eds.). *From books to MOOCs? Emerging models of learning and teaching in higher education* (Wenner-Gren international series, 88, pp. 31–41). London, England: Portland Press.

Brown, M. (2017). *DCU fuse: 24-hour online collaborative brainstorm.* Presentation under ethical leadership category at QS Wharton reimagine education conference, Philadelphia, 4th December 2017.

Brown, M. (2021a). What are the main trends in online learning? A helicopter view of possible futures. *Asian Journal of Distance Education, 16*(2), 118–143.

Brown, M. (2021b). Foreword: Teaching beyond the shadows. In O. Farrell, J. Brunton, C. Ní Shé, & E. Costello (Eds.), *#Openteach: Professional development for open online educators*. Dublin, Ireland: #Openteach Project. https://doi.org/10.5281/zenodo.4599620.

Brown, M., Costello, E., Donlon, E., & Nic Giolla Mhichil, M. (2015). A strategic response to MOOCs: How one European university is approaching the challenge. *The International Review of Research in Open and Distance Learning, 16*(6), 98–115.

Brown, M., & Nic Giolla Mhichíl, M. (2021). Micro-credentials untethered: A wolf in sheep's clothing? Ireland's *Education Yearbook 2021.* Education Matters, Ireland. https://irelandseducationyearbook.ie/downloads/IEYB2021/YB2021-Higher-Education-08.pdf

Brown, M., Nic Giolla Mhichíl, M., & Costello, E. (2021). Learning how to teach online: A rapid massive collaborative response to Covid-19. Paper at EdTech Winter Online Conference 2021 Paradigm Shift: Reflection, Resilience and Renewal in Digital Education. 14th January. Available at https://www.slideshare.net/mbrownz/learning-how-to-teach-online-a-rapid-massive-collaborative-response-to-covid19

Brown, M., Nic Giolla Mhichíl, M., Mac Lochlainn, C., Pirkkalainen, H, & Wessels, O. (2021). Paving the road for the micro-credential movement: ECIU University white paper on micro-credentials. European Consortium of Innovative Universities. https://assets-global.website-files.com/551e54eb6a58b73c12c54a18/600e9e7dff949351b6937d73_ECIU_micro-credentials-paper.pdf

Childs, M., Brown, M., Keppell, M., Nicholas, Z., Hunter, C., & Hard, N. (2013). *Managing institutional change through distributive leadership approaches: Engaging academics and teaching staff in blended and flexible learning.* DEHUB Report Series. https://ro.uow.edu.au/asdpapers/457

Daniel, J., Kanwar, A., & Uvalić-Trumbić, S. (2009). Breaking higher education's iron triangle: Access, cost, and quality. *Change: The Magazine of Higher Learning, 41*(2), 30–35. https://doi.org/10.3200/CHNG.41.2.30-35.

Dopson, S., Ferlie, E., McGivern, G., Fischer, M., Mitra, M., Ledger, J., & Behrens, S. (2019). Leadership development in higher education: A literature review and implications for programme redesign. *Higher Education Quarterly, 73*, 218–234. https://doi.org/10.1111/hequ.12194.

Dublin City University. (2012). *2012–2017 DCU Strategic Plan – Transforming Lives and Societies*. Dublin City University, Dublin. https://www.dcu.ie/qpo/previous-strategic-plans

Dublin City University. (2017). *DCU strategic plan: Talent, discovery, transformation 2017–2022, Strategic Plan*. Dublin City University, Dublin. https://www.dcu.ie/sites/default/files/qpo/dcu_strategic_plan_2017-2022_web.pdf

European Universities Association. (2021). *Universities without walls – A vision for 2030*. Brussels, Belgium: EUA. https://eua.eu/downloads/publications/universities%20without%20walls%20%20a%20vision%20for%202030.pdf

Facer, K. (2021). *Futures in education: Towards an ethical practice.* Paper commissioned for the UNESCO Futures of Education report. UNESCO, Paris. https://en.unesco.org/futuresofeducation/background-research

Farrell, O., Brunton, J., & Costello, E. (2020). *Pivot and the pandemic: Professional learning during the time of Covid-19*. Paper in the proceedings at OE Global 2020 Conference, Online, 15th Nov – 20th November.

Fredericksen, E. (2017). A national study of online learning leaders in US higher education. *Online Learning, 21*(2). https://doi.org/10.24059/olj.v21i2.1164.
Fullan, M., & Scott, G. (2009). *Turnaround leadership for higher education*. San Francisco, NJ: Jossey-Bass.
Gaebel, M., Zhang, T., Stoeber, H., & Morrisroe, A. (2021). *Digitally enhanced learning and teaching in European higher education institutions*. Brussels, Belgium: European University Association. https://eua.eu/resources/publications/954:digitally-enhanced-learning-and-teaching-in-european-higher-education-institutions.html.
Gallagher, S. (2021). The microlearning movement in workplace learning. EdSurge, 22nd November. https://www.edsurge.com/news/2021-11-22-the-microlearning-moment-in-workplace-learning
Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). The difference between emergency remote teaching and online learning. *Educause Review,* 27 March. https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning
HolonIQ. (2020). *2.5x global MOOC web traffic.* https://www.holoniq.com/notes/global-mooc-web-traffic-benchmarks/
Kanter, R. (2011). Managing yourself: Zoom in, zoom out. *Harvard Business Review,* March, 112–116. https://hbr.org/2011/03/managing-yourself-zoom-in-zoom-out
Laufer, M., Leiser, A., Deacon, B., de Brichambaut, P., Fecher, B., Kobsda, C., & Hesse, F. (2021). Digital higher education: A divider or bridge builder? Leadership perspectives on edtech in a COVID-19 reality. *International Journal of Educational Technology in Higher Education, 18*(51), 1–17. https://doi.org/10.1186/s41239-021-00287-6.
MacKeogh, K. (2003). Open distance learning and eLearning in Ireland: Opportunities and challenges. In: Lionarakis*,* A (ed) *Proceedings of the second pan-Hellenic conference on open distance learning* Patras 28–30 March, Patras, Greece: Hellenic Open University, pp. 39–49.
Miller, C. (Ed.). (2019). *Leading digital transformation in higher education: A toolkit for technology leaders*. Penn, USA: IGI Global.
Miller, G., & Ives, K. (Eds.). (2020). *Leading the e-learning transformation of higher education: Leadership strategies for the next generation of elearning* (2nd ed.). Dulles, VI: Stylus Publishing.
Morris, N., Ivancheva, M., Coop, T., Mogliacci, R., & Swinnerton, B. (2020). Negotiating growth of online education in higher education. *International Journal of Educational Technology in Higher Education, 17*(48), 1–16. https://doi.org/10.1186/s41239-020-00227-w.
Peer Review Group. (2021). *Peer review group report for the thematic review of digital learning*. Office of Quality Promotions, Dublin City University. https://www.dcu.ie/sites/default/files/inline-files/prg-report-final-09-02-21.pdf
Perrotta, C., Gulson, K., Williamson, B., & Witzenberger, K. (2021). Automation, APIs and the distributed labour of platform pedagogies in Google Classroom. *Critical Studies in Education, 62*(1), 97–113. https://doi.org/10.1080/17508487.2020.1855597.
Quality and Qualifications Ireland. (2019). *DCU Cinnte Institutional Quality Review 2018.* https://www.dcu.ie/qpo/dcu-institutional-quality-review
Ralston, S. J. (2021). Higher education's microcredentialing craze: A Postdigital-Deweyan critique. *Postdigital Science and Education, 3*, 83–101. https://doi.org/10.1007/s42438-020-00121-8.
Scott, G., Coates, H., & Anderson, M. (2008). *Learning leaders in times of change: Academic leadership capabilities for Australian higher education*. Strawberry Hills, NSW: Australian Learning and Teaching Council.
Selwyn, N., Hillman, T., Bergviken Rensfeldt, A., & Perrotta, C. (2021a). Digital technologies and the automation of education — Key questions and concerns. *Postdigital Science and Education*. https://doi.org/10.1007/s42438-021-00263-3.
Selwyn, N., O'Neil, C., Smith, G., Andrejevic, M., & Gu, X. (2021b). A necessary evil? The rise of online exam proctoring in Australian universities. *Media International Australia,* 1–16. https://doi.org/10.1177/1329878X211005862

Sfard, A. (1998). On two metaphors for learning and the dangers of choosing just one. *Educational Researcher, 27*(2), 4–13.
Singh, V., & Thurman, A. (2019). How many ways can we define online learning? A systematic literature review of definitions of online learning (1988–2018). *American Journal of Distance Education, 33*(4), 289–306.
Teräs, M., Suoranta, J., Teräs, H., & Cruncher, M. (2020). Post-Covid-19 education and education technology 'solutionism': A seller's market. *Postdigital Science and Education, 2*, 863–878. https://doi.org/10.1007/s42438-020-00164-x.
Volungevičienė, A., Brown, M., Greenspon, R., Gaebel, M., & Morrisroe, A. (2021). *Developing a high-performance digital education system: Institutional self-assessment instruments*. Brussels, Belgium: European University Association. https://eua.eu/downloads/publications/digi-he%20desk%20research%20report.pdf.
Williamson, B., Macgilchrist, F., & Potter, J. (2021). Covid-19 controversies and critical research in digital education. *Learning, Media and Technology, 46*(2), 117–127. https://doi.org/10.1080/17439884.2021.1922437.

ODDE Strategic Positioning in the Post-COVID-19 Era

32

A Case Study from South Africa

Jenny Glennie and Ross Paul

Contents

Abstract

This chapter considers some of the challenges of the development of strategy, both for the conventional and ODDE sectors of higher education, with a brief look at the literature since strategic planning was first in vogue in the private

J. Glennie (✉)
Saide, South Africa, Johannesburg, Gauteng, South Africa
e-mail: jennyg@saide.org.za

R. Paul
University of British Columbia, Vancouver, BC, Canada
e-mail: rpaul@uwindsor.ca

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_29

sector in the early 1960s. Although the most common approach in higher education, so much so-called strategic planning does little to advance long-term visions and strategies or to differentiate one institution from another. The sudden pivot to online learning and other distance education that the COVID-19 pandemic has forced on conventional (contact) institutions has blurred distinctions between traditional and ODDE universities, thus rendering effective strategy development and implementation more important than ever.

This chapter conducts the literature review considering both institutional and system-wide strategy development, underlining their common elements. Then, from the unique vantage point of the South African Institute of Distance Education (*Saide*), a nongovernmental organization based in Johannesburg but conducting projects throughout South Africa and sub-Saharan Africa, it discusses the challenges for ODDE strategy development in the particular context of COVID-19. The chapter concludes with implications from the analysis for both the conventional and ODDE sectors in higher education in South Africa and elsewhere based, in part, on the lessons learned during the pandemic.

Keywords

Strategic positioning · Strategic planning · Strategic management · SWOT analysis · Iron triangle · Open learning principles · Organizational culture

Introduction

What makes God laugh? . . .People planning!

At no time in recent memory has this old adage seemed so appropriate. The COVID-19 pandemic has been a roller-coaster ride for governments and educational institutions the world over as they struggle to cope, alternatively declaring specific policies and then being forced to renege or change them in the face of viral mutations and unpredictable human behavior. Any expectations that the peoples of the world would be drawn together by a universal challenge touching everyone have been dashed by conflicting responses, regional chauvinism, and exacerbated political divides about the most appropriate responses to the pandemic.

Under such conditions, one might expect strategic planning, the vaunted approach to corporate leadership in past decades, to be more necessary than ever. However, the notion of dramatically changing times is hardly a new concept. Mintzberg (2014) has shown how leaders in every decade have justified the need for strategic planning because of times of major transformation even though the golden era of strategic planning (1960–1980) was a period of unprecedented stability. But 2021 is clearly a time of unprecedented change and challenge given the threats and instability brought on by the chronic and parallel crises of the pandemic, climate change, and racism, all of which have brought new considerations and increased complexity to institutional and political leadership.

Strategic Planning and Strategic Positioning

Mintzberg's influential writings about the shortcomings of strategic planning have led to reconsideration of its value but, if somewhat altered, it remains a key management tool for organizational and system effectiveness. For example, when someone is appointed as the president of a university or college, he or she usually resorts very quickly to launching a strategic planning process. The standard approach is to consult widely at the outset, both internally and externally, to seek to understand the special circumstances of the institution through some sort of SWOT (strengths, weaknesses, opportunities, and threats) analysis and, hence, to propose a new strategic plan to guide the institution for the years to come. The heart of such a plan is a vision that defines an institution's *raison d'etre* and differentiates it from the competition.

Such approaches are often very effective but they can also be misguided, time consuming, and ultimately unhelpful to the institution's development. Mintzberg (1994, p. 1) asserts that strategic planning is not strategic thinking:

> Indeed, strategic planning often spoils strategic thinking, causing managers to confuse real vision with the manipulation of numbers. And this confusion lies at the heart of the issue: the most successful strategies are visions, not plans.

Mintzberg's work has recognized that a narrow, structured planning process may be too much about administrative control and fail to recognize the importance of strategic thinking and individual responses to institutional plans. This seems particularly relevant to universities where leaders have less prescribed authority and where faculty processes are often cumbersome and resistant to change.

Eckel and Trower (2019) echo Mintzberg's work.

> Too many university strategic plans are mostly outcomes or ideals (or unfunded "wish lists"), without an articulation of strategy. (p. 1)

> . . .strategy is not planning. A focus on strategy is intended to help institutions experiment and take initiative, to ask questions and create synergies, and to move institutions ahead in often unknown and unknowable environments. (p. 4)

Effective strategic planning is not easy. Roger Martin (2014) suggests that many executives pursue it because it is comfortable when the challenges of forging strategic directions are anything but predictable. Like Alex Usher (2019) and Eckel and Trower (2019), he also challenges the tendency to forge five-year strategic plans when effective strategy should be much longer term in its reach – at least 15 years.

Any scrutiny of strategic plans from comparable postsecondary institutions will usually find they are very similar. Martin emphasizes that plans can hardly be considered strategic if they are indistinguishable from each other, given that a key purpose of strategy is to gain institutional advantage. Eckel and Trower (2019) mock this tendency, noting the frequency of such general objectives as "performing high tech research" or providing all students with "a transformational learning experience" by wondering what the alternatives are – "low tech research?" or "providing a less than transformative learning experience for all students?"

According to Ikenberry, strategic planning must not be confused with tactics. He believes that university leaders "are too often seduced by short-term tactical questions. . . that tend to crowd out the major strategic questions that will ultimately be more critical to the organization's future" (Ikenberry, 2006, p. x).

Tactics were particularly evident in many institutions confronted with the onset of COVID-19 when there was little time for strategy and institutional leaders had to scramble to replace conventional teaching and learning with online delivery of programs with little time to prepare faculty, staff, and students for the changes. This pivoting for institutional survival contrasts starkly with Ikenberry's notion of strategic leadership, which "is about long-term positioning, the successful execution of a multiyear strategy. . .It seeks to reposition the institution in new and fresh ways with stakeholders, it seeks differentiation not homogenization and it seeks to thrive, not just to survive" (Ikenberry, 2006, p. xi).

Notwithstanding such well-documented concerns, there is almost no university website that does not feature an updated strategic plan. This usually includes a mission statement and a series of initiatives designed to achieve its goals together with accompanying operational plans and accountability mechanisms such as benchmarks and time lines. While primarily instruments for internal decision-making, strategic plans can also be valuable marketing materials which is why they are so prominent on university websites. For example, the UKOU's one-page summary of its current strategic plans (*The Open University*, 2021) lends itself readily to institutional promotion. This propensity to use strategic plans for marketing and promotion underscores a key difference between private and public sector approaches – private companies seldom publicize their strategic plans so as not to reveal their strategies to the competition.

Concise strategy documents are not the norm, however. The nature of decision-making in a university is particularly challenging for effective strategic planning. There are huge pressures to incorporate objectives from a great range of stakeholders, from faculty and students to governments, funding agencies, and employers. Internal decision-making processes tend to be slow and cumbersome and, too often, the result is a plan that tries to be all things to all people which is thus not really a plan at all.

Even where an institution's strategic plan effectively projects a long-term vision and ambitious objectives for its realization, the work has only just begun. Too many such documents gather dust on president's shelves until the next planning exercise is initiated, often by the incumbent's successor. Falkenburg and Cannon (2020) have explored the whole process systematically and, like Piper and Samarasekera (2021) and earlier research by Westley and Mintzberg (1989), they emphasize the intuitive and the inherent weaving of strategic planning and organizational culture through engaged consultation to facilitate responsiveness rather than complacency. So, while the most common term in higher education in this domain is "strategic planning," our primary interest is in strategic positioning and strategic management as ultimate tests of how effective any planning exercise is, in our institutions and in government.

The Context: The Pandemic and Strategy Development in Higher Education

Bargh, Bocock, Scott, and Smith (2000, p. 24) suggest that when the organizational context is "divergent" (goals and structures are increasingly inappropriate to the prevailing environment), the leader should challenge the status quo. One could argue that the onset of COVID-19 has rendered most organizational contexts "divergent" which would suggest that strategy development, thinking, and management are more important, and perhaps more difficult, than ever.

The pandemic has challenged the very nature of planning by forcing institutions and their leaders to "pivot" frequently to cope with the latest crisis. This is echoed in the public service generally as government leaders struggle to find the appropriate policies and practices in the face of such an elusive and constantly changing threat. The evidence is pretty clear that vision and leadership are particularly challenged in such a disruptive era where today's popular decision may be very unpopular a few months later as a new virus strain upsets all the assumptions of the earlier position.

At a time when the majority of the population is looking to government(s) for leadership, a roller coaster of stop-go decisions has contributed to an undermining of public confidence in their leaders. Political leaders the world over have diverged considerably in the ways they have responded to the pandemic, with some being cautious and quite strict with others seemingly in denial that anything serious has been going on. The ensuing distrust of leadership has implications for institutional leaders as well.

For a college or university president, the most important challenge for strategy development is to build consensus around strategic priorities, a clear understanding of the reasons for them and why they are critical to institutional success. And, once strategies have been adopted, it is vitally important that they guide implementation and decision-making and that they are constantly reviewed on the basis of their impact, both positive and negative.

University leaders do not have the same powers and authorities of their private sector counterparts and it will not be enough to simply proclaim a new strategy. Once one is adopted, the real work begins. Credibility and trust can be built with an effective plan but cynicism and apathy will quickly take over if the plans are ineffective in achieving the higher-level goals held out for them in the first place.

Writing in the British context, Bargh et al. saw vice-chancellors' preoccupations with strategic planning as evidence of their struggles with the pressures of change and tradition.

> Mass higher education poses intellectual as much as managerial and organizational challenges, and so far the university world remains racked with ambivalence about its future(s).

> In that sense strategic planning can be seen as part of a debate about the core values which underpin higher education. (Bargh et al., 2000, p. 24)

This demonstrates that uncertainty about the roles of and priorities for universities were among the significant issues before the onset of COVID-19 but the latter has almost certainly further eroded trust in leadership and rendered the jobs of presidents and vice-chancellors even more difficult.

Strategy Development in Government

Most of the literature on strategy development pertains to individual institutions, but the same principles and concerns apply to those overseeing whole systems of higher education, as we will show in the following case study of South Africa. Boland, Thomas, and Werfel (2021) are strong advocates for strategic planning in government as a prerequisite to dealing with the huge challenges faced in every country, notably in the face of four key and difficult realities:

(a) The scale and pace of change, including changes driven by advancing technology.
(b) The involvement of more stakeholders than in the past (magnified by COVID-19).
(c) An ongoing erosion of public confidence in leaders.
(d) Squeezes on discretionary spending due to rising deficits, aging populations, and the increasing cost of government services.

Hence, the same caveats for successful strategy development apply to government leaders as to the heads of colleges and universities. Ultimately, the success of such planning will depend on the public's trust and confidence in government and institutional leaders alike.

The Particular Demands for ODDE Institutions

If this chapter had been written before the onset of COVID-19, it would have been limited to institutions in the ODDE sector. However, the dramatic need for most conventional colleges and universities to pivot to online learning without much time to prepare or consider the consequences has brought unexpected attention to ODDE. There has not been time, nor indeed the inclination, for conventional institutional leaders to try and learn from the experiences of the ODDE sector. Instead, they have been thrown into an unfamiliar scenario and had to learn quickly from the failures and successes of sudden moves to online learning.

The initial shock in scrambling to replace face-to-face learning in 2020 has been mitigated to some degree by better planning and more professional development in

2021 and by the adoption of blended and hybrid schemes that try to find the best of both worlds. These changes have dramatically increased the profile of ODDE, but because the changes were brought in without time to plan very much, they have also generated considerable negative publicity about online learning dissatisfaction regarding the learning experience in traditional institutions not familiar with the attention given to course design and student support in dedicated ODDE institutions.

The pandemic may have dramatically increased the challenges facing conventional colleges and universities but pressures for change in postsecondary education were already there. The explosive rise of new communications technologies has increasingly challenged the sector to be more nimble and able to pivot quickly to take advantage of opportunities, and there has been more and more acknowledgment of the need for change independent of the pandemic.

In this context, strategy development and planning is central to an institution's (or a government's) ability to respond. Its components are the following:

1. A clear and differentiating vision for the institution's development.
2. Acceptance and articulation of this vision within the institution, a particular challenge in one as diverse and complex as a university.
3. Widespread communication of this vision, both internally and externally.
4. Operational plans designed to realize the vision over the long term.
5. Accountability mechanisms that measure the extent to which the operational plans have been successfully implemented.
6. Regular revisits to strategic choices to ensure that they are still right for the institution and have widespread internal and external support.

In this connection, a 2011 publication from Ontario's *Contact North/Nord* offers a practical template for strategic planning for online learning by the province's institutional leaders. It guides the reader through an exemplary strategic planning process, starting with two fundamental questions that recognize the importance of institutional vision and differentiation.

> Does the institution have a clear, owned and widely understood vision for online learning? Can key leaders describe what it will be doing differently in terms of teaching and learning 5 years from now? (Contact North, 2011, p. 2)

This represents, then, an effective approach to strategic planning that underlines the vital importance of strategy and emphasizes the importance of differentiation for a given institution.

These issues are now explored through the particular case study of ODDE in South Africa and the key strategic role played by the South African Institute of Distance Education (*Saide*). This selection is based both on the importance of exploring the issues in a developing country with the added benefit of an institution dedicated to facilitating it.

Strategic Planning for ODDE in South Africa

University Education System in South Africa (SA)

SA's new democracy in 1994 heralded a dramatic departure from a racially divided university system (with the bulk of universities serving largely the minority White community with separate universities for Black African students in designated "homeland" areas and one university each for so-called "Colored" and "Indian" students) to an integrated system dedicated to the social justice values and principles of the new democracy, committed to promoting equity of access and fair chances of success while advancing redress for past inequalities.

The new system, framed by a white paper (Ministry/Department of Education, 1997), provided for a large amount of public university autonomy under the notion of cooperative governance, with the (now) Department of Higher Education and Training (DHET), the Council on Higher Education (CHE), and its Higher Education Quality Committee (HEQC) steering the system through:

- Enrolment planning – includes the mix (level and subject area) of programs on offer, enrolment numbers, and mode of provision.
- Funding to be expected from government as subsidy as well as ear-marked funding.
- Quality assurance mechanisms overseen by the CHE and HEQC, including institutional audits, new program accreditation, and program reviews for the first two decades. A recent CHE document places emphasis on standards development, promotion and capacity development, and a move away from program to qualifications accreditation (CHE, 2021).

All public institutions are subject to the "steering" outlined above. They are required to negotiate their enrolment plans with DHET in order to receive state funding, which is based on these enrolments as well as on numbers of graduates produced. Private institutions are subject to separate registration but the same quality assurance processes.

The latest *White Paper for Post-School Education and Training* (2014a) saw the development of policy for an integrated post-school system that would:

- Assist in building a fair, equitable, nonracial, nonsexist, and democratic South Africa.
- Expand access, improve quality, and increase diversity of provision.
- Build a stronger and more cooperative relationship between education and training institutions and the workplace.
- Be responsive to the needs of individual citizens, public and private sector employers as well as to broader societal and developmental objectives.

The Special Role of *Saide*

Established as a small nonprofit independent organization, governed by a board of trustees, in 1992, *Saide* is guided by a vision of a society in which all people value, have access to, and succeed in lifelong education appropriate to the global knowledge economy. Its mission is to increase equitable and meaningful access to knowledge, skills, and learning through the adoption of open learning principles and distance education methods. *Saide* acts as an advocate, catalyst, and facilitator of change in education policy and practices. Over the years, *Saide* has contributed to a range of educational policy processes, supported a number of systemic interventions, and worked with educational practitioners to transform their practices. While initiated in South Africa, the organization has increased expanding its services to many countries in sub-Saharan Africa. *Saide* has been particularly active in the South African university sector, contributing to country-wide processes and engaging with individual institutions.

COVID-19 in South Africa

COVID-19 has changed much of our lives including the modes of provision in higher education, particularly for those at residential universities. While faculty and students have enjoyed some respite from daily commuting, taken-for-granted classroom practices in face-to-face teaching environments have been shown to be replaceable with faculty forced to attempt new online practices.

COVID-19 has had dramatic effects on context, with students and staff from traditional institutions coming to accept the possibility of the education process moving away from the classroom to educational practices making use of technology in a variety of ways. It has underscored the importance of understanding who your students are and the context in which they study. It has also exacerbated inequality within and between countries. Rich countries are recovering far more quickly than middle-income and poor ones. The upper middle classes are least affected and employment rates among men recover more quickly than those of women.

COVID-19 has aggravated an already challenged higher education sector. The cost of higher education has increased far more than inflation in many countries, with the cost per student place becoming increasing unaffordable for many countries and students. For example, South Africa cannot afford to fund its target enrolment rate of 1.62 million students by 2030, set in 2012. This was to be a modest 25% of 18- to 25-year-olds up from 17.3% in 2011 (DHET, 2014a, p. 30). Already staff-student ratios have deteriorated, resulting in class sizes growing dramatically in some faculties. All of this has transpired in a context where the growth of higher education is essential for a world of work increasingly dependent upon digitization and artificial intelligence.

Learning from the COVID Experience

These changes impact on strategy for the university sector. Strategy development involves consideration of context, clarity of values, and forging a position in order to determine a plan of action that involves strategic choices. In particular, the COVID experience is likely to erode the taken-for-granted niches of distance education institutions. In this context, it both underlines the need for a complete rethinking of ODDE and serious considerations of new opportunities that are identified in the process.

Role of ODDE in the University Sector

Traditionally, across the world, distance education has been seen as providing an opportunity for those unable to access traditional universities. In 2004, a special report on distance education (CHE, 2004, pp. 17) outlined this positioning by identifying the key motivating factor for distance education as providing "access to students for whom – either because of work commitments, personal social circumstances, geographical distribution, or poor quality or inadequate prior learning experiences – traditional full-time contact educational opportunities are inappropriate or inaccessible."

Experiences of remote emergency teaching under COVID-19 have encouraged traditional universities to venture beyond their practices of offering contact opportunities which "require students to attend classes regularly at set times in order to discover the curriculum" (reference?). This has enlarged the pool of students constituting their target market. Traditional universities can potentially play a far greater role in meeting the needs of the post-school system as described in the 2014 White Paper:

> . . .for the post-school system to cater for a very wide variety of potential student needs, including mature adult learners who have to study and work at the same time, as well as younger people who may have dropped out of the schooling system due to financial, social, learning or other barriers. Such students require access not only to a diverse range of programmes, but also to appropriate modes of provision which take into account their varying life and work contexts, rather than requiring them to attend daily classes at fixed times and at central venues. (DHET, 2014a, p. 48)

The Iron Triangle

The abovementioned CHE (2004) report goes on to suggest that the South Africa's resource-constrained system should also capitalize on the potential of distance education to achieve economies of scale while not compromising quality. Daniel's "iron triangle" as the basis of an effective distance education institution requires an appropriate balance across access, cost, and quality (Daniel, 2009).

Immediately post-1994 in SA, the pursuit of access was considered paramount, with a goal of "massification" particularly for previously marginalized groups, both for the system as a whole and for distance education. The system almost doubled in size from 490 to 837 thousand students over the period 1994–2009, but, importantly, the number of African students in the system increased from 32% in 1994 to 66% in 2009 (National Planning Commission, 2014, p. 317) and to 77% in 2019. (CHE, 2021a, p. 3). This compares very favorably with the percentage of Africans in the population (81%). In 2019, 60% of headcount enrolments were of women compared to their share of 51% of the population (CHE, 2021a, p. 5).

In 2001, distance education students made up 43% of headcount enrolments and, because they were largely part-time, 29% of full-time equivalent students (DoE, 2001, pp. 36, 44). However, by 2014, this percentage of headcount enrolments had decreased to 38% and to 34.5% by 2019 (CHE, 2019, p. 9). This decline is explored below. Of those in distance education, 80% were African and 69% women, showing how distance education has made a particularly important contribution to access. Unfortunately, it appears that access for older students (over 35) has steadily declined in recent years with only 24% of distance students being older than 35 (CHE, 2019, p. 11) compared to 32% in 2011 (CHE, 2018, p. 11). In general, however, distance education has a proud history of offering **access** to more marginalized students.

This provision is also substantially more "cost-efficient" than that of the conventional institutional provision, with government subsidies per full-time equivalent student enrolment in distance education being half that of the subsidy for face-to-face provision (DHET, 2014b). Student fees are generally far lower, with the cost of a three-year qualification through distance being roughly half that of conventional provision.

This aspect is particularly important in South Africa in planning a post-COVID future. The aspiration of equitable access to university education has led to over 60% of South Africa's students being supported by the National Student Aid Fund (NSFAS), which covers tuition fees and living allowances, with much of the remainder of university costs coming from government subsidy. The level of these subsidies is also under attack as COVID-19, among other factors, has wrought havoc on the budget allocated to higher education, with university infrastructure grants already curtailed.

The higher education system is therefore under huge financial pressure – more cost-effective ways of provision need to be found. In positioning themselves in a post-COVID era, it is therefore imperative that the system and individual institutions respond to the extremely serious challenge of the increasingly unaffordable nature of the current teaching and learning model of the university sector.

Unfortunately, the third side of the iron triangle – quality – is questionable in much distance provision. This is exemplified by a measure of one central component of "quality" – student success. Already in 1995, *Saide* had raised an alarm bell that the pursuit of improving access in distance education needed to be accompanied by equal emphasis on student success, showing that only 15% (Arts), 10% (Commerce), and 6% (Science) of students who were enrolled past the census date completed their degrees in 9 or 10 years for a three-year qualification (*Saide*, 1995, p. 5). This was largely ignored by governments and institutions for over 15 years.

More recently, issues of student success have come to the fore. Over the last 10 years in particular, especially as it became clear that there were not enough resources to further expand the system, DHET identified the serious impact of students taking too long to complete with too few ever completing. With the national data available via a new (1998) Higher Education Management Information System (HEMIS), it was possible to track student retention and course/module success rates, as well as conduct cohort analyses which showed student throughput rates within minimum time (M), minimum time plus 1 (M + 1), and minimum time plus 2 (M + 2). Minimum time for a three-year qualification for a distance student is considered to be 6 years.

Figure 1 below shows the dramatic differences between the throughput for three-year degrees through "contact" mode of provision and that of distance provision (DHET, 2020a, pp. 25–28).

They also show the marked improvement in throughput for distance education from the 2006 intake to the 2011 intake. Of the 2006 intake in distance education, 15% completed in six years, 17.7 in seven years, and 20.3% in eight years. (This percentage rose to 24.9% after 10 years.) Of the 2011 intake, 19.5% completed in six years, 23.1% in seven years, and 25.7% in eight years.

The pattern for three-year diploma throughput is very similar. The improvement seen is a result, at least in part, of some deliberate efforts within the dedicated distance education institutions (which make up more than 80% of distance education

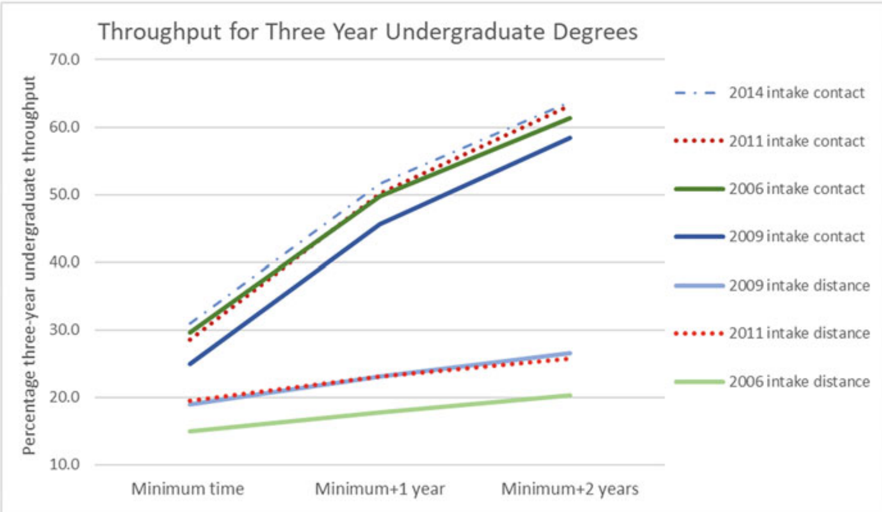


Fig. 1 Throughput for three-year undergraduate degrees across contact and distance provision

provision) to improve their quality of support. The notion that distance education must provide both access and success is now firmly entrenched within policy.

Throughput rates are, however, not the only measure of student success. It is suggested below that open learning principles are a useful high-level lens through which to begin to examine the quality of provision, especially for distance education.

Open Learning Principles

In reimagining university teaching and learning, it is critical to be guided by broad goals for the sector rather than being distracted by the new technological tools it has learnt to use. As set out in the white paper of 2014, this involves careful consideration of the context in which students will study and subjecting the use of the new tools to careful scrutiny through a range of principles.

The white paper, with its vision of diverse modes of provision, sets out principles of open learning to guide implementation. These have strong underpinnings of social justice, in line with efforts to build a new equitable democratic South Africa, providing a clear set of values essential for strategy development. SA policy sees open learning as a range of principles which need to be applied to all modes of provision but particularly to distance education – these include access (widely used in distance education discourse), success, and accumulation of learning.

> Open learning is an approach which combines the principles of learner centeredness, lifelong learning, flexibility of learning provision, the removal of barriers to access learning, the recognition for credit of prior learning experience, the provision of learner support, the construction of learning programmes in the expectation that learners can succeed, and the maintenance of rigorous quality assurance over the design of learning materials and support systems. (DHET, 2014a, p. 13)

These were further elaborated at a September 2021 DHET Research Colloquium as part of a presentation by Glennie (2021) in which she challenged educators to examine their online learning provision using the open learning principles (Fig. 2).

The above framework aligns to South Africa's existing quality criteria, although they need to be interpreted according to the mode of provision. All South African higher education, regardless of mode of provision, has been subject to the same quality assurance provision.

A COVID-related quality assurance framework (CHE, 2020) cites the "humanising framework" of Stobel and Tilberg-Webb (2008, p. 11) which highlights the following core principles for teachers to integrate technologies into instructional design and education:

- Fostering independent thinking.
- Problem-based learning.
- Student-centeredness.
- Student engagement and interaction.

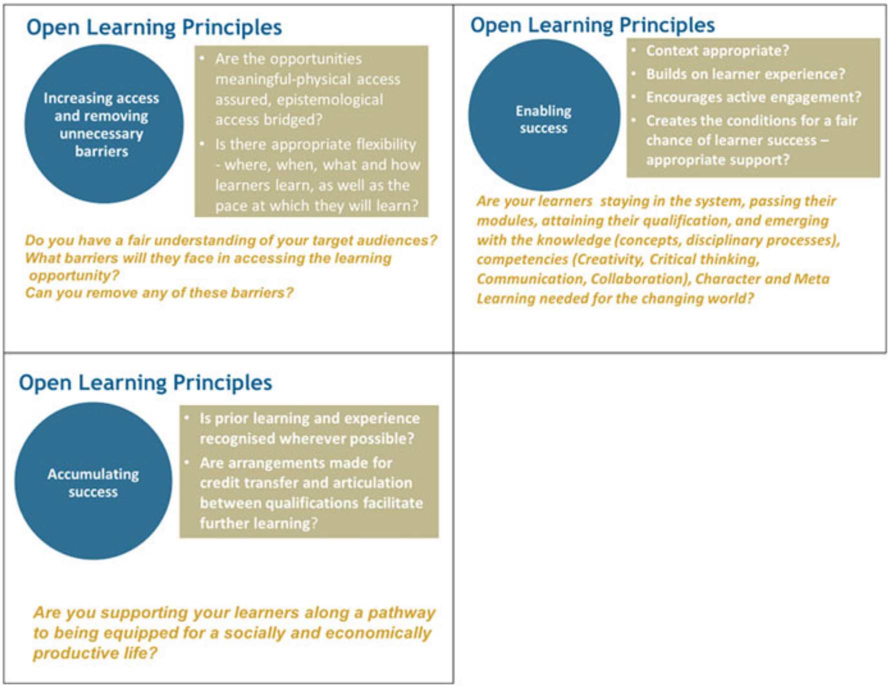


Fig. 2 Open learning principles different dimensions

> The main purpose of the humanizing framework is that the larger educational goal remains in focus and that the technology is only used as when and how it may be appropriate to achieve these goals (CHE, 2020, p. 17)

The values espoused echo several of the open learning principles, but anecdotal evidence points to COVID provision, especially for large classes, concentrating on the conveying of information, with large numbers of resources piled on students, little student engagement, and assessment focused on recall. Moreover, in our digitally unequal society, students often access their learning management systems through smart phones with sporadic connectivity and erratic electricity supply.

Strategic Positioning for both ODDE and Traditional Institutions

Shaping the System Toward National Goals

As indicated in the introduction, it is essential for any strategic planning process to articulate a mission that distinguishes it from other universities. In South Africa, this is referred to as differentiation. In the except that follows, both achieving national goals and differentiation is encouraged.

> Differentiation is a way of ensuring a diverse system that will improve access for all South Africans to various forms of educational opportunities, improve participation and success rates in all higher education programmes, and enable all institutions to find niche areas that respond to various national development needs. A differentiated system should provide a variety of modes of learning, learning programmes, and methods of teaching and assessment for diverse student bodies, and should support both flexibility and innovation. It should also allow an effective and focused way of distributing public funds, and improve the overall quality of the system. (DHET, 2014a, p. 9)

Once these clearly differentiated missions are developed, universities can move to developing their strategic goals to achieve this mission, with related activities and high-level indicators. The ensuing annual performance plans are as follows:

Institutional Strategies

In determining their missions, COVID-19 has blown traditional higher education demarcation wide open and both traditional and ODDE institutions will need to reconsider their overall strategies in response. The competition for students will take place in a number of ways with ODDE institutions finding their traditional markets of remote and part-time students contested.

1. Targeting remote students

Traditional universities are likely now to be confident that they can offer small enrolment courses to students wherever they are located in the country. In preparation, some universities are already considering setting up a network of learning centers which provide all the necessary facilities so that students can study away from their central campus. However, traditional universities may be wary of large enrolment course/modules where the importance of careful course design is paramount, an area where distance education is expected to excel and the organization of large-scale academic and psychosocial student support is underscored.

2. Targeting part-time students

Conventional universities in large urban areas already enrol substantial numbers of part-time students within their vicinity. They may continue their fully online offerings here and feel confident to expand these part-time offerings to remote students as well. Cost may be a deciding factor. In SA, despite the major distance education institution receiving half the enrolment subsidy of traditional residential education from the state, they charge half the fees for a full qualification compared to traditional universities.

3. Understanding the context and profile of students

The COVID experience has underscored the importance of knowing the context of likely students to determine what mix of technology one is able to take as a given, especially if students are not accessing the campus regularly. There are significant disparities in such crucial concerns as access to devices, uninterrupted access to the Internet (which is too often intermittent even in areas of Johannesburg, making synchronous sessions hazardous), and even issues of the constancy of the supply of electricity. Moreover, in a very large sample of South African students, more than half (54%) did not have a quiet place to study, and only half (50%) indicated that they had appropriate network connection (DHET, 2020b, p. 7).

The following grid has been useful in helping to determine where to locate the mode of provision with the accepted notion of a continuum elaborated to include a second dimension of levels of the adoption of technology (Fig. 3).

Distance education is viewed as anything on the right-hand side of the grid above – degrees of remoteness of the student – with the cutoff being the percentage of face-to-face or synchronous learning hours against the learning hours for the course/module. Defining a cutoff was necessary for funding differentiation, and ensuring that traditionally face-to-face universities did not move into serving remote students without adequate planning.

Important dimensions can be added to this grid, including axes for kinds of pedagogy, role of the educator, assessment types, and sources of feedback (Hodges et al., 2020). For this chapter, the consideration of class size is imperative. Hodges et al. suggest class size criteria of under 35, 36–99, 100–999, and over 1000. Clearly, the interactions an educator can have with a class of 35 are very different from those possible with much larger groups. It is in the latter two categories where ODDE is meant to thrive.

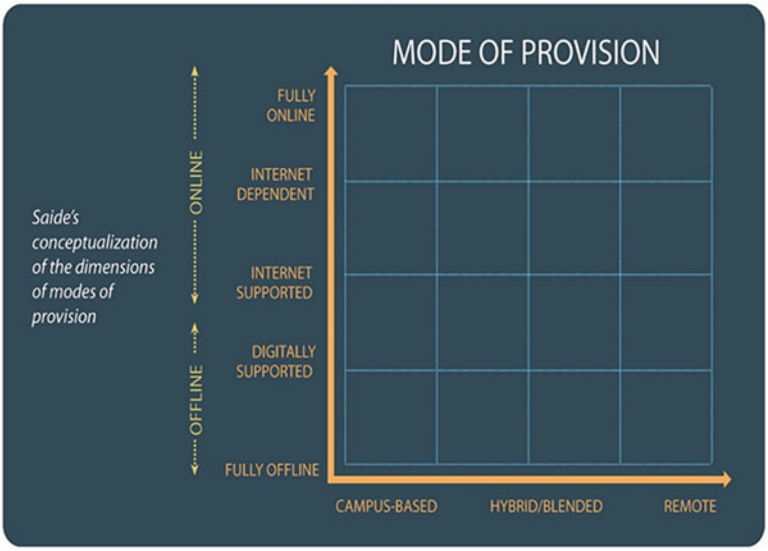


Fig. 3 Dimensions of modes of provision

4. Ensuring cost-effectiveness

It is apparent from the above analysis that any strategy for a distance teaching institution in the post-COVID environment must address all three legs of the iron triangle. It will be no small challenge to retain the system's accessibility via distance education while significantly improving completion rates without jeopardizing its cost advantages.

Summary: Lessons Learned for Better Strategy Development

Effective institutional leadership starts with a strategic approach to institutional development. While the common practice of strategic planning can be an effective tool for institutional advancement, it will only be successful if it is clearly strategic – identifying a particular identity of and long-term vision for the college or university that separates it from competitors followed by comprehensive strategic and operational plans intended to achieve its primary goals.

COVID-19 has blurred the distinctions between conventional and distance teaching institutions as the former have been forced to pivot quickly into online learning and other methods of distance education. This has, in turn, raised the bar for strategic positioning of each institution.

These developments can be both positive and negative for the ODDE sector. On the one hand, distance education and digital learning have gained a new prominence and it is highly unlikely that conventional colleges and universities will revert completely to in-person classroom teaching post-pandemic. Instead, they will develop blended or hybrid approaches that reduce the distinction between conventional and traditional distance teaching institutions. And they will do so in the great majority of cases without trying to learn from the previous experiences and research of ODDE institutions. Indeed, for small classes, it may not be long before the conventional institutions, especially those with greater resources, will catch up to and even surpass ODDE institutions in their knowledge of and effectiveness with online and digital teaching.

However, for large classes, conventional universities may continue some of their existing COVID practices of simply conveying information to students through the online lecture mode with little engagement with and among students. In this case, ODDE institutions need to bring to the fore their particular talents – intensive course design, interactive purposive learning materials, and the ability to engage with large numbers of students through decentralized student support. In this case, they well be able to steal back from conventional universities. This could have a major impact on the latter as large class sizes are an important part of their financial sustainability.

As the South African experience has demonstrated, ODDE institutions have dramatically increased access to higher education but unless they are able to achieve much more competitive completion rates while retaining their cost-efficiencies, they will not be seen as cost-effective recipients for the allocation of scarce national resources. While they will benefit from the legitimization of their approaches to teaching and learning, their response to the envisaged competition will be crucial to their future success. They will need to be very strategic in their development, capitalizing on their experience and expertise in course development and student support, always mindful of the three prongs of the iron triangle.

Overall, national and institutional leaders will have to strategize and plan for a system of institutions that contributes to national goals by meeting the iron triangle requirements and fulfilling open learning principles while always taking the context of the students into account.

While the edges may be sharper and the challenges greater for South Africa than for many wealthier nations, it is not difficult to see that the issues at stake are universal in the post-COVID era. There is no time to lose!

References

Bargh, C., Bocock, J., Scott, P., & Smith, D. (2000). *University leadership and the chief executive*. Buckingham: Society for Research in Higher Education and the Open University Press.

Boland, M., Thomas, T., & Werfel, D. (2021). *Four steps to high impact strategic planning in government*. Boston Consulting Group.

Contact North/Nord. (2011). *A template for strategic planning in online learning in Ontario colleges and universities*. www.contactnorth.ca.

Council on Higher Education, South Africa. 2004. *Enhancing the contribution of distance higher education in South Africa*. Report of an investigation led by the South African Institute for Distance Education.

Council on Higher Education, South Africa.2018. *VitalStats* 2016

Council on Higher Education, South Africa. (2020). *Quality assurance guidelines for emergency remote teaching and learning and assessment during the COVID-19 pandemic in 2020.* https://heltasa.org.za/wp-content/uploads/2020/12/CHE-quality-assurance-guide.pdf

Council on Higher Education, South Africa. 2021a. *VitalStats* 2019

Council on Higher Education, South Africa. 2021b. *A quality assurance framework for higher education in South Africa*, 2021 https://www.ru.ac.za/media/rhodesuniversity/content/institutionalplanning/documents/A_Quality_Assurance_Framework_(QAF)_for_Higher_Education_in_South_Africa.pdf

Daniel, J. (2009). *Breaking higher education's iron triangle: Access, cost and quality.* Vancouver: Commonwealth of Learning. http://oasis.col.org/handle/11599/1442.

Department of Education, South Africa. (2001). *Education statistics in South Africa at a glance 2001.*https://www.dhet.gov.za/DHET%20Statistics%20Publication/DoE%20Stats%20at%20a%20Glance%202001.pdf

Department of Higher Education and Training, South Africa. (2014a). *White paper for post-school education and training*, No. 11. https://www.gov.za/documents/white-paper-post-school-education-and-training-building-expanded-effective-and-integrated

Department of Higher Education and Training, South Africa. (2014b). *Report of the ministerial committee for the review of the funding of universities*. https://www.dhet.gov.za/SiteAssets/Latest%20News/Report%20of%20the%20Ministerial%20Committee%20for%20the%20Review%20of%20the%20Funding%20of%20Universities.pdf

Department of Higher Education and Training, South Africa. (2020a). *2000 to 2017 first time entering undergraduate cohort studies for public higher education institutions.* https://www.dhet.gov.za/HEMIS/2000%20TO%202017%20FIRST%20TIME%20ENTERING%20UNDERGRADUATE%20COHORT%20STUDIES%20FOR%20PUBLIC%20HEIs.pdf

Department of Higher Education and Training, South Africa. (2020b). *Students' access to and use of learning materials, survey report*. https://www.usaf.ac.za/wp-content/uploads/2021/02/DHET_SAULM-Report-2020.pdf

Eckel, P., & Trower, C. (2019, February 14). "Stop Planning!" *Inside Higher Ed.*, 2019

Falkenburg, L., & Cannon, M. E. (2020). *Strategic university management*. New York: Routledge.

Glennie, J. (2021, September 22). *Are blended learning and open learning two sides of the same coin?* Retrieved from https://www.dhetresearchcolloquium.co.za/colloquium/

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). The difference between emergency remote teaching and online learning. *Educause Review*. https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning.

Ikenberry, S. O. (2006). Foreword. In R. L. Alfred et al. (Eds.), *Managing the big picture in colleges and universities: From tactics to strategy*. Wesport, CT: Praeger.

Martin, R. L. (2014, January–February). The big lie of strategic planning. *Harvard Business Review.*

Ministry/Department of Education. South Africa. (1997). *Education white paper 3: A programme for the transformation of higher education*. http://hdl.voced.edu.au/10707/105745

Mintzberg, H. (1994, January–February). *The fall and rise of strategic planning*. Cambridge, Mass: Harvard Business Review.

Mintzberg, H. (2014). *We live in times of great continuity*. Retrieved from https://mintzberg.org/blog/we-live-in-times-of-great-continuity

National Planning Commission, South Africa. (2014). *National development plan 2030 – Our future – Make it work*. https://www.gov.za/sites/default/files/gcis_document/201409/ndp-2030-our-future-make-it-workr.pdf

Piper, M. & Samarasekera, I. (2021). Nerve: lessons on leadership from two women who went first. Toronto: ECW Press.

Saide. (1995). *Open learning and distance education*. Swaziland: Macmillan.

Strobel, J., & Tillberg-Webb, H. (2008). Applying a critical and humanizing framework of instructional technologies to educational practice. In L. Moller, J. B. Huett, & D. M. Harvey (Eds.), *Learning and instructional technologies for the 21st century: Visions of the future*. New York: Springer.

The Open University (2021). The Open University strategic plan to 2021–22: A summary. https://www.open.ac.uk/about/main/sites/www.open.ac.uk.about.main/files/files/Summary_Strategic_Plan_to%202021_22.pdf

Usher, A. (2019). *Time horizons for strategic plans*. https://higheredstrategy.com/time-horizons-for-strategic-plans/

Westley, F., & Mintzberg, H. (1989). Visionary leadership and strategic management. *Strategic Management Journal., 10*, 17–32.

Resilient Leadership in Time of Crisis in Distance Education Institutions in Sub-Saharan Africa

33

Mpine Makoe

Contents

Abstract

As leaders of distance education in sub-Saharan Africa were dealing with myriad challenges of high numbers of young people seeking access to higher education, lack of technologies, and inadequate expertise for online teaching, Covid-19 pandemic emerged, and, almost overnight, quick decisions had to be made to pivot to online spaces to ensure that learning occurred even in the midst of the crisis. Leaders who were flexible and adaptive to changing environment were able to respond effectively to this crisis. Hence the focus of the study is on the character of a distance education leader who is exhibiting personality traits that will enable him or her to move a distance education institution forward.

The futures triangle was used to contextualize and historicize the character of a leader who has the ability to be innovative and willing to take risks in the face of crisis. The aim of this chapter is to illustrate how some historical factors have not only influenced the leadership practices in distance education, but they have molded the characters of distance education leaders. The futures triangle mapping process revealed that the legacy of colonialism, the lack of managerial skills, the slow adoption of using technologies, the growing number of people who cannot be accommodated in higher education, and, most recently, the Covid-19

M. Makoe (✉)
University of South Africa, Pretoria, South Africa
e-mail: qakisme@unisa.ac.za

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_30

pandemic were drivers of change that illustrated how leaders responded in time of crisis. Moving distance education forward requires resilient leaders who are agile and adaptable to lead in an open and technology-rich distance education environment.

Keywords

Leadership · Resilience · Distance education · Futures triangle · Sub-Saharan Africa

Introduction

Leading change in distance education has been a major challenge in most sub-Saharan African countries where there is lethargic economic growth, high unemployment rates, resource constraints and ill-health, wars and displacement of people, and governments that are incapable of providing home-grown solutions to their citizens (Odhiambo, 2014; Sawyerr, 2004; Varghese, 2013). As leaders of these institutions were dealing with all these challenges, the Covid-19 pandemic emerged and further pushed most countries to the worst health crisis ever that affected every institution in the world. Almost overnight, education ministries and academic leaders had to make quick decision to pivot to online learning. Virtually every education institution in sub-Saharan Africa struggled with this transition mainly due to the lack of the requisite information and communication technology (ICT) infrastructure, inadequate expertise for online pedagogies, and inability to provide appropriate devices to their students and staff (Wangenge-Ouma & Kupe, 2020). Transitioning to online environment requires agile systems and structures to support digitalized teaching and learning (Dumulescu & Muţiu, 2021). Leading change of this magnitude require resilient leaders who "have the ability to recover, learn from and grow stronger in the face of adversity" (Reed, 2018; p.127).

Although these changes were taking place in higher education institutions throughout the world, they were exacerbated in places of limited resources such as sub-Saharan Africa. The need for change in the higher education sector of sub-Saharan countries have been on the horizon for a long time. In fact, some of the changes were mooted shortly after independence of many countries in the 1960s. The postcolonial policies identified distance education mode of delivery as the viable option to widen participation in higher education (Makoe, 2018; Mukama, 2016). Regardless of the clear vision provided by policies, there are only six publicly funded distance education institutions in sub-Saharan Africa. For decades, the University of South Africa was the first and only higher education institution to deliver programs through distance mode. It took about 50 years before the establishment of the second open and distance education institution in Africa in the 1980s, and since then, there have been four more open and distance universities established.

Part of the reason that education policies failed in the new independent countries was that the vision, aspirational as it might be, was not aligned to the challenges of building the nations after colonial domination. Some higher education leaders lacked capacity to translate policy issues into actions. This is because most academic leaders had limited understanding of their role as custodians of the vision of the institution (Viennet & Pont, 2017). Although leadership is critical for the success of the institution, it is during changes that leaders are expected to communicate a clear vision on how they plan to move the institution forward. The role of vision is to bring people together and give them hope and the sense of the possible (Inayatullah, 2008, 2020; Shipley & Newkirk, 1999).

The focus of this chapter is on distance education leaders who are expected to generate a powerful vector in the direction of change (Todoruț, 2017). Therefore, leadership will not be viewed in relation to the position an individual held, according Odhiambo (2014); instead, it should be seen in terms of how an individual leader respond to change in times of crisis. Unfortunately, there has been very little research in distance education leadership (Beaudoin, 2003, 2016; Marcus, 2004; Nworie, 2012). The few studies that are there tend to focus on the leadership roles and performance in managing the core functions of digitalized distance education (Beaudoin, 2016; Nworie, 2012; Weller & Anderson, 2013). Little is said about the personality traits, that is, behavioral characteristics of an individual who is expected to lead in a changing environment.

Early personality trait researchers assumed that effective leaders exhibit certain types of characteristics that make them stand out from other people (Ghaffari, Shah, Burgoyne, & Aziz, 2017). However, critics of the personality trait theory argue that effective leaders are those that are able to assess the situation and adapt their style to address a specific need (Lawton-Misra & Pretorius, 2021). Unlike the personality trait theory, the humble leadership theory focused on the characteristics of the leaders and how they relate to their subordinates (Ali, Zhang, Shah, Khan, & Shah, 2020). This theory, like servant leadership, places a lot of emphasis on the importance of relationship between the leader and the subordinates, and they view their accomplishments in relation to others. These two theories are embodied in the African principles of *Ubuntu* that requires strong community interdependence and solidarity among people. In fact, a person who exhibits these traits that are both innate and learnt is often referred to as being human (*botho*). It is therefore expected that a leader exhibits qualities that place the interest of the community above their own. Other theorists argue that leaders adapt their leadership style based on the situation they encounter (Lawton-Misra & Pretorius, 2021). What seem to be clear in all these theories and approaches is that effective leadership may be influenced by a variety of factors including personality traits, the situation in which the person operates, and the strategies that the leader employs when faced with a crisis (Fernandez & Shaw, 2020; Ghaffari et al., 2017; Lawton-Misra & Pretorius, 2021). However, this chapter will focus on what it takes to be a resilient leader in the transitioning environment.

When Romanian academic leaders were asked about their experiences of managing change during Covid-19, they pointed out that their strong proactive attitude and their risk-taking behavior helped them to navigate the choppy waters of the crisis (Dumulescu & Muțiu, 2021). It seems that the academic leaders who were effective during the crisis were those who exhibited the personality traits of resilient leaders who face problems head on and are willing “to take risks by trying out new things and meet challenges in unconventional ways" (Mrig & Sanaghan, 2017, p.24). Resilient leaders are those who use their individual attitudes, values, and actions that enable them to overcome any hurdles on their way. They have an innate human capacity to demonstrate strength and flexibility to withstand adversity (Couto, 2002). What is needed most in the face of a rapidly changing environment is a resilient leader who "don't just bounce back from challenges or crises; but bounce forward" (Mrig & Sanaghan, 2017, p. 24).

Institutions thrive when their leadership is enabling, honest, firm, competent, and provides a vision for the future (Ayee, 2014; Odhiambo, 2014). While leaders produce change, "effective leaders produce constructive or adaptive change to help people survive and grow" (Ayee, 2014, p.240). However, it has been difficult for most leaders in many higher education institutions in sub-Saharan Africa to keep their head above the water in the midst of myriad legacy issues as well as current challenges such as high numbers of young people seeking access to higher education, the growing interest in the use of technologies in education, the lack of competent staff, and, most recently, the Covid-19 pandemic. In these types of environment, leaders are called to manage change by creating and conveying a compelling vision in a strategic and ethical manner (Frantz, Lawack, & Rhoda, 2020). Thus, according to Pityana (2017), a leader's role is more than just the personality of an individual, but is about leading change and motivating employees, working together as a team, and providing a vision for the institution. Since leaders are expected to lead change, "visions of the future are powerful rhetorical devices to promote change in the present to prepare for the future" (Facer & Sandford, 2010, p.77). It is therefore incumbent on the leader to continuously rethink the future of his or her environment in order to manage changes intelligently and effectively (Frantz et al., 2020).

Since a crisis comes unannounced and requires quick response, it is highly unpredictable, and it is often influenced by the history, the trends, as well as opportunities that change presents. This means that leaders should always be on the lookout for trends and opportunities that will assist them to design a vision that gives them a positive sense of direction (Fergnani, 2020; Inayatullah, 2008; Pham, 2006). This should be facilitated by the images of the desired futures, the drivers of change, and the factors that stand in the way of change (Inayatullah, 2008). It is on this basis that the Inayatullah's (2008) futures triangle was used to guide the process of examining the personality traits of the distance education leader who is likely to remain resilient in the face of the crisis.

The aim of this chapter is to illustrate the academic leader's personality traits that are useful in managing change in times of crisis. Nothing challenges a person than leading in times of crisis. There are certain personality traits that are critical for surviving the crisis. Some of the traits are biological, some may be learnt from watching people in leadership positions, and some may be developed through formal professional development and incorporated into the leaders' regular leadership style. Since this chapter is focusing on distance education leaders in sub-Saharan Africa, it is important to look at some traits that may have been learnt and the historical factors that have influenced management and leadership practices and how these have impacted on the character of a leader. It is therefore important to look at the roots of the character formation of the distance education leader in terms of their response to what is taking place currently and how those personality traits will enable them to reach the desired goals. The decisions and actions that leaders take in the present is what shapes the future of their institution (Bell, 1997).

Futures Research Triangle

The mapping method of Inayatullah's (2008) futures triangle will be used to contextualize and historicize the character of leadership in the changing distance education environment in sub-Saharan Africa. The futures triangle incorporates three dimensions that include the weights of the past, the push of the present, and the pull towards the future as well as the tensions between them (Fergnani, 2020; Inayatullah, 2008; Pham, 2006). The process of visioning the future is meant to "create the vision that pulls the future forward" (Inayatullah, 2008). The **weight factors** enable leaders to take forward what worked in the past in order to remove obstacles that may stand in the way of change (Fergnani, 2020; Inayatullah, 2008). The **push** factors refer to the current events that influence our thinking such as the Covid-19 pandemic, economic growth, technologies, and social and political pressures; and the weight factors recognises historical practices that are getting in the way to change. It is therefore important to look at the genealogy of distance education in sub-Saharan Africa and the systems and structures that support it.

Each factor in the corner of a futures triangle is influenced by its own set of trends, drivers, and inhibitors (Inayatullah, 2008; Pham, 2006). Trends are an important part of futures thinking, because "they show ways in which the past and the present give rise to the future by forecasting what might happen if a trend were to continue" (OECD, 2019, p.45). However, trends analysis should not be used as an extension of currently existing trends based on a linear way of thinking (OECD, 2019). Instead, they should be used to gather and arrange information to help leaders to envision what is likely to happen in future and how they should respond to it. These factors are also influenced by the drivers of change which are major societal shifts that directs the way towards the future. Drivers of change identify forces that impact on leadership in distance education. Inhibitors also affect the future in a way in that they can bring the whole process of change to a halt. The process of mapping the future requires clear values that underpin the aspirational vision, and the people involved in the production of the vision and the methods (Bell, 1997; Facer & Sandford, 2010). The futures triangle is used to examine some of the factors that mold the character of a leader, starting from where they are coming from, where they are, and what they become due to changes they encounter.

Weights of the Past

Although distance education leaders' minds are often clouded by the current trends, their understanding of who they are and the tools that they use tend to limit their possibilities of thinking beyond the present. When faced with managing a crisis, decision makers tend to cling to the legacies of the institution, its successes and practices that have survived over the years (Fergnani, 2020). This past may keep them from trying out new things and taking risks.

One way of understanding how some distance education leaders get to lead the way they do is to look back at the history of education in sub-Saharan Africa. By the end of the nineteenth century, virtually all African countries were colonized, mostly by the British and the French who played a major role in shaping education in 80% of sub-Saharan Africa, a home to 46 out 54 African countries (Ayee, 2014; Sawyerr, 2004; Woldegiorgis & Doevenspeck, 2013). When most countries gained independence in the 1960s, they were faced with a mammoth task of educating large numbers of people who were systematically excluded from education by the colonial powers. In addressing this need, most postcolonial governments developed a number of education policies to guide them as they established higher education institutions in newly independent nations (Makoe, 2018; Teferra & Altbach, 2004). In the absence of education models that were geared towards addressing African needs, postcolonial higher education leaders continued to provide an elitist education system modeled after their colonial powers. The structures, systems, curriculum, and leadership practices remain as relics of colonial dominance in every part of the educational system, making it ill-suited and unresponsive to the development agenda of postcolonial Africa (Teferra & Altbach, 2004; Woldegiorgis & Doevenspeck, 2013).

Although distance education did not gain traction as it was envisioned, postcolonial governments identified distance education as a viable mode of delivery that will enable access to large numbers of people. Despite this, distance education did not take off as expected, and campus-based system continued to exclude large numbers of people who were in desperate need of access to higher education. For decades, South Africa was the only country in the continent that provided university programs via distance mode. The University of Cape of Good Hope, which later became the University of South Africa (UNISA), was established in 1873 initially as an examining center for British universities modeled after the University of London centralized administration and decentralized colleges, many of which later became universities in South Africa (Reddy, 2004; Manson, 2016). The mission of the University of London External Study was based on serving the British "empire with its oppression of peoples all around the world" (Tait, 2008, p.86). The motive of the university leaders at the time was to develop skills for colonial administration workers with a clear mission of executing colonial agendas in Africa (Tait, 2008; Woldegiorgis & Doevenspeck, 2013).

In 1946, UNISA was transformed from being an examining center to becoming the first university to offer higher education courses through correspondence. This was after the British administrators had handed over the management of UNISA to the Afrikaners, whose main purpose was to advance the apartheid agenda, an Afrikaner Nationalist government system of discrimination based on race. The mission of apartheid education leaders was to ensure separate racial development; hence many black people were excluded from participating in higher education in general (Bell, 2001; Reddy, 2004). Although UNISA positioned itself as "an enterprise dispersing educational benefits to all who earned the right to it regardless of race," it excluded a vast number of South African populations who could not speak English or Afrikaans (Manson, 2016). While South Africa was the only country in the continent that had several higher education institutions including a distance education university, higher education in other parts of the continent was provided by commercial correspondence colleges. The limited number of public universities in most countries illustrates that there was no political will to provide higher education to large numbers of people in Africa.

Since its inception, distance education was established to widen participation to those people who were excluded from participating in higher education. The role of distance education leaders is to ensure that different types of people irrespective of their age, gender, economic status, and abilities are accommodated and supported. To support students who are geographically separated from their teachers, peers, and the institution, a distance education leader manages interdependent subsystems that work together as a whole (Beaudoin, 2003; Marcus, 2004). Each component of the subsystem addresses structures that have to do with program and curriculum development; facilitation and learning strategies and techniques; development of learning resources and study material; decentralized student support services; and delivery systems that work together to support an individual student who studies on their own using various technologies (Beaudoin, 2003; Nworie, 2012).

All these subsystems are interrelated and interconnected, and if one part of the subsystem is not functioning, it affects all other parts. Therefore, a distance education leader assumes many roles while working in an evolving field that is part of an old system, and operating in a fast-changing environment requiring adaptation of emerging technologies and pedagogies (Nworie, 2012). It is these differences that are often misunderstood by campus-based universities which even question the quality and the legitimacy of distance education qualification. It took the Covid-19 pandemic crisis to move distance education from the periphery to the center. As education institutions faced lengthier shutdown, the expectation was that remote online learning would become a fixture for learning, whether teachers or even leaders were ready for it or not. What was widely overlooked was an overall understanding of what to anticipate in managing technologically enhanced distance teaching and learning. Teaching in an online environment is fundamentally different from classroom teaching and therefore requires resilient leaders who are dynamic and have the ability to apply flexible, creative approaches and provide an enabling environment for online learning (Reed, 2018).

Education leaders, including those in the distance education sector, were totally unprepared for this challenge of managing in time of crisis. By and large, sub-Saharan higher education institutions are often managed by people who do not have the necessary administrative or management skills to effectively lead (Ayee, 2014). In most higher education institutions, leadership is not professionalized, and there is very little interest in training and developing leaders (Beaudoin, 2003; Nworie, 2012; Varghese, 2013). It is assumed that any person who has held an administrative role such as a head of the department or a dean may be a leader in higher education. Yet, leadership is a complex vocation that requires specific personality traits such as tenacity, perseverance, adaptability, courage to make decisions, to mention a few (Reed, 2018). In some African countries, leadership is so politicized such that academic leaders are appointed by the ruling government (Sawyerr, 2004; Varghese, 2013). Added to this challenge is a general shortage of academic leaders in sub-Saharan Africa due to brain drain, and this situation is worse in distance education institutions (Varghese, 2013).

The legacy of education in sub-Saharan Africa has a lot to do with the current practices of academic leaders. Many of the practices resemble those that were used by colonial academic leaders whose main aim was to create obedient and submissive Africans. To this day, the inherited higher education system still pays little attention to the social, economic, and political needs of most African countries. It is therefore important that current leaders identify those areas from the past that they need to leave behind and those that they can take forward in order to provide a vision that will transform distance education institutions from the industrial based system to a technologically enhanced learning environment. The shortage of competent leaders in some higher education institutions, as well as the inertia of systems, structures, and practices inherited from colonial and apartheid (in the case South Africa); and the failure of implementation of policies are the weights that pulls distance education leaders away from acting effectively when faced with crisis.

The Push of the Present

Over the past 30 years, distance education leaders have had to deal with social, economic, technological, and political factors that are pushing distance education towards the future. These factors have been influenced by the changing needs of the emerging economies, the growing number of young people who seek access to higher education, and the impact of the Covid-19 pandemic on the education sector (Inayatullah, 2020; Wangenge-Ouma & Kupe, 2020). Ill-equipped for these challenges, distance education leaders found themselves faced with massive and complex challenges with no clear solutions in sight. These drivers that push for change require "innovation, risk taking, and continuous learning; and new skill sets that traditional strategies of the past are not sufficient to address" (Mrig & Sanaghan, 2017). It is at this point where distance education leaders need "to be informed and enlightened enough to ask fundamental questions that could well influence their institution's future viability" (Beaudoin, 2003, p. 1). As decision makers, leaders need to predict what is essential for their institution in order to develop appropriate polices and implementable strategic plans that enables them to adjust and adapt to the new distance education environment. In a constantly changing environment, distance education leaders need to have a well-founded vision that will take the university forward to the future (Beaudoin, 2016; Pityana, 2017; Nworie, 2012). It is precisely during times of crisis that resilient leaders are needed because of their ability to be innovative in ensuring that teaching and learning, research, as well as community service occur in the midst of all these challenges.

Although most of the changes, with the exception of Covid-19, have been on the horizon for some time, they were largely ignored despite their huge potential to reshape the distance education sector. One such driver of change is the growing number of young people. It has been projected that the population of sub-Saharan will double in 30 years and close to 60% of those will be younger than 25 years of age (Roser, 2020; UNESCO, 2021). This indicates that distance education leaders need to put plans in place to ensure that these large numbers of people are absorbed in higher education. If Africa's young people receive the right education and training geared towards the development of the continent, they will provide an unparalleled comparative advantage that will accelerate the economic growth of the continent (Roser, 2020). However, Africa has been lagging behind in terms of people who complete their basic education, let alone higher education. Africa produces less than 2% of research outputs, and it is in serious need of high level skills needed for the knowledge economy, according to a World Economic Forum survey (WEF, 2017). Africa's most important resource is its young population who currently do not have access to higher education. Therefore, there is a dire need for the whole education ecosystem to engage in discourses that will ensure that young people are equipped with high level skills, qualifications that are relevant to the economic and the development needs of their respective countries, and effective programs for those who need skilling and reskilling (UNESCO, 2021; WEF, 2017). Studies have shown that countries that have thriving economies are those whose higher education participation rates is more than 50%, while most sub-Saharan African countries have less than 5% of people in higher education (Altbach, Reisberg, & Rumble, 2009). Given the limited number of universities on the continent, it therefore makes sense that open and distance education systems are better positioned to address this need for an affordable, scalable education system. This will ensure that there is capacity to service the struggling economies of developing countries.

While higher education institutions were grappling with challenges of inadequate systems, Covid-19 pandemic hit with lockdowns that forced every person to work remotely. Even distance education institutions that were supposed to be trailblazers in online learning did not have the necessary infrastructure and resources to support this mode of delivery. The Covid-19 pandemic provided a unique opportunity for distance institutions to start addressing the needs of people who are forced to upskill and reskill to effectively function in what is considered the new normal. However, some distance education leaders failed to leverage on opportunities provided by the pandemic. The lack of preparation for eventualities tends to be the biggest drawback for academic leaders. This is further exacerbated where leaders are forced to focus on day-to-day operational matters and, in the process, neglect the risks that may arise due to unforeseen circumstances that impact on the practices of the sector.

Higher education institutions that are going to be resilient in future are those that are going to utilize technology to change its practices (Weller & Anderson, 2013). Practices such as teaching, administering, and managing processes in distance education rely entirely on robust information and communication technologies (ICTs) infrastructure, and agile systems and structures that support online pedagogies. All these require resilient leaders who possess broader sets of skills that show that they have deeper understanding of how technology works and how to manage it (Redecker & Punie, 2013; Weller & Anderson, 2013). Although the use of technologically mediated forms of teaching and learning are as old as distance education itself, many African distance education institutions do not have the necessary financial resources to adopt new technologies. Inadequate facilities and infrastructures, problems of quality and relevance to the current labor market, limited capacity of teaching and research, critical shortage of faculty, and huge brain drain are some of the major challenges faced by distance education leaders (Ayee, 2014; Wangenge-Ouma & Kupe, 2020; Woldegiorgis & Doevenspeck, 2013). Given these and other pressing questions, decision makers must clearly understand all influencing factors. It is therefore important that leaders pay attention to these signs, according to Mrig and Sanaghan (2017), because leaders should be constantly thinking about the future while managing today's challenges. The future calls for resilient leaders who will be able to take more responsibility in all matters concerning the institutional affairs (OECD, 2020; Redecker & Punie, 2013).

The Pull to the Future

Moving distance education forward requires leaders who are constantly reviewing current trends, adapt to changes, and initiate solutions to problems (Portugal, 2006). The history that brought distance education to where it is now and the drivers that push these institutions to change requires resilient leaders who can pull the vision of the institution forward. The drivers that pull the future forward communicate aspirational ideas that have a potential to empower the leader to have confidence in moving the institution forward (Inayatullah, 2008). The visioning process of what distance education leaders should aspire for should be guided by the type of skills and knowledge they may need to empower themselves to steer the institution to the desired future. It therefore makes sense that leaders should draw on their personal efficacy and their support base to survive in a rapidly changing environment. "Resilience is fundamental to sustainability, in enabling individuals and communities to manage crises and disruptions, and to find alternatives" (Hall & Winn, 2011, p. 348). Resilient leaders have a clear sense of purpose and meaning, and they make do with what they have and never focus on what is missing when they meet difficult challenges (Couto, 2002; Sanaghan, 2016). This shows that resilience is a necessary trait and skill every distance education leader should develop and possess especially in times of turbulence (Couto, 2002; Sanaghan, 2016). The good news, according to Sanaghan (2016), is that "resilience can be developed with deliberate and conscious actions on the part of the leader" even though the process of building this trait may take long.

The development of a resilient leader should start by understanding the context of leadership in the present, and how it was influenced by the past. The findings of Dumulescu and Muțiu (2021) study of academic leaders during Covid-19 revealed that personal attributes such as responsibility and adaptability helped leaders adopt strategies to deal with the changes created by the pandemic. From a practical perspective, there is a need for development of leadership programs that will train people on how to adapt and find best ways to address any challenges that they may face (Dumulescu & Muţiu, 2021). Resilient leaders require three skills sets, according to Reed (2018), and these include resilient thinking skills, resilient capacity building skills, and resilient action skills.

1. Thinking skills requires leaders to view their current reality and assess its probability to influence the future. Therefore, it is expected that the leader should be optimistic about the future while dealing with the current adversity.
2. Capacity building skills have to do with the personality that a leader possess. These includes personal values that goes beyond the crisis period. Personality and self-efficacy traits are not situational, but they regulate a person's behavior when dealing with the current situation.
3. Action skills focuses on the leader's ability to make decisions with confidence and conviction. Flexible and creative approaches are needed by leaders to successfully traverse through stumbling blocks created by adversities (Reed, 2018). These actions highlight the benefits of proactivity where a leader is not only in control of a current situation, but also, he or she is mentally and physically prepared to change the environment by providing the vision for the future (Reed & Reedman, 2020).

The first two are necessary, but the third one is crucial in carrying out the demonstrated abilities to act, according to Reed (2018). The action-oriented skills were what the retired academic leaders in South Africa mentioned as crucial in steering the transformation of universities in the early 2000s (CHE, 2016). In the past two decades, higher education in South Africa went through a series of dramatic changes that were meant to address a deeply divided education sector. It was during these periods of extreme change that leaders were expected to find ways to manage in an extremely insecure environment. It was, therefore, incumbent on the academic leaders at the time, to ensure that people are motivated to carry on with their work. To achieve this, leaders needed to understand the character of the people that they are leading. The higher education sector is inclined to attract creative people who focus mainly on creating innovative ways of looking at things and finding solutions and therefore these individuals find it extremely difficult to be to be micromanaged. In fact, they work best in environment that allows them to be creative, that engages them, and that acknowledges their contributions to projects that drives the transformation agenda, according to one of the retired leaders (CHE, 2016). In this instance, a leader should lead from the back, by recognizing and supporting as well as leading from the front, by showing how it is done (Ramsden, 1998).

Academic leaders who lead from the front are those that contribute to the development of future leaders through sharing responsibilities with others. The academic leaders' role in times of crisis is to set the institutional priorities and distribute responsibilities to the team and allow them to assume the responsibility of their own decisions while increasing the sense of empowerment of each member of the team (CHE, 2016; Dumulescu & Muţiu, 2021). This approach allows teams to make connections with people at different levels and that way every member of the institution gets involved in the changes that are taking place. In addition, leaders are expected to provide a vision and direction and allow the team to work towards accomplishing institutions' mission (Ramdass, 2015). This type of resilient leadership requires mindset change and attitudes that embrace new ways of leading change.

Distance education institution that will remain relevant in future are those that have resilient leaders who learn, grow, and adapt to constant changes that are taking place around them (Reed, 2018). These types of leaders will be the ones who see lessons embedded in every challenge they encounter (Couto, 2002). They also have the capacity to identify trends, look for opportunities in a crisis, and understand strategic implications embedded in the challenges. Distance education leaders, according to Beaudoin (2016), operate in a rapidly changing environment that requires an agile system that will change swiftly. The pervasiveness of the mobile technologies and internet in sub-Saharan Africa; the automation and the flexibility of working environments; the growing number of people seeking spaces in higher education are all pushing distance education leaders to think critically on how to prepare people to perform effectively in the future environment (WEF, 2017). Based on these drivers, researchers anticipate that the future of education will be digital, open, flexible, collaborative, and personalized (Muňoz, Redecker, Vuorikari, & Punie, 2013; OECD, 2020; Redecker & Punie, 2013). To prepare for this future, distance education leaders need to invest in technological infrastructure, systems, and structures that are needed to support the use of technologies to enable flexible, open, and personalized ways of learning. This can be achieved if distance education leaders commit to building their own resilience by learning from the past and reflect on the present in order to catapult to the future they want. Resilience is an ongoing learning and developmental experience that provides leaders with competencies they need to lead with greater confidence while gradually preparing themselves and their subordinates for future (Reed & Reedman, 2020). Even though leaders' specific roles are clearly defined, "the effective application of management tasks is strongly dependent on leadership self-efficacy, personal attribute, shared trust, common goals and perceiving the change and crisis as opportunity" (Dumulescu & Muţiu, 2021, p.8).

Conclusion

The discussion in this chapter illustrated that adaptive challenges facing distance education will demand resiliency, because setbacks and mistakes will be made; yet, there is a need to move forward (Hall & Winn, 2011; Mrig & Sanaghan, 2017; Reed, 2018). Despite the social and economic changes that are taking place in African countries, distance education leaders "must develop a deeper foundation of balance to manage on-going and future challenges" (Portugal, 2006, p.8). All these requires resilient leaders who are not held back by the weights of the past, but who are willing to learn from the past, strengthen what is working, and move forward to the desired future. What was clear from this chapter was that there is a need for leadership programs that will equip academic leaders with skills and knowledge on how to navigate jerky and shifting environments in distance learning. "Leading wisely, involves a balance between personal philosophy, vision, pedagogical knowledge, and a willingness to transcend daily challenges and/or political struggles" (Portugal, 2006, p.8). The sustainability of distance education is dependent on resilient leaders who have the ability to learn and adapt to changes while responding to challenges by framing contextually responsive solutions for the sector (Hall & Winn, 2011).

References

Ali, M., Zhang, L., Shah, S. J., Khan, S., & Shah, A. M. (2020). Impact of humble leadership on project success: The mediating role of psychological empowerment and innovative work behaviour. *Leadership & Organization Development Journal, 41*(3), 349–367. https://doi.org/10.1108/LODJ-05-2019-0230.

Altbach, P. A, Reisberg, L., & Rumble, L. A. (2009). *Trends in global higher education: Tracking an academic revolution*. A report prepared for the UNESCO 2009 World Conference on Higher Education.

Ayee, J. R. A. (2014). Academic leadership in Africa. In J. R. A. Ayee & B. G. Jallow (Eds.), *Leadership in Postcolonial Africa*. New York: Palgrave Macmillan. https://doi.org/10.1057/9781137478122.

Beaudoin, M. (2003). Distance education leadership for the new century. *Online Journal of Distance Learning Administration, 6*(2). Retrieved from http://www.westga.edu/~distance/ojdla/summer62/beaudoin62.html.

Beaudoin, M. (2016). Issues in distance education: A primer for higher education decision makers. *New Directions for Higher Education, 173*, 9–19.

Bell, D. I. (2001, July). *Leading change: African conceptions of leadership and transformation in higher education in South Africa*. Paper presented at Higher Education Close Up 2 conference, Lancaster University.

Bell, W. (1997). *Foundations of futures studies*. New Brunswick, NJ: Transaction.

Council on Higher Education (CHE). (2016). *Reflections of South African university leaders, 1981 to 2014*. Cape Town: African Minds & Council on Higher Education.

Couto, D. L. (2002). How resilience works. *Harvard Business Review, 80*, 46–55.

Dumulescu, D., & Muţiu, A. I. (2021). Academic leadership in the time of Covid-19-experiences and perspectives. *Frontiers in Psychology, 12*, 648344. https://doi.org/10.3389/fpsyg.2021.648344.

Facer, K., & Sandford, R. (2010). The next 25 years?: Future scenarios and future directions for education and technology. *Journal of Computer Assisted Learning, 26*(1), 74–93. https://doi.org/10.1111/J.1365-2729.2009.00337.X.

Fergnani, A. (2020). Futures Triangle 2.0: Integrating the futures triangle with scenario planning. *Foresight, 22*(2), 178–188. https://doi.org/10.1108/FS-10-2019-0092.

Frantz, J., Lawack, V., & Rhoda, A. (2020). Reflections of academic and professional leaders on leadership in a higher education institution. *SA Journal of Human Resource Management/SA Tydskrif vir Menslikehulpbronbestuur, 18*(0), a1373. https://doi.org/10.4102/sajhrm.v18i0.1373.

Ghaffari, S., Shah, I. M., Burgoyne, J., & Aziz, S. S. (2017). The influence of motivation on job performance: A case study at Universiti Teknologi Malaysia. *Australian Journal of Basic & Applied Science, 11*(6).

Hall, R., & Winn, J. (2011). Questioning technology in the development of a resilient higher education. *E–Learning and Digital Media, 8*(4). Microsoft Word – 5 Hall ELEA 8_4.doc (lincoln.ac.uk). https://doi.org/10.2304/elea.2011.8.4.343.

Inayatullah, S. (2008). Six pillars: Futures thinking for transforming. *Foresight, 10*(1), 4–28.
Inayatullah, S. (2020). Co-creating educational futures: Contradictions between the emerging future and the walled past. *Education Research and Foresight Working Paper 27*. Paris, UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000373581/PDF/373581eng.pdf.multi.
Lawton-Misra, N., & Pretorius, T. (2021). Leading with heart: Academic leadership during the Covid-19 crisis. *South Africa Journal of Psychology, 51*(2), 205–214. https://doi.org/10.1177/0081246321992979.
Makoe, M. (2018). Using future research methods in analysing policies relating to open distance education in Africa. *Open Praxis, 10*(1), 5–15. https://doi.org/10.5944/openpraxis.10.1.581.
Manson, A. (2016). The University of South Africa (Unisa) 1918–1948: the first transition, from colonial to segregationist institution. *African Historical Review, 48*(1), 1–20. https://doi.org/10.1080/17532523.2016.1230308.
Marcus, S. (2004). Leadership in distance education: Is it a unique type of leadership: A literature review. *Online Journal of Distance Learning Administration*, (1) https://www.learntechlib.org/p/193181/.
Mrig, A., & Sanaghan, P. (2017). The skills future higher-ed leaders need to succeed. *Academic Impressions*. https://www.academicimpressions.com/PDF/future-skillset.pdf.
Mukama, E. (2016). *From policies to implementation of open distance learning in Rwanda: A genealogical and governmentality analysis of what and how*. In the Pan Commonwealth Forum PCF8, Commonwealth of Learning. Retrieved from http://oasis.col.org/handle/11599/2555.
Muňoz, J. C., Redecker, C., Vuorikari, R., & Punie, Y. (2013). Open Education 2030: Planning the future of adult learning in Europe. *Open Learning, 28*(3), 171–186.
Nworie, J. (2012). Applying leadership theories to distance education leadership. *Online Journal of Distance Learning Administration, 15*(4).
Odhiambo, G. (2014). The challenges and future of public higher education leadership in Kenya. *Journal of Higher Education Policy and Management, 36*(2), 183–195. https://doi.org/10.1080/1360080X.2014.884676.
OECD. (2019). *Education at a Glance 2019: OECD indicators*. OECD Publishing. https://doi.org/10.1787/f8d7880d-en.
OECD. (2020). *Back to the future of education: Four OECD scenarios for schooling*. Educational Research and Innovation, OECD Publishing. https://doi.org/10.1787/178ef527-en.
Pham, T. H. T. (2006). The development of the higher education sector of Vietnam within the globalization discourse: Using futures methodologies. *Journal of Futures Studies, 11*(2), 35–60.
Pityana, N. (2017). Leadership and ethics in higher education: Some perspectives from experience. In D. Singh & C. Stückelberger (Eds.), *Ethics in higher education values-driven leaders for the future* (pp. 133–161). Geneva: Globethics.net.
Portugal, L. (2006). Emerging leadership roles in distance education: Current state of affairs and forecasting future trends. *Academic Leadership, 4*(3) https://scholars.fhsu.edu/alj/vol4/iss3/3.
Ramdass, K. (2015). Leadership challenges: A higher education perspective, Portland International Conference on Management of Engineering and Technology (PICMET), 2015, pp. 1112–1120. https://doi.org/10.1109/PICMET.2015.7273044.
Ramsden, P. (1998). Managing the effective university. *Higher Education Research and Development, 17*, 347–370. https://doi.org/10.1080/0729436980170307.
Reddy, T. (2004). *Higher education and social transformation: South Africa case study, report.* Council on Higher Education, Microsoft Word - HEandSocialTransformationReportFinal-25Feb2004.doc (uct.ac.za). https://open.uct.ac.za/handle/11427/22067.
Redecker, C., & Punie, Y. (2013). The future of learning 2025: Developing a vision for change. *Future Learning*. https://doi.org/10.7564/13-FULE12.
Reed, D. E. (2018). Resilient educational leaders in turbulent times: Applying the leader resilience profile to assess resiliency in relationship to gender and age. *Perifiria, 10*(2), 119–134.
Reed, D. E., & Reedman, A. E. (2020). Reactivity and adaptability: Applying gender and age assessment to the leader resilience profile. *Frontiers in Education, 5*, 574079. https://doi.org/10.3389/feduc.2020.574079.

Roser, M. (2020). *Future population growth*. OurWorldInData.org. Retrieved from https://ourworldindata.org/futurepopulation-growth.
Sanaghan, P. (2016). *Building leadership resilience in higher education. Academic Impressions: Denver*. (99+) (DOC) Building Leadership resilience | patrick Sanaghan - Academia.edu. https://www.academicimpressions.com/sites/default/files/0116-leadershipresilience-md.pdf.
Sawyerr, A. (2004). *Challenges facing African universities: Selected issues*. Accra: Association of African Universities.
Shipley, R., & Newkirk, R. (1999). Vision and visioning in planning: What do these terms really mean? *Environment and Planning*. https://doi.org/10.1068/b260573.
Tait, A. (2008). What are open universities for? *Open Learning: The Journal of Open, Distance and e-Learning, 23*(2), 85–93. https://doi.org/10.1080/02680510802051871.
Teferra, D., & Altbach, P. G. (2004). African higher education: Challenges for the 21st century. *Higher Education, 47*(1), 21–50. https://doi.org/10.1023/B:HIGH.0000009822.49980.30.
Todoruţ, A. V. (2017, November). Approaches of leadership in higher education. *The Role of Management in the Economic Paradigm of the XXIst Century,* Proceedings of the 11th International Management Conference, Bucharest, pp. 823–828.
UNESCO. (2021). *Covid-19 Education response: Snapshot of educational challenges and opportunities for recovery in Africa.* Paris: UNESCO. Available at: A snapshot of educational challenges and opportunities for recovery in Africa – UNESCO Digital Library. https://fr.unesco.org/sites/default/files/20210527a_snapshot.pdf.
Varghese, N. V. (2013). Governance reforms in African higher education: The missing link. *Chronicle of African Higher Education, 3*, 1–19.
Viennet, R., & Pont, B. (2017). *Education policy implementation: A literature review and proposed framework,* Working Paper No. 162, Paris, OECD. https://doi.org/10.1787/19939019.
Wangenge-Ouma, G., & Kupe, T. (2020). *Uncertain times: Re-imagining universities for new, sustainable futures*. Presentation at a Special Meeting of the Universities South Africa (USAf) Board on 24 July 2020. Uncertain-Times-Paper.pdf (usaf.ac.za). https://www.usaf.ac.za/wp-content/uploads/2020/09/Uncertain-Times-Paper.pdf.
Weller, M., & Anderson, T. (2013). Digital resilience in higher education. *European Journal of Open, Distance and e-Learning, 16*(1), 53–66. ISSN 1027-5207.
Woldegiorgis, E. T., & Doevenspeck, M. (2013). The changing role of higher education in Africa: A historical reflection. *Higher Education Studies, 3*(6), 35–45.
World Economic Forum (WEF). (2017). *The future of jobs and skills in Africa*. Retrieved from http://www3.weforum.org/docs/WEF_EGW_FOJ_Africa.pd.

ODDE and Debts

34

Taking Account of Macroeconomics

Thomas Hülsmann

Contents

Abstract

Recent monetary policies of quantitative easing have produced a cognitive dissonance with the previous "there is no money" mantra and invite us to revisit our understanding of the costs and economics of distance education (DE). It turns out that study of the costs of DE was narrowly rooted in neoclassical microeconomics. Consequently, DE has focused on driving down costs and devolving costs to the students, thereby contributing to increasing student debt. The chapter summarizes the efficiency gains of traditional DE and their changes due to the emerging affordances of information and communication technologies (ICT). The chapter also notes changes in the "macroeconomic weather conditions," which have led to regarding education less as means to raise productivity than as a center for profit itself. As a consequence, cost efficiency gains have often not

T. Hülsmann (✉)
University of Oldenburg, Oldenburg, Germany
e-mail: thomas.huelsmann@uni-oldenburg.de

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_31

been handed to the learner, leading to rises in tuition fees and, consequently, student debt.

The second half of the chapter introduces modern money theory (MMT), a different economic paradigm, which suggests that monetary sovereign countries have enough policy space not to focus narrowly on driving down costs. It notably suggests that devolving costs to students turns out, from the MMT perspective, to be misguided. It identifies a policy space which can be used to build in additional resilience, especially required in times of crises.

Keywords

Human capital theory · Costs of distance education · Economics of distance education · Online learning · Modern monetary theory (MMT) · Efficiency · Resilience

Introduction: Crises, Money, and the State

The last decades have been characterized as a time of global crises. There was the Global Financial Crisis (GFC) 2008, and there is at present the Covid-19 pandemic and, in the offing for quite a while, the climate crisis.

The GFC was a crisis emerging from internal contradictions of neoliberalism (which is considered here as a political translation of neoclassical economics), while Covid-19 is generally seen as an external shock, though, obviously through urbanization and globalization, the virus found it easy to spread. The climate crisis, announced already in the 1970s (Club of Rome), increasingly enters the headlines.

All three crises have in common that they force one to rethink the understanding of money and the state. Especially, after decades of austerity politics (accompanied by the mantra "there is no money"), the experience that, in response to the GFC, it was possible to flood the global economy with large sums of money created a widespread cognitive dissonance ("where does all this money suddenly come from?"). Moreover, while the role of the state had been denigrated for a long time as inefficient, the US government (the Treasury and the Federal Reserve Board, FED) had to bail out the banks (though not the people) in order to stabilize the system (Adam Tooze, 2018).

Similar things have happened during the Covid-19 crisis. Governments began pumping large sums into the economy in ways inconsistent with the neoclassical "no-money" mantra. The measures were regarded as temporarily suspending the policies of "solid finance" (keeping government expenditure within the limits of tax income and bond sales). It has already been announced by most governments that all debts will have to be paid back once the Covid-19 pandemic is over. The coming climate crisis, as already understood, will again require governments to find huge sums of money in order to restructure the economy. The climate crisis combines internal and external contradictions and imposes objectives which are unlikely to be met by leaving investment decisions to profitability considerations alone.

These three crises require us to reconfigure the usual understanding of money and the state. Modern Money Theory (MMT) claims to have a different and empirically more grounded concept of money and the state, which allows for identifying a policy space which is far wider than neoclassical economics allows for, and which could accommodate the pressing policy agendas related to these crises.

What has all this to do with distance education (DE)? A short summary of the history of DE from a costing perspective forms the basis for the argument that much of the understanding of the costs and economics of DE has been shaped by (neoclassical) microeconomics with a focus on driving down unit costs and, still consistent with neoclassical policy recommendations, devolving the costs to the learners.

MMT suggests that the microeconomic focus is too narrow, and that embedding the costs and economics of DE and online learning in a macroeconomic context would lead to a more realistic analysis and, consequently, better policy responses. In particular, it advances the notion that devolving cost to the learners, in MMT terms "users of the currency," is misguided.

A Brief History of DE from a Costing Perspective

The founding of the Open University of the United Kingdom (OUUK) in 1969 will be taken as a point of departure for the purposes of this discussion, although DE is much older than that. DE at the time was intended to widen access to education, much in line with the Universal Declaration of Human Rights (1948), which included a right to education. The Organization of Economic Cooperation and Development (OECD) considered education as an important investment to sustain economic and technological superiority. It was observed that the socialist rival already successfully tapped the cognitive resources of the working class as well as those of women. The Sputnik shock of 1957, when the Soviet Union launched the world's first artificial satellite, was taken in the West as an alert to reform education in order to widen participation beyond its traditional audience (Papadopoulos, 1994). For the developing world, Coombs called for reforming education to make it more efficient by introducing more division of labor (Coombs, 1985). The health services had successfully started on this path, and the author suggested that education should follow.

In this summarized walk through the history of DE, three phases will be distinguished: Traditional DE, online DE, and ODDE (open, distance, and digital education). The headings are not meant to signify the substitution of one phase by the next but rather are meant to emphasize newly emerging aspects.

Traditional Distance Education

Coombs' propositions, cited above, were echoed in Peters' theorization of DE as the "most industrial form of education" (Peters, 1983). Peters was clear that to use technology and division of labor renders education more cost-efficient and, therefore, more accessible.

Traditional DE will be used here as backdrop against which later changes in the cost structure of DE are made visible. The reference frame for analyzing the costs of DE is the cost of traditional campus-based education.

With its lecture halls, libraries, sport facilities, student accommodation, catering, and similar amenities, conventional campus-based higher education (HE) is clearly quite costly, such that it can be taken for granted that the total costs of campus-based education are higher than the total cost of DE (for a given number of students). More interesting is that, even if you strip down total costs to those elements directly impinging on teaching and learning, the costs of DE still can be expected to undercut those of conventional education (Fig. 1).

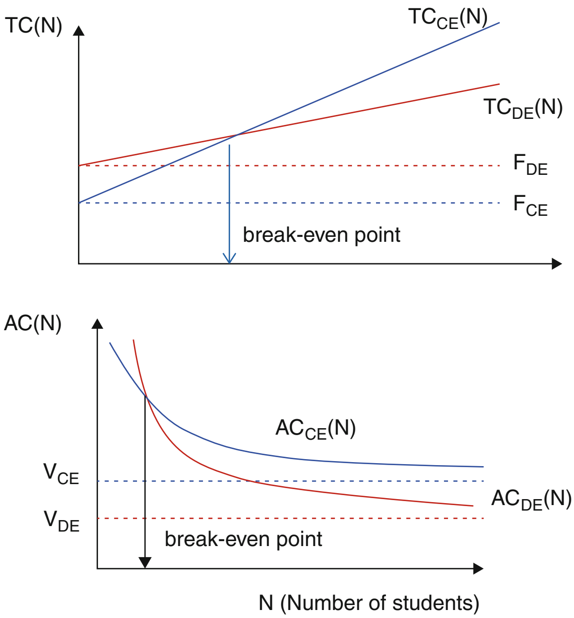
The obvious structural reasons for the cost efficiency of DE can be identified by revisiting the basic cost equations:

(i) $TC(N) = F + V{*}N$ and
(ii) $AC(N) = F/N + V$

(TC stands for Total cost, F for Fixed cost, V*N for Variable cost, and N for the Number of students. AC for Average cost per student. For N increasing, AC (N) approaches V, the variable cost per student or unit cost.)

Hence, as in many industrial processes, cost efficiency is achieved by a combination of capital for labor substitution and labor for labor substitution (meaning a

Fig. 1 Total and average cost equations



substitution of more costly by less costly labor) to capture scale economies (SE). How is it possible for DE to achieve this?

DE shifts costs to course development (a fixed cost). The development of DE courses often involves not only the subject matter expert, but also instructional designers and media experts (Koumi, 2006). Course development includes the tests/exam questions as well as evaluation rubrics. Even if, in order to ensure the quality of the course material, course development costs in DE may be higher than in CE (conventional education), total costs of DE rise slower than total costs of CE, such that, for a sufficiently high number of students (N), it holds that $TC_{DE}(N) < TC_{CE}(N)$ (Fig. 1, upper part). Recall, that V (the variable cost per student) determines the inclination of the graph of the (linear) total cost equations. Hence, in order to be cost efficient, it is important for DE that $V_{DE} < V_{CE}$. To keep V low, DE reduces contact with the teacher and/or "unbundles" the teacher role into various functions, which then can be remunerated differently. Teaching in traditional DE was identified with course development (Mills, 2003, p. 104), which is a fixed cost (contributing to F) and not part of V. Contributing to V is course presentation, as well as student support and the marking of assessments. Hence, it is possible to keep V low by using tutors or adjunct lecturers as compared to professors of subject matter experts. Not only are they remunerated at lower rates, but also often they are on shorter-term contracts and paid per task. In Fig. 1 (lower part), one can observe that the average costs asymptotically fall toward V and that, if $V_{DE} < V_{CE}$ for N sufficiently large, $AC_{DE} < AC_{CE}$.

Two further insights present themselves: first, that AC cannot fall below V (even if you multiply student intake for the course); second, scale economies (SE) do erode, and eventually quite quickly. Planners should not be misguided by the promise of scale economies. Daniel is right that DE can widen access while, at the same time, bring down costs, thus "breaking the iron triangle of cost, access and quality" (Daniel et al., 2009). However, the Daniel argument comes with a sleight of hand: While average costs fall, total costs rise and possibly beyond what the institution can afford (Avoiding the income trap, Butcher, 2004, January, p. 20 ff).

While there are structural reasons for expecting DE to be more cost efficient in terms of cost per student, the same level of cost advantage does often not carry through to comparisons in the cost per graduate (Rumble, 2014). This is due to the often very high dropout rates in DE:

$$\text{Cost per graduate} = \frac{\text{cost per student}}{100\% - \text{wastage}}$$

Hence, the cost advantage of DE shrinks due to the often-higher dropout (wastage) rates in DE. The cost efficiency of DE (cost per student) is often so much lower (i.e., "better") that it can accommodate a considerable level of dropout, before its cost effectiveness falls below that of its conventional competitor (Raza, 2008, pp. 497–498).

While the higher dropout rate in DE could be brushed aside by pointing at the different characteristics of the DE audience, another criticism of DE weighed heavier: the lack of interaction between the student and teacher in DE. Educators quite often see personal interaction as closely linked to the quality and effectiveness of teaching and learning. However, somewhat surprisingly, distance educators also claim interaction for DE. For example, Holmberg argued that, by building some instructional design features into the course material (such as in-text questions and in-text activities) and adopting a more empathetic conversational style in course presentation, the course material itself could be designed as guided didactic conversation, which can trigger an inner monologue which he referred to as "simulated communication" (Holmberg, 1983, 2008). Moore (arguing along similar lines) distinguished three main forms of interaction in DE (Moore, 1989): student-content interaction (SCI), student-teacher interaction (STI), and student-student interaction (SSI). Since not all distance educators found Holmberg's guided didactic conversation a convincing substitute for student-teacher interaction and interaction among students (Rumble, 2001, p. 3), traditional DE usually included opportunities for face-to-face meetings in evening classes or weekend seminars. Paradoxically, students typically wanted it to be available more than they actually made use of it. It certainly was a factor to drive up the cost of DE.

Online Distance Education

The development of information and communication technologies (ICT) brought new affordances for DE impinging on all three forms of interaction. Hülsmann (building on Rumble 2004) referred to features following from the information-processing aspects of ICT as type-i affordances and to features following from the communication-enabling aspects of ICT as type-c affordances (Hülsmann, 2014, June, 24, p. 244). Type-i affordances include automated responses or simulations, including the learning objects (LO) and, more recently, features based on artificial intelligence (AI) and machine learning, which are applied in learning analytics (LA). All these features can be used to enhance SCI, far beyond the early design features of in-text questions and in-text activities. While much of this (e.g., LA) allowed developing a more precise learner profile, enabling institutions to better support students, it also allowed the close surveillance of students and staff with concomitant ethical issues (Slade & Prinsloo, 2013).

Type-c affordances for the first time in the history of education allowed responsive interaction at a distance, both between teacher and students (STI), and among students (SSI), inaugurating a new paradigm of teaching at a distance (Garrison & Anderson, 1999). This allowed keeping the teaching/learning experience closer to the "normal" experience in schools or universities, since the notion of class and the teacher were re-introduced into DE (Bernath & Rubin, 1998; Hiltz, 1995). The changes were also welcomed by many distance educators, since the previous lack of responsive interaction was perceived as a major educational handicap. However, it soon became apparent that the advantage came with eroding DE's potential for scale economics (SE), which is a major selling point for DE. One can see this by adapting the cost equation to the situation of online learning (Fig. 2):

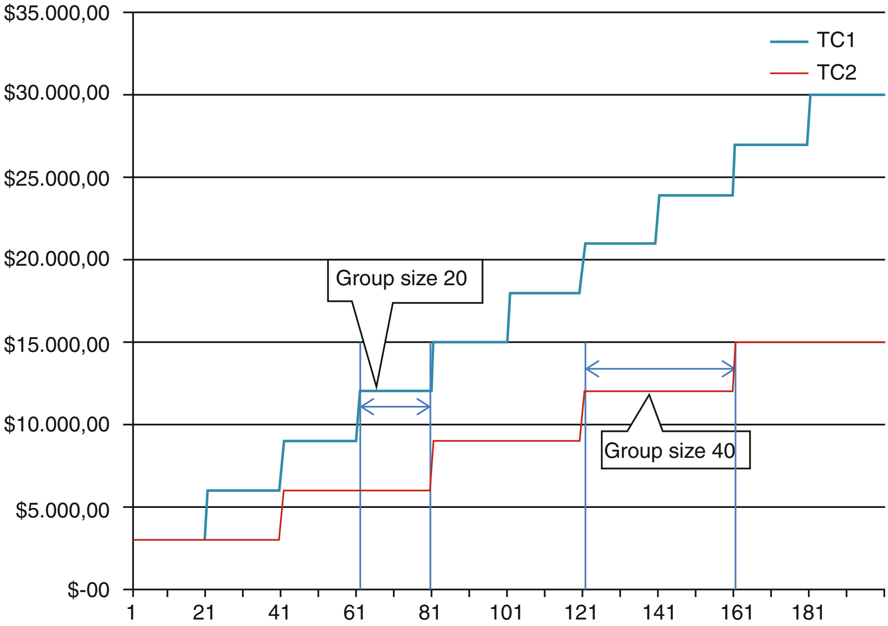


Fig. 2 Total costs in online education. (Note: Introducing the classroom changes TC into a step function. The larger the class size, the lower the rate of increase in total costs)

TC(N) = F + [N/G]*SV + V*N where G indicates group or class size and SV the semivariable costs, incurred when an additional class has to be opened.

After a regrouping of terms:

$$\mathrm{TC(N)} = \mathrm{F} + [\mathrm{SV/G} + \mathrm{V}] * \mathrm{N}$$

Since SV/G $>$ 0, it is obvious that online DE raises unit costs:

$$\mathrm{AC(N)} = \mathrm{F/N} + \mathrm{V}^0$$

where $\mathrm{V}^0 = \mathrm{SV/G} + \mathrm{V}$.

Since $\mathrm{V}^0 > \mathrm{V}$, the online form of DE shifts the break-even point further to the right (i.e., you need, other things being equal, more students to break even) (Thomas Hülsmann, 2016, p. 48).

The lower the cost of the teacher (SV) and the larger the acceptable class size (G), the higher the potential for scale economies. The in-built contradiction of pursuing, on the one hand, the aim of bringing down costs through economies of scale, while on the other hand trying to achieve effectiveness (quality) through improved responsive interaction, was captured in the incompatibility theorem: More scale economies (SE) require restraint in student-teacher interaction (STI) and emphasizing STI erodes SE (Hülsmann, 2014, June, 24).

The realization that online learning with higher levels of STI erodes SE cooled down the initial enthusiasm of the early promoters of a more responsive DE. Anderson had welcomed the new affordances of interaction in the paper on "big and little distance education" (Garrison & Anderson, 1999), but soon adjusted his position in "Getting the mix right" (Anderson, 2003) and, especially, in "Disruptive pedagogies" (Anderson & McGreal, 2012).

Two other findings have further influenced the reassessment of the importance of interaction (and especially STI). The first was the research by Bernard et al., who investigated the relative effectiveness of different forms of interaction (Bernard et al., 2009). Surprisingly, it turned out that among the three interaction formats, SCI was rated first and STI last. This finding was a boon for the proponents of big distance education. Daniel and his team hence were quick to draw the obvious conclusion:

> Some important research by Robert Bernard . . . , explodes the myth about the importance of face-to-face support. They carried out a meta-analysis of hundreds of studies in which distance-education students were treated in different ways. They distinguished three types of interaction: student with content; student with student; and student with teacher. They then analyzed all the studies to find which type of interaction made the greatest difference to student performance when it was increased. The results showed clearly that increasing student–content interaction had much the greatest effect, with student–student interaction coming next and student–teacher interaction last. (Daniel et al., 2009, p. 34)

The second major finding was the Interaction Equivalency Theorem (IET), proposed by Anderson and later by Miyazoe and Anderson (Terry Anderson, 2003; Miyazoe & Anderson, 2010, 2012). The IET states:

> Deep and meaningful formal learning is supported as long as one of the three forms of interaction (student–teacher; student–student; student–content) is at a high level. The other two may be offered at minimal levels, or even eliminated, without degrading the educational experience.
>
> High levels of more than one of these three modes will likely provide a more satisfying educational experience, though these experiences may not be as cost or time effective as less interactive learning sequences. (Anderson, 2003, p. 4)

The gist of this theorem resonates with the study mentioned earlier (Bernard et al., 2009). It allows the interpretation that all three forms of interaction can be considered equivalent, and that, to achieve deep learning, only one of the interaction formats needs to be developed at a high level. If all the interaction formats are equivalent, but have very different cost implications, the obvious conclusion is to go for the least costly option. (For the spectrum of teaching options and their respective cost structures, see Fig. 3.) It is quite convenient to find what is educationally the best and turns out to be the cheapest option. *Honi soit qui mal y pense.*

Within DE, discussions such as developing the concept of a community of inquiry (CoI) (Arbaugh et al., 2008)) dominated the field and usually proved more innovative than most studies on costs.

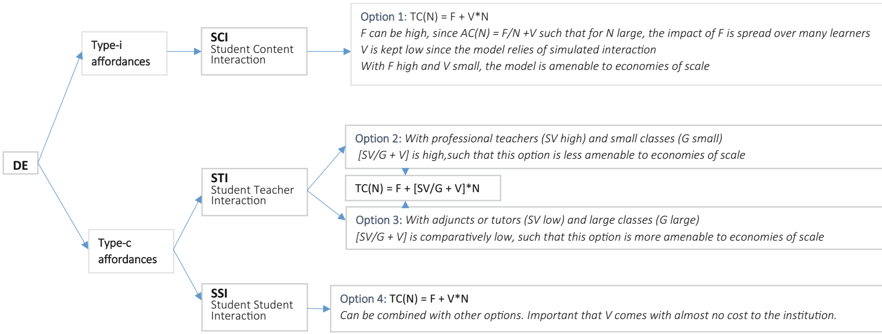


Fig. 3 Spectrum of options

The new affordances of ICT created a sort of identity crisis in DE (Guri-Rosenblit, 2008) as indicated by the plethora of new terms and acronyms, such as online learning, e-learning, virtual classrooms or virtual seminars, technology-enhanced learning (TEL), and, more recently, open, distance, and digital education (ODDE).

Open, Distance, and Digital Education (ODDE)

The term ODDE is used here, not to indicate that a new form of DE has taken over from online DE. It is meant to highlight the implications of the digital aspect beyond what was emphasized for online DE. Online DE had inaugurated a new DE teaching option, which reintroduced the use of the class due to the type-c affordances of ICT to sustain responsive interaction at a distance, especially between student and teacher (STI) and among students (SSI). This led to raising the V component in the total cost equation, since time spent in personalized teaching and supporting students is possibly the major factor contributing to V. Increasing V, it was argued, decreases the potential for scale economies (Fig. 3).

STI is, however, not the only factor contributing to V. The other factor is the cost of replication and distribution (RD) of course material. In traditional DE institutions, which often still operate using print material and still distribute it via the postal services, RD remains a significant cost factor. Once the teaching material is digitally captured and the institution is linked to the Internet, these costs fall to close to zero.

The realization that digitally captured knowledge can be made available to all with access to the Internet at minimal costs has huge consequences. It challenges business models in publishing (Open publishing) (Anderson, 2013; Willinsky, 2006) and inaugurated the open educational resources (OER) movement, which dates back to the 2001 MIT publicity coup (MIT OpenCourseWare) to open its archives to the world (at least as far as the world has access to the Internet) (Butcher, 2011).

The step from OERs to massive open online classes (MOOCs) is small. Once ivy-league institutions realized the wealth of the already digitally captured educational resources in their archives, the question arose, why not make them available as courses? The fixed costs of development are zero and, as long as no personalized learner support is promised, V also is zero (V is composed of an STI and an RD factor; the first was zero by design, the second zero due to the fact that RD of digitally captured knowledge over the Internet is zero). Hence:

$$TC_{MOOC}(N) = F_{MOOC} + V_{MOOC}{}^{*}\ N = 0$$

Obviously, this is a somewhat stylized version, since moving a course into the international limelight was, at least in the early days, a publicity coup. Pulling a course out of the archive and turning it into an MOOC required more than "a bit scrubbing" (Weller, 2014, p. 79). Hollands and Tirthali collected data about the costs of developing MOOCs varying between $ 30,000 and $ 300,000 (Hollands & Tirthali, 2014). For instance, to compensate for the lack of personalized support, the inserted quizzes (a more responsive version of the old in-text questions) are instantly evaluated, the data being fed back to the design team to ensure improvements in the next course presentation (Koller, 2012).

If MOOCs can be regarded as "traditional DE reloaded for the digital age" (radicalized in increasing N and reducing V), it comes as no surprise to find it being beset with the same problems (also in a more extreme manner): Completion rates in MOOCs are low, according to some authors below 13% (Ahrache et al., 2013). It turns out that MOOCs require an already seasoned, autonomous, and resilient learner, perhaps even more so than does traditional DE.

The concept that MOOCs were meant to be open (i.e., free to the learner) attracted considerable public attention. In the wake of the GFC, when Higher Education (HE) funding had been cut back at a time when HE was becoming increasingly necessary for a better job, tuition (in the USA and the UK) soared way beyond home prices and the consumer price index (Thomas Hülsmann, 2016, p. 22). Education appeared to be "broken," unable to serve as a vehicle for upward mobility. In this situation, MOOCs emerged with the promise to rebuild HE in a very American way: through the combined forces of technology and venture capital (Bates, 2015, p. 176). However, the very openness presented a problem for this combination. Being open, MOOCs did not, at least in the early days, produce any substantial streams of revenue.

From HCT1 to HCT2

This gives the opportunity to comment on some changes in the "macroeconomic weather conditions." Early human capital theory (here labeled HCT1, to distinguish it from a later mutation) was based on the perception that education would raise general productivity and should be seen as an investment. The profitability crisis of the 1970s, however, inaugurated the neoliberal project in major capitalist countries (Todaro & Smith, 2003). Margaret Thatcher famously declared that "there is no society but only individuals" and that "all the money the government can dispose of is taxpayers' money," which, everybody knew, was scarce. Consequently, selling off public monopolies such as roads and other infrastructure was turned into opportunities for rent extraction. “This turns the economy into a set of tollbooths as user-fees raised on labor, industry and other non-financial ‘real’ activity” (Hudson, 2012). The user of the highway pays a fee for using it, the ill have to pay for their treatment, and the students for their education. Since social surveys indicated that the educated enjoy higher lifetime earnings than the less educated, students can be expected to take out loans for their education (Hülsmann, 2011; Spraul, 2006), a development here referred to as HCT2. The perception of HCT in education had changed: While earlier it had been seen mainly about enhancing societal productivity (by reducing, for instance, overhead costs coming with training), the changed perception now regarded education as a center of profit itself.

In education, this shift led to various attempts to participate in the education market. An early attempt was to open for profit universities. This proved not to be too successful (Hanna, 2003, p. 69). More promising were the inroads in the HE market due to the proliferation of ICT in education. Universities were among the first to be connected to the Internet. They found the emerging web-based learning management systems (LMS) useful, also on-campus.

When, in the wake of the GFC, much of the HE funding was slashed, universities looked for diversifying their income streams. Educational technology (EdTech) providers already played a prominent role in various services. It seemed a win-win situation for HE and EdTech providers to join forces. In some cases, the entire online management programs (OMP) were outsourced to EdTech companies, which allowed increasing student intake. The added revenue (fees) were split between the university and the OMP provider. At times, the bigger share (60%) goes to the EdTech provider, which still helps the HE institution since it gets 40% instead of, as before, nothing (Carey, 2019, February 6).

After this short *tour d’horizon* of DE costs structures, the potential of DE in terms of cost-efficiency should be plausible. However, the rising tuition fees in many countries suggest that, in spite of bringing the unit costs down, the cost-efficiency gains were not handed down to the students. Instead, devolving costs to the students compensating for reduced state funding, often increased tuition, and in the wake, student debts.

Modern Money Theory (MMT)

Earlier in this chapter, it was argued that the present three crises require reconsidering the understanding of money and state. In the next section, the history of DE with a focus on its economic aspects was revisited. It was shown that the costs and economics of DE had been framed by the neoclassical economic paradigm predicated on an implicit understanding of money and state. According to this paradigm, the only money the state disposes of is the scarce taxpayers’ money. In this frame, it seemed plausible to devolve educational cost to the students who, after all, are supposed to benefit from it in terms of higher lifetime earnings.

MMT has a different understanding of money and state. For MMT, any analysis that confines the costs and economics of DE to the perspective – anticipating MMT terminology – of the users of the currency is insufficient. Education, like health and infrastructure, has traditionally been under the purview of government, which, in MMT terms, is the issuer of the currency. Since money in the chartalist MMT tradition is a creature of law and, by extension, the state (Knapp, 1905), money is neither scarce, nor is it necessarily taxpayers' money. Therefore, MMT would arrive at different consequences for the costs and economics of DE by (i) exposing its traditional microeconomic focus as too narrow and (ii) devolving educational costs to the learner as misguided.

MMT Basics

Inspecting the understanding of MMT, it shows three important features:

1. Money is a creation of law (and by extension of the state).
2. The acceptance of money is driven by taxes.
3. Money can be understood as tax receipt (tax credit).

The first point situates MMT in the chartalist tradition. Chartalism sees money as a creature of law (Knapp, 1905). MMT starts with a distinction between the issuer and the users of the national currency (Mitchell et al., 2019). All citizens, all private sector institutions, and even local governments are users of the currency. The sole legal issuer of the currency is the government. MMT usually refers to the government (or "consolidated government") as the ministry of finance and the central bank together (in the USA, the Treasury and the FED).

In the chartalist tradition, money has no intrinsic value and is often referred to as fiat money. That distinguished it from an earlier metallist tradition, which saw money as being tied to gold or silver. Since the end of the gold standard (1971), the links to the metallist tradition were severed inaugurating the modern fiat money economy. The question, how governments were able to get an intrinsically valueless currency accepted, leads to point two of the list above: The acceptance is driven by taxation. The government holds two monopolies: the monopoly of power and the monopoly to issue the national currency. By imposing taxes payable in its own currency, the government creates a demand for its (intrinsically valueless) currency. For example, between 1755 and 1774 the state of Virginia issued its own currency. Having to pay taxes in Virginia, Pounds ($£_{VA}$) colonists were forced to offer part of their resources (most importantly labor) to earn the state's currency. Grubb reported that the tax money "redeemed" was literally burned (Grubb, 2015; Wray, 2019). Since all colonists had to get hold of the currency to pay their taxes, the intrinsically valueless $£_{VA}$ notes were accepted as general means of payment.

The (general) stylized story that MMT tells is that first the government agents (soldiers, police officers, judges, administrators, etc.) were paid in the government's currency. They would accept the government's currency, since they could buy anything with the government's money such as shoes and shirts and bread, because the shoemaker, the tailor, and the baker also urgently needed to get hold of the government's currency for paying their taxes. In this way, "taxes drive money" (Mitchell et al., 2019 p. 137) or, more precisely: Taxes drive the acceptance of the currency. Note that, by setting the salaries of its agents, the government defines the reference frame of labor costs. The salaries have to be sufficiently high for the government's agents to reproduce their labor power or, better, high enough to ensure their loyalty. Other salaries will eventually judder in place accordingly (Höfgen, 2020, p. 105). Beyond getting the government's currency accepted, there are further functions taxes can support: They can be a tool in demand management, they can be used to battle inequality, or to influence expenditure or behavioral decisions; financing the government's budget is not among them (Bell, 2000; Höfgen, 2020, p. 121; Ruml, 1946).

This brings us to point three. Since all citizens need to pay taxes, and one can pay taxes only in the government's currency, money can be seen as tax receipt or tax credit. Note the double inversion in which MMT differs from the mainstream view: First, in the mainstream account, the government needs the taxpayers' money to "finance" its budget, while for MMT, the citizens need the government's currency to pay their taxes. Since the government is the currency issuer (creator of fiat money), it makes no sense to assume that it is after the tax payers' money. There is obviously something else it wants: It wants some of the people's resources, most importantly their labor! To put it simply: The government creates fiat money (by issuing money icons, e.g., notes, or simply keying numbers in authorized spreadsheets); imposing taxes in that currency incentivizes a maze of economic activities (e.g., producing commodities, providing services), which in turn underpin the fiat money with value. Second, while in the mainstream, account taxing precedes (government) spending and even sets the limit for its budget, in MMT, spending has to precede taxing (Kelton, 2020). Moreover, since the government as currency issuer faces no inherent limit in creating fiat money, it follows what one may call the "main theorem of MMT": "A sovereign government does not face any financial constraints. It always can buy anything on offer in its own currency" (Mitchell et al., 2019 p. 13). Obviously, this does only apply for governments which did not tie their currency to another country's currency or a commodity (e.g., gold) or which are indebted in a foreign currency. Hence, there is a spectrum of sovereignty. The USA enjoys high monetary sovereignty, the UK, Australia also, while Zimbabwe has little monetary sovereignty. Countries of the European Monetary Union (EMU) are sitting somewhere in the middle since they use a currency not controlled by a national government.

The MMT main theorem is accompanied by a corollary: that even sovereign governments face real resource constraints, i.e., constraints in labor, natural resources, or knowledge resources. But: "Anything what we actually can do we can afford" (Tooze, 2021, p. 22, quoting Keynes' 1942 BBC Address). The limit is not: "Can we afford it?" The limit lies in the actually available real resources. Spending into an economy, where all resources are already activated, leads to inflation. Involuntary unemployment, however, is a clear indicator of unused capacity.

Two dangers are usually invoked: the mounting public debt and the (alleged) likelihood of inflation. Inflation describes the process when average prices rise beyond average wages. MMT rejects the monetarist claims that inflation is driven by the expansion of money supply (cf. "quantity theory of money") both on theoretical and empirical grounds. Instead, it sees a strong link between inflation and unit labor costs (Flassbeck et al., 2020, pp. 72, 94). Only increasing wages beyond the level of productivity increases under conditions of full employment leads to inflation. Central banks observing such developments usually can reduce demand from labor by increasing interest rates to manage inflation. The mounting of public debt leads us to the next section where sectoral analysis will throw a new light on what public debt means.

Sector Analysis and the Mechanics of Balance Sheets

The government issues fiat money and spends it into the economy. Hence, the money in the nongovernment sector increases while the money in the government sector decreases. However, "money flow" is a metaphor too close to the traditional understanding of money as a thing, which "changes hands" or flows from one bucket to another. It is more appropriate to conceive the monetary system as a set of related balance sheets, in which claims accumulated in one balance are exactly mirrored by liabilities in someone else's balance. In a closed economic system (and the world as a whole is a closed economic system), the net financial balance is at each point in time zero (so are the net financial liabilities) (Flassbeck et al., 2017, p. 4). It also shows that the world as a whole cannot "save" (acquire net financial assets) for the future: Wealth consists of net financial assets and tangible assets. Since the world's net financial assets are always zero, the wealth of the world consists of its tangible assets (its capital stock). This shows how misguided austerity policies are from a macroeconomic vantage point when it tries building financial wealth at the expense of the maintenance of the capital stock.

Godley's "one equation model of the world" (Kelton, 2019, p. 105) states:

$$\text{Government financial balance} + \text{Nongovernment financial balance} = \text{Zero}$$

This means that a deficit in the government's financial balance implies a surplus in the nongovernment sector's financial balance.

Usually economists partition an economy in three sectors, the public sector, the private sector, and the foreign sector. If one ignores for a moment the foreign sector (it may be marginal or balanced), Godley's equation would read:

$$\text{Government financial balance} + \text{Private sector financial balance} = \text{Zero}$$

This is equivalent to saying that the government's deficit is equal to a surplus, the private sector surplus. This is a major MMT punchline: "Their red ink is our black ink" (Kelton, 2020, p. 101 ff) (Fig. 4).

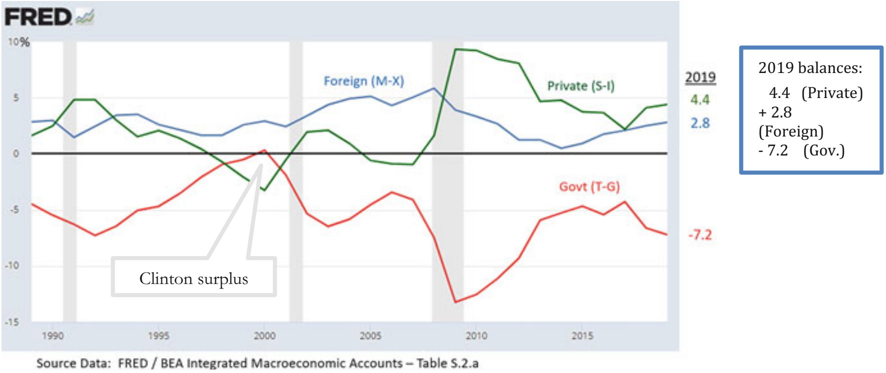


Fig. 4 Sectoral financial balances in US economy 1990–2017. (Note: The diagram illustrates how the **private sector financial balance** and the **government sector financial balance** mirror each other. By definition, the three balances must net to zero

During the Clinton administration (1993–2001), the government reduced the deficit (and even achieved a surplus). However, at the expense of a massive private sector deficit.)

Misled by the (wrong) analogy of the government's balance and a household budget, it is widely preferred to have a surplus not only in the private sector but also in the public sector. This is, in principle, possible (for some countries) if the foreign sector balance (import minus export) is negative, i.e., exports exceed imports. Germany is a point in case. However, sector analysis shows that this is not a generalizable option: A surplus country requires a debtor country since the accounting system matches each surplus with a deficit, each credit with a debt. It is not possible to wipe out all debts (liabilities) without wiping out all credits (claims) at their same time. (Note that, in a "normal" market economy, businesses borrow to invest and pay back the credits out of the profits.) Since meanwhile the business sector balance sheets (in the USA or Germany) also show surpluses, the governments have to pick up the debtor role.

Fiat Money

In a modern economy, we distinguish between two monetary circuits. The circuit of reserves connects the central bank with the commercial banks, while the circuit of money of account connects the commercial banks with their customers. Each bank has an account at the central bank, and each household or business has at least one account at a commercial bank.

The creation of fiat money is done on two levels: on the level of commercial banking through lending and on the government level through spending into the economy (deficit spending).

Until recently, commercial banks were seen as mere intermediaries, whose lending depended on what savers have deposited. Meanwhile, it is widely accepted that "loans create deposits" (McLeay et al., 2014; Werner, 2014). In the words of an economist of the European Central Bank (ECB): Money is created since the commercial bank pays with a claim against itself (liability). Such liabilities of commercial banks are counted as part of the money supply (Biswanger, 2012, p. 29). (If an apple farmer wants a credit, the bank simply keys a number into his account. The farmer, on the other hand, has to produce real apples and sell them to service the loan.) In reality, money creation is driven more by commercial lending than by central bank activities (Douglas & Raudla, 2020, p. 9). In principle, this creation of fiat money is a flexible way of providing the economy with the needed liquidity. If all works well, the money is used productively and incentivizes activities in the real economy rather than being used for speculation.

Money creation on the government level involves the central bank and the ministry of finance. MMT considers the central bank as being "owned" by the government and refers to the central bank and the ministry of finance as "consolidated government." If the government needs money to spend into the economy, it advises the central bank to credit the account the reserves needed. The central bank does so while entering the same amount as liability in its own account. Say, the government wants to construct a harbor. Then the ministry of finance convenes a consortium of companies to do so. It advises the central bank to create the reserves necessary to equip the banks representing the consortium with the reserves necessary to enable them to credit the companies with the necessary money of account. In the end, the government gets the harbor, the companies get their profits, and the workers get their salaries. There is nothing here which has to be paid back … unless (for questionable reasons) the government is not allowed to run a deficit. MMT considers this as self-imposed constraint.

Generally, this forces the governments to sell bonds to the banking sector. Due to the deficit (!), the banking sector can do that and, since it involves simply swapping the reserves the banks keep at their central bank accounts with bonds (i.e., interest-bearing reserves), is very interested to do that.

As long as money creation (by commercial banks or the central bank) incentivizes productive activities in the real economy to realize the government's democratic mandate, there is little danger of inflation. However, while governments can create money, they cannot control its use. Often it is not invested in the real economy but for the buyback of shares or in the FIRE sector (FIRE = Finance Insurance Real Estates) leading to a form of "nightmare MMT" where the expansion of the money supply is, via internal mechanisms of our economic arrangements, handed through to the billionaire class (Hudson et al., 2020b, April 10). To prevent that, monetary and fiscal policies have to be coordinated.

Normative Extensions

MMT refers to itself as a descriptive theory. It claims to provide a superior description of the mechanisms of the monetary system in the USA (and nations of similar monetary sovereignty) (S. T. Fullwiler, September 2010 (edited April 2011); E. Tymoigne, 2016; É. Tymoigne & Wray, 2013). This understanding provides MMT with a lens, which allows identifying additional policy space. Government spending is not constrained by tax revenues (or the selling of bonds), but by inflation signaling real resource constraints. This creates additional policy space. How this space is used poses normative decisions and cannot be deduced from the descriptive kernel of the theory.

MMT sees economics as "the study of creation and distribution of society's resources" (Mitchell et al., 2019 p. 7). It is not seen as a natural science or a form of applied mathematics, the logic of which renders the negotiation of societal goals irrelevant. MMT researchers therefore explore the viability of their normative preferences in the light of the MMT framework. The first issue is unemployment, which they proposed to address by a general Job Guarantee (JG). The idea here is simple: While at present the economy operates with a buffer stock of unemployed people, the JG proposes to operate with a buffer stock of employed people. MMT proposes a centrally funded but locally administered "public service employment" (PSE) (Randall Wray & Kelton, 2018; Tcherneva, 2018). Another issue is the Green New Deal (GND) which relates to the climate crisis (Nersisyan & Randall, 2019). In relation to education, the issue of student debt cancellation has been explored (Fullwiler et al., 2018, p. 50). It was found that student debt cancellation would be feasible and, instead of being an unsustainable burden, would act as a positive economic stimulus (since it would free income to spend back into the economy). The impact on inflation was found to be negligible (Fullwiler et al., 2018, p. 50).

Covid, Conclusions, and Caveats

Covid: This chapter is written under the conditions of covid-19. The pandemic led to major government interventions, some pertaining to the economy as a whole, others directly impacting education. Monetary sovereign governments were able to impose lockdowns, intentionally putting the economy in artificial coma, while keeping it on life support by launching massive stabilizing programs (Bibow, 2020).

With respect to education, the pandemic-imposed "social distancing" should have provided a through pass for "distance education." And in higher education, DE worked reasonably well; since universities were reasonably digitally connected, students usually owned the necessary mobile devices and were competent in operating them (Dolch et al., 2021). In schools, the pandemic-induced precipitated shift to DE (referred to as Emergency Remote Teaching (ERT) (Hodges et al., 2020)) worked less well. Due to the varying quality of the Internet infrastructure, basic preconditions for online teaching were not in place. Pupils did not own the necessary end devices, nor had they easy access to them. What they had varied according to the socioeconomic status of the family. Teachers have to deal with devices of varying quality, often lacking interoperability. Both problems show that ERT was facing problems beyond the reach of individual institutions.

Conclusion: The first part of this chapter sketched the costs and economics of DE. Costing is part of microeconomics. MMT, as a macroeconomic discipline, has little to add here. The insights in the cost-efficiency of DE remain valid. Financing education is part of macroeconomics. It is here that MMT makes a difference. When discussing financing, distance educators find it necessary to call for redistributive taxation (e.g., Rumble, 2007) or want to bring in private capital (e.g., Daniel et al., 2006). MMT tells us that monetary sovereign governments do not have to rely on taxes for financing their goals as long as it has the required resources. Money is debt and is created either as private or public debt. In the first case, it is created through commercial lending, in the second case as government "debt." The change of macro-economic weather conditions (cf. HCT 2) gave preference to private rather than public debt. Understanding sectoral analysis changes the perception of public debt (cf. Kelton's "their red ink is our black ink"). It is less intimidating than private debt, since the (consolidated) government is in a much different debtor position than an individual. Moreover, MMT identifies policy space, beyond tax income and below the inflation threshold, where some policy agenda can be realized: free (or subsidized) education, health, and infrastructure. It can be used for implementing the initial mission of DE: to widen access to education, including HE, beyond its traditional audience. In contrast, under the neoliberal preference for commercial lending (private debt), the real economy of production and consumption is surrounded by a tightening network of tollbooths where surplus is siphoned off in form of interests and rents to the FIRE sector. The dynamics of compound interest threatens "killing the host," i.e., the real economy (Hudson, 2015, 2017). Student debt is one of such tollbooths.

Hence, MMT shows that it is possible to widen access to education (including HE) without devolving the costs to students, nudging them toward debt peonage. This allows DE to relax its efficiency drive and build in more resilience in the its system, sadly missed in times of emergency.

Caveats. First, MMT is based on the notion of monetary sovereignty. Not only is there a spectrum, but also a hierarchy of monetary sovereignty with the US$ in a position of dominance. This limits what can be transferred. Nevertheless, understanding modern money systems takes some of the TINA sting out of the "there is no money" austerity mantra. Second, the MMT insistence that taxes only serve to ensure the currency acceptance underplays their importance in preventing state capture (e.g., regulatory capture). Quantitative Easing illustrates that spending money into the economy does not prevent it ending in the coffers of the 1% (Hudson et al., 2020a). Third, admittedly this presentation of MMT lives not up to the depth and the scope the discussion of the topic merits. For more, the reader is referred to ("Modern monetary theory and its critics," 2019, October, 11). The more mathematically inclined may download the (free) Minsky software and view S. Keen's tutorials on how to use it to explore some MMT aspects (https://www.youtube.com/watch?v=Dt4thL3eToU).

Cross-References

► From Correspondence Education to Online Distance Education
► Informal Learning in Digital Contexts

▶ Managing Innovation in Teaching in ODDE
▶ Pedagogical Paradigms in Open and Distance Education

References

Ahrache, S. I. E., Tabaa, Y., Badir, H., & Medouri, A. (2013). Massive open online courses: A new dawn for higher education? Paper presented at the International Conference on Engineering Education and Research 1 July–5 July Marrakesh.

Anderson, T. (2003). Getting the mix right again: An updated and theoretical rationale for interaction. *International Review of Research in Open and Distance Learning, 4*(2).

Anderson, T. (2013). Open access scholarly publications as OER. *International Review of Research in Open & Distance Learning, 14*(2), 81–95.

Anderson, T., & McGreal, R. (2012). Disruptive pedagogies and technologies in Universities. *Journal of Educational Technology & Society, 15*(4), 380–389.

Arbaugh, J. B., Cleveland-Innes, M., Diaz, S. R., Garrison, D. R., Ice, P., Richardson, J. C., & Swan, K. P. (2008). Developing a community of inquiry instrument: Testing a measure of the community of inquiry framework using a multi-institutional sample. *Internet and Higher Education, 11*(3–4), 133–136.

Bates, T. (2015). Teaching in a digital age: Guidlines for designing teaching and learning. Retrieved from http://opentextbc.ca/teachinginadigitalage/

Bell, S. A. (2000). Do taxes and bonds finance government spending? *Journal of economic issues, 34*(3), 603–620.

Bernard, R. M., Abrami, P. C., Borokhovski, E., Wade, C. A., Tamim, R. M., Surkes, M. A., & Bethel, E. C. (2009). A meta-analaysis of three types of interaction treatments in distance education. *Review of Educational Research, 79*, 1243–1288. https://doi.org/10.3102/0034654309333844.

Bernath, U., & Rubin, E. (1998). *A virtual seminar for international professional development in distance education*. Paper presented at the Universities in a Digital Era. Transformation, Innovation and Tradition. Roles and Perspectives of Open and Distance Learning. Proceedings of the seventh European Distance Education Network (EDEN) Conference, held at the University of Bologna, Italy, June 24–26, 1998, Budapest. http://www.c3l.uni-oldenburg.de/literat/eden2.htm

Bibow, J. (2020). *Amerika probt schon mal die Wiedereröffnung der Wirtschaft*. Makroskop.

Biswanger, M. (2012). *Sinnlose Wettbewerbe: Warum wir immer mehr Unsinn produzieren*. Freiburg i.B: Herder.

Butcher, N. (2004, January). *Costing distance education and open learning in Sub-Saharan Africa: Working group on distance education and open learning: A survey of policy and practice: FINAL REPORT*. Retrieved from http://www.col.org/SiteCollectionDocuments/04CostingDEinSSA.pdf

Butcher, N. (2011). OER Dossier: Open educational resources and higher education. Retrieved from http://www.col.org/SiteCollectionDocuments/OER_Open_Educational_Resources_and_Higher_Education.pdf

Carey, K. (2019, February 6). The Creeping Capitalist Takeover of Higher Education Just a few years ago, universities had a chance to make a quality education affordable for everyone. Here's the little-known and absolutely infuriating history of what they did instead. *Huffington Post*.

Coombs, P. H. (1985). *The world crisis in education: The view from the eighties*. New York/Oxford: Oxford University Press.

Daniel, J., Kanwar, A., & Uvalic-Trumbic, S. (2006). A tectonic shift in global higher education. *Change, 38*(4), 16–23. https://doi.org/10.3200/CHNG.38.4.16-23.

Daniel, J., Kanwar, A., Uvalic-Trumbic, S. (2009). Breaking higher education's iron triangle: access, cost, and quality. *Change, The Magazine of Higher Learning*. Retrieved from http://www.changemag.org/archives/back%20issues/march-april%202009/full-iron-triangle.html

Dolch, C., Zawacki-Richter, O., Bond, M., & Marin, V. (2021). Higher education students' media usage: A longitudinal analysis. *Asian Journal of Distance Education, 16*(1), 31–53. https://doi.org/https://doi.org/10.5281/zenodo.4585372

Douglas, J. W., & Raudla, R. (2020). Who is afraid of the big bad debt? Amodern monetary perspective on federal deficits and debts. *Public Budgeting & Finance, 40*(3), 9.

Flassbeck, H., Spiecker, F., & Steinhardt, P. (2017). Das Schuldenproblem und die europäische Krise. *Makroskop*.

Flassbeck, H., Spieker, F., & Dudey, S. (2020). *Atlas der Weltwirtschaft 2020/21: Zahlen, Facten und analysen zur globalisierten Ökonomie (Mit sonderteil Corona Schock)*. Frankfurt: Westend Verlag.

Fullwiler, S. T. (September 2010 (edited April 2011)). Treasury debt operations—an analysis integrating social fabric matrix and social accounting matrix methodologies.

Fullwiler, S., Kelton, S., Ruetschlin, C., & Steinbaum, M. (2018). *The macroeconomic effects of student debt cancellation*. Retrieved from file:///C:/Users/Aina/Downloads/FullwilerKelton-ReutschlinSteinbaum2018TheMacroeconomicEffectsofStudentDebtCancellation.pdf.

Garrison, D. R., & Anderson, T. D. (1999). Avoiding the industrialization of research universities: Big and little distance education. *American Journal of Distance Education, 13*(2), 48–63. https://doi.org/10.1080/08923649909527024.

Grubb, F. (2015). *Colonial virginia's paper money regime, 1755–1774: a forensic accounting reconstruction of the data* (Working Paper No. 2015–11). Retrieved from https://lerner.udel.edu/sites/default/files/ECON/PDFs/RePEc/dlw/WorkingPapers/2015/UDWP2015-11.pdf

Guri-Rosenblit, S. (2008). Challenges facing distance education in the twenty-first century: Implications for paper presented at the fifth EDEN research workshop, Paris.

Hanna, D. (2003). Organizational models in higher education, past and future. In M. G. Moore & W. G. Anderson (Eds.), *Handbook of distance education*. Mahwah/London: Lawrence Erlbaum Associates.

Hiltz, S. R. (1995). *The virtual classroom learning without limits via computer networks*. Norwood, New Jersey: Ablex Publishing Corporation.

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). *The difference between emergency remote teaching and online learning*. EDUCAUSE Review.

Höfgen, M. (2020). *Mythos Geld Knappheit: Modern Monetary Theorie oder warum es am Geld nicht scheitern muss*. Stuttgart: Schäfer & Poeschel.

Hollands, F. M., & Tirthali, D. (2014). Resource Requirements and Costs of Developing and Delivering MOOCs. *International Review of Research in Open & Distance Learning, 15*(5), 113–133.

Holmberg, B. (1983). Guided didactic conversation in distance education. In D. K. Sewart & B. Holmberg (Eds.), *Distance education: International perspectives* (pp. 114–122). London: Croom Helm (Routledge).

Holmberg, B. (2008). *The evolution, principles and practices of distance education* (Vol. 11). Oldenburg: Bibliotheks- und Informationssystem der Carl von Ossietzky Universität Oldenburg.

Hudson, M. (2012). *The bubble and beyond: Ficticious capital, debt deflation and the global crisis*. Dresden: ISLET.

Hudson, M. (2015). Killing the Host: How Financial Parasites and Debt Bondage Destroy the Global Economy Taschenbuch – 20. August 2015: ISLET.

Hudson, M. (2017). *J is for Junk economics*. ISLET.

Hudson, M., Bezemer, D., Keen, S., & Öncü, T. S. 2020a *The use and abuse of MMT*. Retrieved from https://www.nakedcapitalism.com/2020/04/the-use-and-abuse-of-mmt.html

Hudson, M., Bezemer, D., Keen, S., & Öncü, T. S. (2020b, April 10). *The use and abuse of MMT*. Retrieved from https://www.nakedcapitalism.com/2020/04/the-use-and-abuse-of-mmt.html

Hülsmann, T. (2011). *Distance education: From access to accumulation*. Paper presented at the The Fourteenth Cambridge International Conference on Open: Distance and e-Learning Internationalisation and Social Justice: the role of Open, Distance and E-learning, Cambridge, UK.

Hülsmann, T. (2014, June, 24). *Instructional models and their cost structure: What transitioning to online distance education could mean for UNISA*. Paper presented at the NADEOSA, Pretoria.
Hülsmann, T. (2016). *The impact of ICT on the costs and economics of distance education: a review of the literature*. Burnaby, British Columbia, Canada: Commonwealth of learning (COL).
Kelton, S. (2019). The wealthy are victims of their own propaganda. To escape higher taxes, they must embrace deficits. *Bloomberg Businessweek*.
Kelton, S. (2020). *The deficit myth: Modern money theory and the birth of the people's economy*. New York: PublicAffairs.
Knapp, G. F. (1905). Staatliche Theorie des Geldes: Dunker & Humblot.
Koller, D. (2012). *What we're learning from online education*. Retrieved from https://www.youtube.com/watch?v=U6FvJ6jMGHU
Koumi, J. (2006). *Designing video and multimedia for open and flexible learning*. London, New York: Routledge, Tayler & Francis.
McLeay, M., Radia, A., & Thomas, R. (2014). Money creation in the modern economy. *Bank of England Quarterly Bulletin, 1*, 1–14.
Mills, R. (2003). The centrality of learner support in open and distance learning: A paradigm shift in thinking. In A. Tait & R. Mills (Eds.), *Rethinking learner support in distance education: Change and continuity in an international context* (pp. 102–113). London, New York: RoutledgeFalmer.
Mitchell, W., Wray, L. R., & Watts, M. (2019). *Macroeconomics*. Red Globe Press.
Miyazoe, T., & Anderson, T. (2010). The Interaction Equivalency Theorem. *Journal of Interactive Online Learning, 9*(2), 94–104.
Miyazoe, T., & Anderson, T. (2012). *Interaction equivalency theorem: The 64-interaction design model and its significance to online teaching*. Paper presented at the AAOU 2012, Makuhari, Japan. http://equivalencytheorem.info/et/wp-content/uploads/2011/08/The-EQuiv-and-64-Interaction-Design_20121018.pdf
Modern Monetary Theory and Its Critics (2019, October, 11). Real-world economics review, (89), 204. Retrieved from https://bsahely.com/2019/10/11/modern-monetary-theory-and-its-critics-real-world-economics-review/
Moore, M. G. (1989). Three types of interaction. *The American Journal of Distance Education, 3*(2), 1–6.
Nersisyan, Y. W., Larry Randall. (2019). *How to pay for the Green New Deal* (Working paper Levy Economics Institute of Bard College(931)).
Papadopoulos, G. S. (1994). *Education 1960–1990: The OECD perspective*. Paris: OECD.
Peters, O. (1983). Distance teaching and industrial production. A comparative interpretation in outline. In D. Sewart, D. Keegan, & B. Holmberg (Eds.), *Theoretical principles of distance education* (pp. 98–110). London: Routledge.
Randall Wray, L., Fullwiler, F. D. S., Tcherneva, P. R., & Kelton, S. A. (2018). *Public service employment: A path to full employment Levy Institute*. Bard College. Retrieved from https://www.levyinstitute.org/pubs/rpr_4_18.pdf.
Raza, R. R. (2008). New evidence on outcomes from South Asian distance education tertiary institutions: some implications for future policy. *Compare, 38*(4), 483–500.
Rumble, G. (2001). E-education: whose benefits, whose costs? Inaugural Lecture, Wednesday, 28 February 2001.
Rumble, G. (Ed.) (2004). *Papers and debates on the costs and economics of distance education and online learning* (Vol. 7). Oldenburg: Bibliotheks- und Informationssystem der Carl von Ossietzky Universität Oldenburg.
Rumble, G. (2007). Social justice, economics and distance education. *Open Learning: The Journal of Open and Distance Learning, 22*(2), 167–176.
Rumble, G. (2014). the costs and economics of online distance education. In O. Zawacki-Richter & T. Andersen (Eds.), *Online distance education: Towards a research Agenda* (pp. 197–216). Athabasca: AUPress.
Ruml, B. (1946). Taxes for revenue are obsolete. *American Affairs, VIII*(1), 35–39.

Slade, S., & Prinsloo, P. (2013). Learning Analytics. *American Behavioral Scientist, 57*(10), 1510–1529. https://doi.org/10.1177/0002764213479366.
Spraul, K. (2006). *Bildungsrendite als Zielgröße für das Hochschulmanagement*. Berlin: BWV Berliner Wissenschafts Verlag.
Tcherneva, P. R. (2018). *The job guarantee: Design, jobs, and implementation* (Levy Economic Institute Working Paper No. 902).
Todaro, M. P., & Smith, S. S. (2003). Human capital: Education and health in economic development. In M. P. Todaro & S. S. Smith (Eds.), *Economic development* (8th ed., pp. 360–410). Boston: Addison Wesley.
Tooze, A. (2018). *Crashed: Wie die Finanzkrise die Welt verändert hat*. München Siedler.
Tooze, A. (2021). *Die Welt im Lockdown: Die globale Krise und ihre Folgen*. München: C.H.Beck.
Tymoigne, E. (2016). Government monetary and fiscal operations: Generalising the endogenous money approach. *Cambridge Journal of Economics, 40*(5). https://doi.org/10.1093/cje/bew012.
Tymoigne, É., & Wray, L. R. (2013). *Modern money theory 101: A reply to critics*. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2348704
Weller, M. (2014). *The Battle for Open: How openness won and why it doesn't feel like victory.* Retrieved from http://www.ubiquitypress.com/site/books/detail/11/battle-for-open/
Werner, R. A. (2014). Can banks individually create money out of nothing? — The theories and the empirical evidence☆. *International Review of Financial Analysis, 36*, 1–19.
Willinsky, J. (2006). *The access principle: The case for open access to research and scholarship*. Cambridge, MA: MIT Press.
Wray, L. R. (2019). *Alternative paths to modern money theory. Real-world economics review (89 Modern monetary theory and its critics)* (pp. 5–22). Levy Institute, Bard College.

Institutional Partnerships and Collaborations in Online Learning

35

David Porter and Kirk Perris

Contents

Abstract

Globally, partnerships and collaborations are increasingly common in post-secondary education. The advent of networked technologies has intensified bilateral and multilateral engagements, and in the context of learning, it reveals there are a variety of partnership and collaboration "types" that can form. This chapter presents three examples of partnership and collaboration types drawn from the academic and business literature. Four case studies of partnerships and collaborations are then presented, and the aforementioned types are applied as a best fit to a given case study. The exercise illustrates how partnerships and

D. Porter (✉)
Principal DP+Associates, North Vancouver, BC, Canada
e-mail: david@dpassociates.ca

K. Perris
Principal Karte Education Consultants, Vancouver, BC, Canada
e-mail: kirk.perris@utoronto.ca

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_32

collaborations in postsecondary education may develop and evolve, and how they can be sustained. The partnership and collaboration types offer some structure to better understand how institutions may approach and derive benefit from engagement with other institutions centered on achieving the objectives of access, quality, and innovation, espoused by proponents of online learning.

Keywords

Propositional collaborations · Cooperative partnerships · Mutual service alliances · Postsecondary education · Online learning

Introduction

University and college systems, as well as governmental, parastatal, and intergovernmental organizations, are undertaking large and small-scale projects to implement online learning through partnerships, alliances, or collaborative ventures with increasing frequency. The objective is often focused on a common educational activity, leveraging each partner's comparative advantage, and pooling resources to achieve a common goal in the form of curriculum reform, technological application, and programmatic diversity. In many cases, stakeholders work together to support corresponding policy goals usually informed by economic priorities.

In this chapter, we focus on partnerships that are centered on widening access to quality learning and realized through the application of information and communications technologies (ICT). In these contexts, academic, social, or workplace development needs frequently motivated partners to engage in such collaborative initiatives, with the impetus arising from systemic pressures to:

- More fully utilize public education opportunities
- Provide increased access to higher education, adult education, and lifelong learning opportunities for underserved populations
- Increase learner mobility, upskilling, or reskilling for dynamic employment environments

While the long-term success of such ventures is largely unproven, and their downstream sustainability remains terrain to be explored, there is continuing evidence of governmental support for collaborative initiatives that broaden access to education. The examples provided in this chapter will describe and discuss research and practice specific to collaborations and partnerships in education and delivered through ICT applications. We use the following topics to provide background for discussion.

- The nature of collaborations and partnerships: **propositional** (Cardell, 2003), **cooperative** (Todeva & Knoke, 2005), **mutual service alliances** (Eckel & Hartley, 2008), and others that may be extant in the academic or business realms.

- Discussion of partnerships, collaborations, and alliances in the Global South and Global North and their relationship to strategic success factors with short case studies drawn from the following entities:
  - Commonwealth of Learning: Regional Centres (Sub-Saharan Africa, Asia, Mediterranean, and South Pacific) (Perris & McGreal, 2021)
  - Partnership for Enhanced and Blended Learning (PEBL) in East African universities (UK Aid, 2021)
  - BCcampus (2012, 2014)
  - eCampusOntario (Higher Education Quality Council of Ontario, 2020)
- Discussion and focus on factors that promote sustainability or facilitate strategic "pivots" to account for emergent issues or new priorities of institutions and governments that can be served effectively by collaborations or partnerships

To delineate on the case study examples presented in this chapter, we offer a brief overview of several types of partnerships in the literature and then apply them to the aforementioned entities to deepen understanding on how partnerships may form, demonstrate value, and can be sustained.

Types of Partnerships and Collaborations

Propositional Collaborations

When a collaboration or partnership is developed to capitalize on perceived opportunities that are not yet proven, the term used by Cardell (2003) is "propositional." That is, there is a set of factors in the context of proposed partner operations that is seen to align to offer new possibilities of interest to each stakeholder. An example in higher education is the branch campus, defined as an institution, usually from a country in the Global North, setting up a campus in a country in the Global South. For the institution, it enhances its international footprint, enables faculty exchanges and networking, and provides an additional revenue stream. For the hosting country, the branch campus addresses and fulfills unmet demand for higher learning, provides quality education that is usually recognized domestically, and enables local faculty to gain international experience in the home context. In this example, though not necessarily exclusive to propositional collaborations, the goals of each entity are not necessarily aligned but are complementary.

Cooperative

The cooperative approach implies a level of commitment by individual participants through an equal stake in the governance of the partnership and established processes for membership, participation, and the setting and amending of the rules of engagement. It is considered a democratic model of collaboration. Unlike the example of a branch campus as a propositional collaboration where roles and goals are largely distinct, a cooperative approach reflects the need to innovate toward a product in which both, or all entities may benefit, and all stakeholders participate in a democratic decision-making process to ensure outcomes are truly congruent with the majority's needs.

Mutual Service Alliances

Mutual service alliances require the least amount of commitment from the collaboration. This type of partnership can be characterized as participants engaged in an arrangement that provides content, service, and support at a lower cost or with lower overhead than what might be expected participating in the same service as a singular entity. One example might be the development of a policy brief by a hosting organization that would provide value to a receiving organization. Another might be a shared service where multiple organizations share the cost of an online application by aggregating participants among institutions to lower the cost of service for all. Mutual service alliances are becoming a common way to arrange for cost-effective services to meet a community need.

Examples of Collaborations and Partnerships in Practice: Formation, Value, and Sustainability

In this section, four case studies are be presented, drawn from Canadian and transnational arrangements. The aforementioned partnership and collaboration types will be aligned to a given case study to illustrate how partnerships and collaborations in postsecondary education may develop and evolve, and how they can be sustained.

Commonwealth of Learning: Regional Centres

Established in 1987, the Commonwealth of Learning (COL) is an intergovernmental organization located in Metro Vancouver, Canada. COL's mandate is to engage in capacity building (e.g., workshops), advocacy (e.g., thought leadership), networking (e.g., holding and attending events), and partnerships.

Profile The 54 member states of the Commonwealth are clustered in Sub-Saharan Africa (19 member states), Asia (8), the Caribbean and Americas (13), Europe (3), and the Pacific (11) (see Fig. 1). Of the 2.4 billion inhabitants, 60% are under the age of 30, as compared to the OECD, for example, where the median age is over 40. India is home to the largest population of Commonwealth citizens at 1.35 billion, and Nauru is home to the smallest by population at nearly 10,000. Economically, GDP per capita ranges from USD 97,000 in Singapore, the richest, to USD 1,000 in Malawi, the poorest. More than half of the member states, at 31 countries, are

Countries by region

Africa	Asia	Caribbean and Americas	Europe	Pacific
• Botswana • Cameroon • Gambia, The • Ghana • Kenya • Kingdom of Eswatini • Lesotho • Malawi • Mauritius • Mozambique • Namibia • Nigeria • Rwanda • Seychelles • Sierra Leone • South Africa • Uganda • United Republic of Tanzania • Zambia	• Bangladesh • Brunei Darussalam • India • Malaysia • Maldives • Pakistan • Singapore • Sri Lanka	• Antigua and Barbuda • Bahamas, The • Barbados • Belize • Canada • Dominica • Grenada • Guyana • Jamaica • Saint Lucia • St Kitts and Nevis • St Vincent and The Grenadines • Trinidad and Tobago	• Cyprus • Malta • United Kingdom	• Australia • Fiji • Kiribati • Nauru • New Zealand • Papua New Guinea • Samoa • Solomon Islands • Tonga • Tuvalu • Vanuatu

Fig. 1 Member states of the Commonwealth

categorized as small states, loosely defined as having approximately 2 million inhabitants or fewer. Amid this immense diversity, there are several binding elements shared by Commonwealth member states, including a commitment to democracy and to human rights.

To enable its operations, COL relies on a vast network of partners throughout the Commonwealth. Long-term partnerships with member states are essential, and this is largely manifested through key country appointments. Otherwise referred to as Focal Points, these appointees are staffed in government or educational institutions (usually universities) and act as liaisons between their home country and COL. Among a range of roles, Focal Points field requests from COL for annual country contributions, inform COL of strategic directions and learning needs in their country, and can identify new institutional partners for COL. The focal point is a voluntary role and carries a degree of transience. Consequently, the level of engagement from Focal Points varies.

Another important partnership to COL is its Regional Centres. There are four Regional Centres, strategically located in several geographical regions, and they are outlined below.

Regional Training and Research Institute for Distance and Open Learning (RETRIDOL) The first Regional Centre, established in 2003, was the Regional Training and Research Institute for Distance and Open Learning (RETRIDOL). It is located at the National Open University of Nigeria, located in Abuja, the country's capital city. RETRIDOL responds to the ODL needs of the five Commonwealth States in West Africa. RETRIDOL is focused on training, networking, and research (Eya, Shaibu, & Amini, 2019). It has several main projects, which focus on tertiary education to develop ODL capacity and ultimately acquire accreditation from their national higher education governing bodies. RETRIDOL is also engaged with ongoing collaborations with the Economic Community of West African States, which includes 15 member states from the region.

Southern African Development Community Center for Distance Education Geo-politically, Southern Africa is supported by the Southern African Development Community (SADC), comprised of 16 member states. The COL Regional Centre in the SADC region takes its name from this organization, as it is entitled, the SADC Centre for Distance Education, or SADC-CDE. SADC-CDE is housed at Botswana Open University, which, like SADC, is in the capital city of Gaborone. SADC-CDE was jointly established by its hosting university and the Ministry of Education and Skills Development[1]. SADC-CDE has a large geographical remit that includes 11 Commonwealth States. Its projects mainly focus on building capacity for technology-enabled learning in secondary or open schooling institutions.

Pacific Centre for Flexible and Open Learning for Development The Pacific Centre for Flexible and Open Learning for Development, or PACFOLD, is COL's Regional Centre in the Pacific. Established in 2013, it is housed at the University of the South Pacific, a regional university with 13 campuses located throughout the South Pacific. Like its Open University counterparts in Nigeria and Botswana, the University of the South Pacific has a focus on open and distance learning, though it has not adopted an ODL moniker. PACFOLD's remit is the nine Pacific Island Countries that are also members of the Commonwealth. The work of PACFOLD is focused on developing skills and employability. It is engaged in several projects having recently been coawarded a grant from New Zealand's Ministry of Foreign Affairs and Trade. Projects are largely focused on youth and youth workers (Commonwealth of Learning, 2019), out-of-school-children (Narayan, Naidu, Mays, & Perris, 2021), and teacher education (Mays, Ogange, Naidu, & Perris, 2021).

Commonwealth Centre for Connected Learning Foundation The newest COL Regional Centre is the Commonwealth Centre for Connected Learning Foundation, or 3CL Foundation. It was established in 2017. The 3CL Foundation is in Valletta, Malta, and is supported by the Ministry of Foreign Affairs. The 3CL Foundation has a unique remit, as compared to the other Regional Centres. Situated in the southern Mediterranean, it serves as a linkage to COL with the European Union and includes the United Kingdom and Cyprus as its Commonwealth counterparts in the region. As these are high-income countries, COL and 3CL Foundation focus their work elsewhere, and mainly in Sub-Saharan Africa, and pan-Commonwealth. Its projects are

[1] The Ministry has been reconfigured and split into two: Ministry of Basic Education and Ministry of Tertiary Education, Research, Science and Technology. The Ministry of Basic Education is aligned to SADC-CDE.

focused on imparting innovations in postsecondary education such as in digital literacy, and blockchain in education.

Formation and Context of the Partnership COL and its Regional Centres demonstrate the effectiveness of a regional service alliance. Both entities are dedicated to the advancement of open and distance learning and focus these efforts in low- and middle-income countries. Funding is a shared endeavor. COL provides annual operating budgets, and a dedicated staff member to support project implementation, and the hosting organization of a Regional Centre provides staffing, space, and equipment. In reverting to the understanding of a mutual service alliance, the synergies are quite clear – COL has a mandate to support its member states and relies on the Regional Centres to carry out COL's work by leveraging local networks and delivering or codelivering workshops, and related activities. The Regional Centres rely on COL for funding, strategic direction, and technical expertise. For either entity to engage in such work independently, the yield of outcomes and impact would be significantly curtailed. Contractually, there is usually a three-year agreement signed between COL and a Regional Centre, but funding is in one-year instalments.

Where COL is focused on the pan-Commonwealth, the Regional Centres are more localized. To date, there have been few multilateral or other bilateral arrangements between the Regional Centres, and it will likely remain the responsibility of COL to foster interactions between its Regional Centres.

The Partnership for Enhanced and Blended Learning

The Partnership for Enhanced and Blended Learning (PEBL) project was aimed at enhancing the quality, development, and delivery of blended learning modules[2] among a collection of universities located in four East African states that were also members of the Commonwealth. The four countries included Kenya, Rwanda, Tanzania, and Uganda. The project was run over 5 years, from 2017 to 2021.

The project was formed by four technical partners including the Commonwealth of Learning and three UK-based organizations: the Association of Commonwealth Universities, or ACU, the University of Edinburgh, and the Staff Educational Development Association. The project was funded by the Department for International Development of the United Kingdom under the Strategic Partnerships for Higher Education Innovation and Reform initiative. The ACU was the lead organization responsible for disbursement of funds to the technical partners and liaised with the funder.

[2] The term module refers to a particular unit within a discipline, which is referred to as a course, in other contexts. In this case, several courses, or modules, will comprise a credential.

The project was a response to the immense growth in participation rates in higher education in the region (Young et al., 2021). To ameliorate a shortage in subject matter expertise, the project was designed to develop and share quality-assured blended learning modules across institutional and national boundaries, a distinctive feature given the challenges of accreditation and transfer in the region (Trines, 2018).

Nontechnical partners included Kenya's Commission for University Education, and 23 universities engaged in module development and module sharing located in the aforementioned four African states.

To enable the development and utilization of modules, all universities were to designate individuals who would be eligible to participate in pedagogical and quality assurance capacity-building activities. COL was designated as the quality assurance lead. It carried out its role in two ways. First, COL developed a rubric to quality assure the modules against a series of benchmarks codesigned with technical and nontechnical partners (Perris & Mohee, 2020). Second, COL developed a self-audit tool for universities to assess their status with blended learning, identify gaps (e.g., professional development, physical infrastructure), and develop a corresponding improvement plan (Mohee & Perris, 2021). Like other technical partners, COL conducted in-person and online workshops, along with digital correspondence (email and text messaging) to build rapport with participants, provide support, and share materials.

Modules were developed for undergraduate- and master-level programs and covered a range of disciplines. In total, there were 22 modules developed. They are located as free downloadable files, as Word files, or as Moodle backups, at OER Africa: https://www.oerafrica.org/partnership-enhanced-and-blended-learning-pebl.

The comparative advantage of a given institution was in its capacity to design quality-blended learning modules in a particular discipline that could be openly shared with another institution lacking comparable capacity in a given discipline. Overall, the project carried the following aims:

1. Improved network of universities for sharing degree-level blended learning courses
2. Strengthened and increased use of regional (OER Africa) and individual learning management systems (LMSs)
3. Increased capacity of universities to support pedagogical approaches for blended learning
4. Strengthened quality assurance systems for blended learning courses
5. High-quality, credit-bearing blended learning courses included in university programs

Formation of the Partnerships The PEBL project was comprised of multiple partners, located across seven countries and three continents. On the surface, the technical partners were the *purveyors of knowledge*, and the nontechnical partners were the *recipients of knowledge*. Each technical partner brought a niche area of expertise in pedagogy, quality assurance, technology, or project management that contributed to the project's aims. Each nontechnical partner brought a foundation, or interest in blended learning, along with subject-matter expertise.

Among the technical partners, the formation of the partnership was an *ad hoc* bilateral arrangement between the ACU and each technical partner. COL, for example, only engaged with the other technical partners during annual in-person meeting and workshops. Though it was no fault of any technical partner – there were no restrictions to engage with any technical or nontechnical partner – this presented some challenges as the flow of information and decision-making was largely controlled by the ACU. The nature of the partnerships varied; between technical partners, it was deemed more of a cooperative approach. All technical partners had an equal stake in the governance of the partnership, exemplified as membership in decision-making bodies that included the Steering Committee and Module Development Fund Committee. The partnership with the ACU and the other technical partners, however, was not fully equal. As the liaison with the UK government (funder), ACU was privy to more details and was the ultimate decision-maker in the project.

Like the case study of COL and the Regional Centres, the arrangement in PEBL between technical and nontechnical partners can be best described as a mutual service alliance. The universities in the PEBL project were recipients of funds to produce an outcome(s). In this case, it was to build capacity of staff to deliver blended learning modules, and for some of the institutions, there was the added outcome to develop modules. A small proportion of individuals from the universities participated in governance structures, but by and large, there was little room for nontechnical partners to contribute to decision-making. Technical partners relied on the universities which held the subject-matter expertise, institutional knowledge, and understanding of the sociopolitical contexts of their institution and their constituents. Without their presence, no outcomes could be generated.

In alignment with the main deliverables on quality assurance, COL developed two tools, informed by inputs from technical and nontechnical partners, to support the development of modules, and to develop institutions' capabilities to delivery-blended learning of good quality.

Most institutions which used the tools wrote reports to reflect learning and progress with a module and/or the institutional self-review. The creation of the tools was enabled by inputs from all partners, which occurred in person and virtually from 2018 to 2019. Technical and nontechnical partners piloted or offered inputs to the first version of the Rubric applied to the first six modules. It was then revised, independently reviewed, and published carrying a CC BY-SA 4.0 license. The subsequent 16 modules were quality assured using the published Rubric document.

The other tool COL developed was the Institutional Quality Assurance Review Tool, which was designed for institutions to carry out a self-audit to identify the status, gaps and means of improvement to deliver quality-blended learning. Like the Rubric, the QA Review Tool was benchmarked against a set of criteria codesigned by COL and other PEBL partners. Each institution's implementation of the QA

Review Tool included an online survey and follow-up on-site review that entailed planning, collecting, and analyzing data (e.g., interview, document analysis) to corroborate and expand upon findings from the online survey. The culminating activity was a report that outlined the findings and an improvement plan. The QA Review Tool was published under a CC BY-SA 4.0 license. Of the 23 universities in the PEBL project, 20 submitted the report at the time of writing this chapter.

By most accounts, including the findings from an external monitoring and evaluation exercise for the PEBL project (Young et al., 2021), the QA outcome reiterated here, “Strengthened quality assurance systems for blended learning courses,” was achieved. Institutions adopted some of the tools as a matter of policy, including the Open University of Tanzania and Makerere University (Uganda). Discussions have begun with Kenya’s Commission for University Education to consider a national policy on blended learning with focus on quality assurance, and there is potential to broaden such engagements with commissions in Rwanda, Tanzania, and Uganda.

The sustainability of the activities and partnerships forged in the PEBL project remain. In the middle of the PEBL project, the Covid-19 pandemic caused nationwide lockdowns in the four East African countries where the project was focused. To an extent, this was a blessing in disguise as it accelerated the adoption of digital learning. With limitations on in-person gatherings persisting, the importance of imparting flexible learning options in a blended format will likely persist. Without the technical and financial support enabled from PEBL, questions loom on how far progress will continue. One promising development is that COL has started independent work with three universities to expand on some of the capacity-building activities from PEBL.

Leveraging Resources Through Partnerships Within University and College Systems

Universities and colleges across Canada, and indeed globally, have initiated large and small-scale projects to implement online learning consortia with the objective of participating in a common activity or pooling their resources for achieving a common goal. Once equipped with the needed ICTs, they form these alliances to bring postsecondary educational opportunities directly to learners. Various academic, social, or workplace development needs motivate such consortia initiatives. The impetus for the initiatives has come from systemic pressures to utilize public education opportunities more purposefully, to provide increased access to higher education for underserved populations, or to increase learner mobility in competitive employment environments.

Governments, funding agencies, and institutions strive to understand and control some of the factors that affect the success of large-scale consortia projects in which they invest to give propositional collaborations a stable platform on which to build and grow. Examples from two provinces in Canada, British Columbia and Ontario, are described to highlight the value propositions of these collaborative ventures and to discuss the requirements toward their sustainability.

BCcampus Over 19 years, BCcampus has moved from a propositional venture to an operational entity, providing research, services, and support for the 25 public higher education institutions in British Columbia. BCcampus is a government-initiated collaborative venture carrying the aim to network these institutions in a manner that allows learners to find and engage in online learning opportunities. The BCcampus concept was designed to benefit students by providing them with a set of online services that promoted access, choice, flexibility, and mobility.

In strategic collaboration terms, BCcampus began as a propositional collaboration, a visionary approach to an organizational or business need (academic services in this case) based upon the need to enhance research, instructional delivery, and student services to the parties involved. A primary mandate was to enhance students' ability to identify, choose, register for, and take courses from any of 25 institutions in the province. BCcampus also enabled students to apply any academic credits earned within the system against credentials from a selected (home) institution. While providing students with measurable value – namely, online course spaces available from all institutions – the collaboration was also intended to benefit institutions through the rationalization of demand for academic opportunities from students. This was realized through the supply of all online courses available, and the system attempted to mitigate duplications of service for maximum efficiencies within this large academic ecosystem.

Leveraging resources through partnership is not a new concept for academic institutions, particularly in areas where they do not compete or where the aggregation of resources effectively lowers costs for all as outlined from the following two examples in British Columbia:

- BCNet: An arrangement between universities and government to operate a high-speed research network.
- BC Council on Admission and Transfer (BCCAT): Using its Education Planner Website, it provided parents and students an information resource about the details of program requirements and transfer regulations across the BC higher education system.

These instances, however, did not pose an existential threat to a participating institution. Where "brand" played an important role – such as in the recruitment, admission, and registration of highly qualified students – partnerships and strategic collaborations were typically more difficult to develop and sustain. And, because propositional collaborations are based upon visionary goals rather than fully identified need, their development and nurturing required a more sophisticated approach to mitigate risk and to underscore the importance of cultural fit. In such cases, the prerequisite is the same for both active participation and persistence: the identification of resonant value from the perspective of each institution. For example, BCcampus needed to ask: *Which critical need for College X might be met by one or more of the many benefits that BCcampus brought to students, educators, and the postsecondary system?* The type and extent of this need fulfillment was the value proposition for individual institutions.

BCcampus explored the power of resonant value during its early years when the consortium administered the awarding of grants for reusable online resource development, funded by the provincial Online Program Development Fund. On bringing the successful grant proponents into a community of practice, BCcampus surfaced their concerns around copyright and reuse. A disconnect became apparent between the tools available in the proposed Creative Commons licensing scheme for open educational resources (OER) and the requirement by some institutions and faculty members for more tightly controlled copyright and licensing of creative works. This concern exposed a crack in the collaborative venture and the government-sponsored funding programs associated with it. The norm in the beginning was to preserve an institution's competitive advantage in its marketing of programs and courses. To fulfill this essential requirement, a hack of the Creative Commons license, the BC Commons license was designed. Its resonant value was to ensure that reuse was preserved within the province, but that marketing and sale of courseware could remain an exclusive revenue stream when institutions marketed learning resources and programs outside of the province. This decision was a double-edge sword, which deviated from an ideal of Creative Commons licensing that later in its lifecycle had to be revisited, readvocated, and reestablished by BCcampus. Fortunately, with lower costs, standards-based service levels, and predictable dates for upgrades, the approach taken by BCcampus was an overwhelming success.

Even within a network of collaborative ventures where partner entities have clearly defined roles, there is a possibility for service overlaps or even service confusion in the context of changing technologies and organizational capabilities.

In the case of BCcampus and BCNet, each provided different versions of shared services to academic institutions with the goal of reducing cost and enhancing a consistent service and maintenance for key services such as LMSs and other academic technologies. By 2012, BCcampus had multiple shared services as described in Fig. 2.

What sometimes became a confusing approach to shared services for institutional partners, and conveyed the appearance of competition between services providers, was resolved by specialization (or comparative advantage) using organizational strengths.

BCcampus had a strong pedagogical approach to defining service needs, and BCNET had a strong technical orientation to structuring and managing online services. In 2014, the leadership of both organizations structured and signed a memorandum of understanding to define roles that complemented the strengths of each organization as illustrated in the role descriptions in Table 1. Each partner committed to executing its role in an optimal fashion.

Since 2014, BCcampus and its partners have been providing services to the province's 25 postsecondary institutions. BCcampus has specialized as a leader in the development, adaptation, review, and distribution of open educational resources. It has also served as a leader in providing services to support emergent academic needs. Equity, diversity and inclusion programs, the facilitation of online teaching and learning, and supporting training for universal design for learning are some examples.

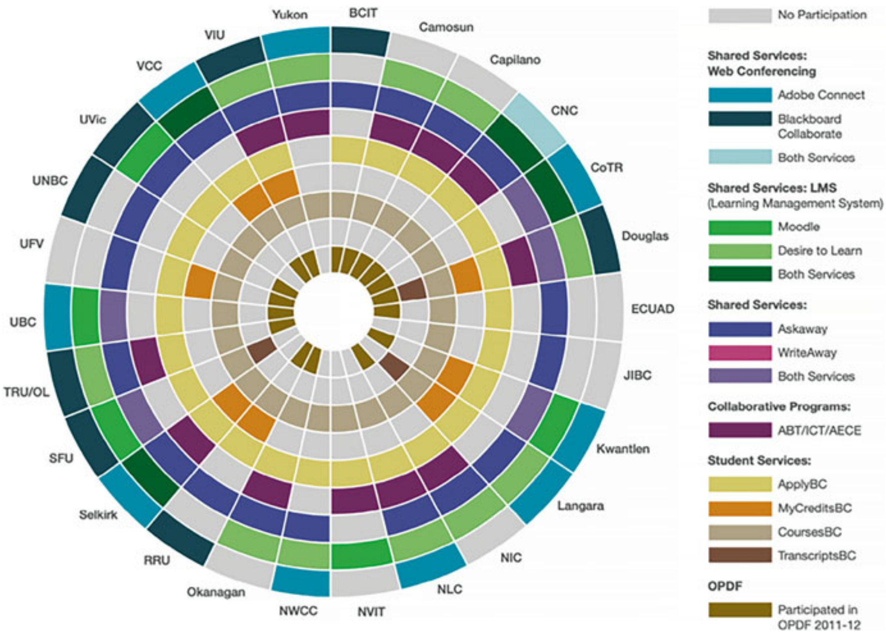


Fig. 2 BCcampus shared service offerings 2011–2012 (BCcampus, 2012)

Table 1 Shared service role structures for BCcampus and BCNET as outlined in a 2014 memorandum of understanding (BCcampus, 2014)

BCcampus role (application)	BCNET role (infrastructure)
• At the request of participating institutions, BC government departments, or based on an environmental scan, BCcampus will research, evaluate, and implement pilot instances of educational technologies and applications to a maturity phase: • Research innovative educational technologies for adoption • Coordinate and develop communities of practice for evaluation and pilot implementation of the technologies • Implement and support technologies and applications, and establish interim governance through the pilot phase	• With support of its institutional members, BCNET will operate mature shared educational technology services: • Provide core IT infrastructure (hosting, storage, and networks) as the basis for such services • Procure and manage software licenses and third-party services needed for the deployment and growth of educational technologies • Create and manage contractual agreements with members for services • Act as the signatory for various contractual agreements with suppliers
Joint roles	
• Transition of educational technologies and applications from pilot to operational phases, facilitated through collaborative IT and educational technology / teaching and learning working groups (e.g., Collaborative Technologies Working Group, LMS Working Group, and others as required) • Collaborative development of a roadmap for shared educational technology services	

BCcampus is funded by government primarily and, as such, is largely seen as a public service in British Columbia's higher education sector demonstrating a collaborative approach to support institutional needs. In collaborative ventures which begin as propositional initiatives, a key strategy is incremental adjustment to continuously provide resonant value for client institutions and partners in federated service roles.

In 2013, the government of Ontario, Canada's largest province, made the decision to follow the model provided by BCcampus and initiate its own collaborative venture among the province's 45 public colleges and universities. The government of Ontario called its collaborative proposition eCampusOntario and began the development of the entity in earnest in 2014.

eCampusOntario In 2014, the Ontario government committed $72 million over 5 years to support the development of eCampusOntario, and the provision of high-quality online learning experiences for Ontario's postsecondary students. It established eCampusOntario as a nonprofit corporation positioned between government and its members: the province's 45 public colleges and universities. Its revenues were provided by government, and the broad range of functions eCampusOntario was mandated to provide was rooted in a rapidly evolving series of transfer payment agreements between eCampusOntario and the provincial government.

eCampusOntario initiated the process to build its first strategic plan in late Fall of 2015. It embraced the following six targeted services: Quality (in courses and programs), Innovation, Collaboration, Research, Accountability, and Relevance.

The Ministry funded the creation of eCampusOntario with the ambition to push system improvements through collaboration and innovation and build Ontario's global reputation as a recognized leader in online and technology-enabled education. Unlike the original BCcampus model which initially supported access to online courses and course registration and transfer support, the eCampusOntario model had a much more focused mandate, aimed specifically at the pedagogical aspects of supporting technology-enabled learning. Its mandate, as outlined in its strategic plan, broadly described the trajectory for the organization at the 45 members institutions:

- Support the development and delivery of quality online learning experiences
- Lead in research, development, and sharing of best practices in online and other forms of technology-enabled learning
- Support member institutions in fostering innovation, collaboration, and excellence on behalf of Ontario students
- Contribute to the evolution of teaching and learning by:
  - Anticipating and responding to new and emerging technologies
  - Leveraging existing strengths in Ontario's postsecondary system
  - Developing new capacity
  - Supporting the development of state-of-the-art fully online courses and programs

The mission was clear and bold and, with a highly competitive edge, intended to position Ontario as a learning technology leader in Canada and globally. eCampusOntario was to work with member institutions "to promote accessibility, collaboration and innovation in online and technology-enabled learning that will enhance learner experience, support faculty development and extend Ontario's global reach," and become "a centre of excellence and a global leader in the evolution of teaching and learning through technology" (eCampusOntario, n.d.).

From 2016 to 2018, eCampusOntario operated under its initial strategic plan that also had as a primary duty the distribution of competitive grant funding to institutions to address the items from the strategic agenda that would be undertaken by institutions themselves. The bulk of the funds flowed to institutions as requested by government, divided equally between the college and university sectors in agreement with Colleges Ontario and the Council of Ontario Universities, the two sector councils representing academic institutions with government.

In 2016, a chief executive officer was hired to lead subsequent steps in moving the eCampusOntario development process forward, including a renewed focus on collaboration guided by an updated strategic plan for the 2017–2021 time span. The strategic priority of government at the time was to also build on work by BCcampus to create a digital library of open textbooks and other teaching resources that would be freely available to Ontario faculty and students. eCampusOntario responded by launching an OER development fund and the creation of a digital library with search tools, submission, and review (tools) to ensure a quality-informed process was used to build a collection of free and reusable academic resources. By 2021, eCampusOntario had reported over USD $10 million in savings using open textbooks by students and the subsequent savings to students through the availability of free learning resources. In British Columbia, where BCcampus has been established since 2003 and its open library since 2012, they reported savings of USD $16 million by October 2020 (BCcampus, 2020).

eCampusOntario continued rounding out its portfolio of service offerings to institutions and faculty through the 2016–2019 period. Notable additions to its service offerings mirrored expressed needs from institution, faculty, and government and included the following key programs:

- LearnOnline portal: A directory of online courses offered by all 45 member institutions, and transfer requirements, and noted whether a course used an open textbook as its primary resource https://learnonline.ecampusontario.ca
- The Ontario Open Library: A directory of downloadable open textbooks and resources that could also be integrated with websites and LMSs https://openlibrary.ecampusontario.ca
- Micro-credential Portal: Funding and support for institutions and employers to create short-form, assessed, competency-learning experiences to upskill and reskill learners to enhance employability https://micro.ecampusontario.ca
- Extend: A microcredentialed professional learning program comprised of six modules and a capstone project to upskill educators for online teaching (see https://extend.ecampusontario.ca)

- Student Experience Design Lab (SXDLab): Focused on bringing together students to create new forms of experiential learning (see https://sxdlab.ecampusontario.ca)

As often happens with government-funded propositional collaborations, a change in government can affect policy and priorities. A new government, elected to office in 2018, decided to review its digital education agencies and commissioned a study of eCampusOntario. It reported that eCampusOntario had a consistent focus on:

- Coordinated course delivery across multiple institutions for credit
- The generation of best practices, research, and data on technology-enabled learning
- Interinstitutional collaboration on tools, services, and technologies to create a suite of supports for online learners and their instructors

However, the report noted that it was difficult to ascertain whether government had a higher-level strategy and expectation for digital learning that included other digital agencies that it supported, and whether each, including eCampusOntario, was having the impact at a level government should expect. As the report highlighted,

> eCampusOntario serves two masters — the government that funds it and the institutions that represent its shareholders. Given the makeup of its governing board, it is perhaps not too surprising that a nontrivial amount of its funding goes directly to institutions to promote the digital-learning developments and activities they desire. The fundamental question is whether these activities of eCampusOntario are consistent with the desires and inclinations of its funder, the government, or whether the government would like to see some of this funding directed to other provincial digital-learning priorities and goals. The answer to this question demands clarity from government and, subsequently, clear direction to eCampusOntario from government. (Higher Education Quality Council of Ontario, 2020)

Subsequently, the government of Ontario has continued to fund eCampusOntario and has established a Virtual Learning Strategy centered on a new USD $40 million investment that is intended to drive growth and advancement in virtual learning across the province's postsecondary institutions. The strategy will expand the possibilities of traditional and lifelong learning through the accelerated use of both online and hybrid learning https://vls.ecampusontario.ca.

Factors That Promote Sustainability or Facilitate Strategic Pivots in Effective Collaborations or Partnerships

In this chapter, we set out to identify forms of partnerships and collaborations present in four case studies premised on advancing access to quality learning through the application of ICTs. The collaborations and partnership types included **propositional collaborations**, **cooperative**, and **mutual service alliances**.

International Case Studies

In the internationally oriented case studies – the COL Regional Centres and PEBL – we identified cooperative and mutual service alliances as commonly represented. The arrangement between the four technical partners in the PEBL project was most closely aligned to **cooperative**. Governance structures and procedures were subject to deliberation by all technical partners. The Association of Commonwealth Universities, however, was the ultimate decision-maker. This outcome illuminates important contours to the types of collaborations and partnerships discussed in this chapter. Partnerships should be assumed to be complex arrangements. Institutional histories, individual personalities, and varied interests are oftentimes tacitly expressed and can never be completely understood by another party. In PEBL, the arrangement between technical partners, albeit cooperative, was nuanced and fluid. Readers should therefore view these types as existing on a continuum and consider the idiosyncrasies – which are also not fixed – in a partnership to understand the arrangements, contributions, and roles of each stakeholder.

As a **mutual service alliance,** the services provided by the PEBL technical partners enabled cost savings for the 23 recipient universities. The quality assurance outputs, to which COL was responsible, were reliant on inputs and piloting of tools by the 23 partner institutions. Their contributions were mainly in-kind and in the form of professional time and absorbing incidental costs.

It is noteworthy that COL initiated efforts to deepen the relationship with three of the universities in East Africa. COL's invitation to partner on different initiatives tangentially related to PEBL is an example of emergent or new priorities deemed of mutual benefit in relation to capacity building in technology-enabled learning. These new arrangements, which will continue as mutual service alliances, point to a degree of maturation between parties and reinforce the fluidity of partnerships. The interests that bring together partners may be based on a vision or an idea, akin to a propositional arrangement, rather than a specific project. These new mutually beneficial opportunities have deepened the partnership between COL and some of the other partners and bode well for their sustainability.

In the context of the COL Regional Centres arrangement, this was also identified as a mutual service alliance. Like the PEBL project, the partners from the Regional Centres are able to acquire cost-savings for their constituents based on COL's financial contributions and technical inputs. COL, in turn, strengthens its footprint and reaches a wider swathe of institutions across the Commonwealth.

Partnerships have existed over several decades in the case of RETRIDOL and SADC-CDE, and new regional centers have emerged with additions of PACFOLD and the 3CL Foundation over the last several years. The partnership between COL and RETRIDOL and SADC-CDE has been sustained over time because of continuous investment in human and financial resources on the part of both COL and the Regional Centres' hosting organizations – a point that has been articulated to the other two Regional Centres relative to growth and sustainability. External circumstances have also elevated the visibility of the Regional Centres. The New Zealand government made a sizeable investment in PACFOLD and the University of the South Pacific, and there have been discussions to strengthen the relationship with regional bodies in West and Southern Africa. The extent that COL and the Regional Centres may deepen their partnership, with the prospect of securing additional funding from external sources, is the likeliest scenario toward continued sustainability, and more importantly growth.

Canadian Case Studies

In Canada, province-wide needs to develop a more cohesive and comprehensive learning culture in the uptake of online learning were paramount. A differentiator in the Canada-centered case studies was that resources and technical expertise were locally available. There was also direct government involvement and oversight as these partnerships and collaborations were intended to serve each province's taxpayers. Indeed, COL and the PEBL network imparted accountability mechanisms, but as multilateral initiatives, the involvement of government funders was lessened. Scrutinizing the nuances of domestic or internationally formed partnerships, relative to value for money and impact, is beyond the scope of this chapter, though evaluations of entities, in three case studies cited earlier, included a review of expenditures (see Higher Education Quality Council of Ontario, 2020; McGreal, 2020; Young et al., 2021).

The BCcampus and eCampusOntario case studies were designated as **propositional collaborations** and predicated on creating a robust, comprehensive, and evolving online learning ecosystem that would include all the publicly funded postsecondary institutions in each province. The visions from each entity were complementary – eCampusOntario was the spawn of BCcampus yet diverged based on the context of Ontario. Both entities carried a mandate to enhance the student learning experience and did so by identifying visionary goals rather than fully identified need. BCcampus promoted learner access to courses across institutions in British Columbia, developed a comprehensive repository of open textbooks, and engaged other province-wide entities to offer complementary or shared services. Its counterpart in Ontario was tasked with responding to nearly twice the number of institutions. It emulated the work of BCcampus by creating its own open textbook repository for Ontario faculty and students and providing information on transfer requirements between institutions, developing microcredentials, and other innovations.

The propositional collaborations to which we aligned BCcampus and eCampusOntario required an approach of "building the plane as you fly." It required well-resourced funders, and each provincial government was in concert with these entities. In both cases, bold moves were made that necessitated accepting risk that the 70+ institutions shared between the two provinces would buy in to their idea of advancing teaching and learning. As evidenced in the case studies, the risks paid off, and both BCcampus and eCampusOntario continue to make inroads through innovation and providing resonant value to their constituents.

Conclusion

As we conclude, it should not be assumed that mutual service alliances are a better fit to meet the educational needs in the emerging world context, or that propositional collaborations are a better fit to meet the educational needs for the well resourced. Partnerships are contextual, and in those we have identified, the binding element is to advance access to quality learning suitable for rapidly changing social and economic conditions. The presentation of the four case studies demonstrates the variance in pathways to achieve this end. Any view to sustainability must recognize partnerships as dynamic, subject to change, and not necessarily bound by fixed deliverables, time frames, or resources.

References

BCcampus. (2012). BCcampus annual report 2011–2012. Archive document. Available on request.

BCcampus. (2014, January 23). *Memorandum of understanding with BCNET.* Internal BCcampus and BCNET document. Available on request.

BCcampus. (2020). $20 million in 2020. Retrieved from https://bccampus.ca/2020/10/31/20-million-in-2020/

Cardell, S. (2003). *Strategic collaboration: Creating the extended organization*. Canada: Oxford University Press.

Commonwealth of Learning. (2019). *Increasing access to youth work education and training across the Commonwealth.* Accessed from: https://www.col.org/news/news/increasing-access-youth-work-education-and-training-across-commonwealth

eCampusOntario. (n.d.). *Mission and Vision*. Retrieved from https://www.ecampusontario.ca/about/

Eckel, P. D., & Hartley, M. (2008). *Developing academic strategic alliances: Reconciling multiple institutional cultures, policies, and practices*. Retrieved from http://repository.upenn.edu/gse_pubs/187

Eya, P., Shaibu, M. & Amini, C. (2019). Regional training and research institute for distance and open learning (RETRIDOL) – Commonwealth of Learning partnership: A 16-Year journey in pursuit of opening up access to education. Paper presented at the 9th Pan-Commonwealth Forum, Edinburgh, Scotland. Retrieved from http://oasis.col.org/handle/11599/3329

Higher Education Quality Council of Ontario. (2020). *Government's role in digital learning: Review and recommendations for the Ontario Ministry of Colleges and Universities*. Toronto: Higher Education Quality Council of Ontario. Retrieved from. https://heqco.ca/pub/governments-role-in-digital-learning-review-and-recommendations-for-the-ontario-ministry-of-colleges-and-universities/.

Mays, T., Ogange, B., Naidu, S. & Perris, K. (2021). Supporting teachers moving online, using a MOOC during the COVID-19 pandemic. Journal of Learning for Development, 8(1), 27-41. Retrieved from, https://jl4d.org/index.php/ejl4d/article/view/497

McGreal, R. (2020). Evaluation report on three regional centres established by the Commonwealth of Learning. *Commonwealth of Learning*. Retrieved from, http://oasis.col.org/handle/11599/3730

Mohee, R. & Perris, K. (2021). Institutional quality assurance review tool for blended learning. *Commonwealth of Learning*. Retrieved from, http://oasis.col.org/handle/11599/3734

Narayan, S., Naidu, S., Mays, T. & Perris, K. (2021). Out of school children: A contemporary view from the Pacific Island Countries of the Commonwealth. *Commonwealth of Learning*. Retrieved from, http://oasis.col.org/handle/11599/3779

Perris, K., & McGreal, R. (2021). Developing partnerships to acquire impact: The role of three regional centres' capacity building efforts for ODL adoption in the emerging world. *Journal of*

Learning for Development, 8(2), 346–363. Retrieved from https://jl4d.org/index.php/ejl4d/article/view/507.

Perris, K., & Mohee, R. (2020). Quality assurance rubric for blended learning. *Commonwealth of Learning*. Retrieved from, http://oasis.col.org/handle/11599/3615

Porter, D. & Perris, K. (2021) Digital transformation implications for higher education. To be presented by COL President at the Commonwealth Heads of Government Meeting, Kigali, Rwanda, 20 June 2022.

Todeva, E. & Knoke, D. (2005). Strategic alliances and models of collaboration. International Management, Strategy and Enterprise Research. 43. 10.1108/00251740510572533. Retrieved from, https://www.researchgate.net/profile/Emanuela_Todeva/publication/30929528_Strategic_Alliances_andModels_of_Collaboration/links/02e7e51a52fe29827b000000/Strategic-Alliances-and-Models-of-Collaboration.pdf

Trines, S. (2018). Bologna-type harmonization in Africa: An overview of the common higher education area of the east african community. *World Education News + Reviews*. Retrieved from, https://wenr.wes.org/2018/12/common-higher-education-area-chea-of-the-east-african-community

UK Aid. (2021). Partnership for enhanced and blended learning. Foreign, Commonwealth Development Office. Retrieved from, https://www.spheir.org.uk/partnership-profiles/partnership-enhanced-and-blended-learning

Young, J., Nzegwu, F., Schaeffler, V., Chiriyankandath, J., Khandoker, F., Calamassi, S. Perris, K., Onyango, G., & Ikiara, L. (2021). Blended learning in universities in East Africa: Lessons from the PEBL partnership. *International Network for Advancing Science and Policy (INASP)*. Retrieved from, https://www.inasp.info/project/summative-evaluation-partnership-enhanced-and-blended-learning-project

Marketing Online and Distance Learning 36

Maxim Jean-Louis

Contents

Abstract

How do colleges and universities market online learning? This chapter explores contemporary approaches to marketing online courses and programs and uses the historical lens of marketing Athabasca courses and degrees as a backcloth for

M. Jean-Louis (✉)
Contact North | Contact Nord, Sudbury, ON, Canada
e-mail: maxim@contactnorth.ca

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_33

understanding the unique challenges for this work. The chapter introduces a new approach to the marketing funnel as well as an understanding of the growing importance of social media in marketing to potential learners. The growing global competition for learners is also explored. The growing use of analytics and the challenges of overcoming myths are also discussed. The chapter gives emphasis to the importance of retaining students as well as "capture" of a student registration.

Keywords

Strategic marketing · Marketing funnel · MOOCs · Brand differentiation · Target and niche markets · Social media marketing · Analytics · Student retention

Introduction: Understanding Context

Marketing any product or service in a highly competitive market is difficult and challenging, especially when the market constantly changes and the "customer" is a sophisticated buyer. It demands a deep understanding of what successful customers both expect and like about the product and services they have purchased and an ability to identify the unique value proposition associated with the organization offering that product or service. It also requires those engaged in marketing to position the products and services on offer with integrity – recognizing their strengths, limitations, and weaknesses. Marketing is not easy, as this chapter will demonstrate.

Based on 30 years of marketing experience in Canada and on significant reviews of marketing activities in Australia, Britain, Europe, and other countries, this chapter offers an overview of the work involved in marketing for online, distance, and open education.

The chapter is focused on the challenges faced in marketing something "different" (online learning) from what is understood as "normal" (face-to-face teaching) and on the core processes required to secure and retain a student registration and to build on student completion to secure the next registration.

The Products and Services Have Changed Over Time: Posing New Marketing Challenges and Opportunities

Before looking at marketing as a process and offering a description of the key components of contemporary marketing for online and distance learning, it is important to recognize that the challenges faced by those who market and secure registrations have changed over time. This is important because, as the sector has developed, the challenges faced have been different and each phase has demanded a different marketing response.

Distance education began with Pitman shorthand courses and, in 1858, the opportunity to use distance education and assessment by mail to complete a degree in law at the University of London. From the beginning, the three key issues of access, quality, and cost have shaped much of the challenge which marketing needed to address. This chapter uses a case study of Athabasca University – Canada's leading online and distance teaching university offering courses from skills upgrading to masters and doctoral degrees to approximately 40,000 learners across Canada and around the world each year. This case study will highlight many of the challenges that those marketing online and distance learning continue to face and will set the stage for an understanding of what the current marketing challenges in this space are.

The 1970s Positioning the New and Responding to Issues About Quality

When open and distance education began in Canada in the 1970s with the founding of Athabasca University in Alberta and Télé-université in Quebec, marketing needed to convey a very specific value proposition. For Athabasca University, anyone over the age of 18 could begin studying a university-level course or program irrespective of past educational performance or experience – no prior educational admission requirements – which raised issues of quality in the minds of some. These were new propositions, alien to a great many.

Further, learners could begin their studies whenever they were ready (the university has 12 admission periods for undergraduate courses – it was not semester based) and learners could call for assessment when they were ready to do so, which changed the pattern of recruitment and registration. This too was new and required a lot of explanation.

Learning resources – mainly print with some audio and later video (1977) – were dispatched to the learners' home and learners connected to their assigned tutor by telephone. Those studying science had mini-lab kits sent to their home for some basic experiments. This was very much the situation between 1970 and 1994, with audio and videoconferencing (optional) becoming available in the mid-1980s. This required marketing to position "self-study" and 1:1 tutoring as effective ways of learning – again, new to a great many people.

A specific challenge at Athabasca University was to increase the number of students pursuing programs and qualifications at Athabasca rather than simply using courses to transfer credit to other institutions. For example, in 1994–1945 there were some 11,386 Athabasca undergraduate students but 92% of these were taking just one or two courses and then transferring their credits to other programs across Canada. While this is a good thing and is in line with the lifelong learning mandate of the university, it meant the university was graduating between 200 and 250 students with a first degree annually and this created issues of brand perception for government and others.

The second challenge in this period was the low level of course completion. In the 1990s, completion rates for students new to distance education students at Athabasca were approximately 38% and for students who were continuing their studies about 47%. A key challenge for marketing was to overcome the idea that studying at a distance was “hard” and that completion rates “were so low that it was not worth the money.” Again, this posed significant challenges for marketing teams, as it continues to do for many engaged in marketing online and distance learning around the world.

The third challenge, which is connected to these first two, was just the scale of registrations needed to sustain the institution, tuition revenue being a key component of the financial health of the organization. Because of the high turnover of students (low number of courses taken and low completion rates), the university needed to grow by 10% each year from a base of 25,000 course registrations which meant securing some 23,000 new course registrations from approximately 17,500 individuals new to distance education. Securing new registrations from existing students or past students became a key marketing strategy – a point returned to below. Athabasca became resilient and robust because it knew how to do this work well.

1994 and the Arrival of Online Learning

In 1994 the Internet and online learning began to “take off,” with Athabasca University offering the world’s first fully online MBA alongside other graduate programs in distance education and nursing and some online undergraduate courses, especially in business, nursing, and professional studies.

The Internet posed new marketing challenges, since access to the Internet was not widely available (it is still not available in large parts of rural Canada and to Indigenous communities living on reserve lands) and required telephones to be hooked up to a telephone modem cradle device – something which few people had.

But online learning has grown very rapidly. By early 2011 in just one Canadian Province – Ontario – there were over 25,000 undergraduate-level courses available online from publicly funded colleges and universities which had attracted 830,000 registrations. What is more, completion rates for online learning were high – 76% for colleges and 85% for universities, both of which required program admission based on prior educational achievement, unlike Athabasca.

Satisfaction studies, whether at an institutional level or system level, have also shown a high degree of satisfaction with students’ learning experiences. A 2002 Government of Alberta study placed Athabasca University first among the four universities in Alberta for satisfaction with the relevance of courses, overall educational experience, and value for money. Frequent satisfaction studies undertaken by Contact North | Contact Nord in Ontario also show high satisfaction levels from students with their online learning experience.

2012 MOOCs and the Globalization of Learning

The first massive open online course (MOOC) was created by Stephen Downes and George Siemens and was called *Connectivism and Connective Knowledge* and offered through the University of Manitoba in 2008. But the real sea change from a marketing perspective came in 2012 when two professors at Stanford offered *An Introduction to Artificial Intelligence* for free and 160,000 individuals from around the world engaged with this course. The creators – Sebastian Thrun and Peter Norvig – saw potential and created *Udacity* (2012) which was soon joined by MIT's *EdX* (2012) and *Coursera* (2012), with the Open University (UK) and 11 other universities creating *FutureLearn* in 2012. Also in play was Udemy, founded in 2010 as an open marketplace portal for online courses developed by others. Unlike Coursera, which is a curated marketplace portal (only "topflight" institutions or organizations can offer courses on its platform), Udemy is open to any provider able to offer a course. Udemy's courses are largely vocational, with a strong focus on technology, business, and design.

Quite quickly, many quality and free online courses were offered which attracted very large numbers of learners. Not all were interested in qualifications or assessment – they wanted to access to quality learning, not credit. But the existence of MOOCs and their growth changed the dynamics of the market, not least by making online learning part of the fast growing, globalized market for education and demonstrating both the advantages and challenges of learning at scale.

Also at this time, other players entered the global market. The University of Phoenix, founded in 1976 as a private university (now owned by private investors), secured a significant market share in the USA when it moved its programs online in 1989, though repeatedly failed to gain a foothold in Canada. By 2010, it was registering over 470,750 students in its degree and diploma programs worldwide and was reporting revenues of US$4.5 billion.

Various attempts by others to "go global," such as the Open University's failed attempt to enter the US market in 1999 (it closed in 2002 – Meyer [2015]) and the failure of AllLearn – a consortium formed in 2000 by Yale, Stanford, and Oxford to offer online courses worldwide, point to the marketing and recruitment challenges of a global offer at that time. After spending over US$12million, it closed in 2006. In 2000, Columbia University sank US$30 million into an online learning initiative called Fathom, which failed to secure sufficient registrations and closed after just 3 years. Purdue University's global division, created following the university's acquisition of Kaplan, has lost over $63 million in its first 2 years of operation. One explanation: "a deliberate and focused investment of $28.5 million in marketing" produced a gain of just 2,000 new students. These examples show how complex securing student registrations can be: Even major universities with significant marketing resources and access to world-class academic expertise have failed (Watters, 2021).

MOOCs also provide an interesting case. Originally conceived as free, accessible, and fully online lifelong learning opportunities, the MOOC providers quickly realized that revenues were key to survival. Launched in 2012 and pushed hard in the following 8 years, MOOC providers gradually shifted from free to fee and from being credential free to focusing increasingly on credentials, especially micro-credentials and degrees. EdX was created with a $60 million "starting" fund from Harvard and MIT (it more recently sold for $600 million to an online program management company); FutureLearn was launched with initial funding from the Open University (UK) and its partner institutions. In 2019, FutureLearn secured £50 million (approximately US$69 million) from SEEK Ltd. in exchange for majority ownership. Coursera had raised $300 million before the pandemic.

By December 2019, some 13,500 MOOCs were offered on a number of major platforms from over 900 hundred universities and colleges and had secured 120 million students worldwide. As part of their offer there were 820 microcredentials (certificates, nano-degrees, specializations, and MicroMasters) and 50 full degrees. Coursera was the single largest player in this market (45 million learners, 3,800 courses) followed by EdX (24 million learners, 2,640 courses), Udacity (11.5 million learners,200 courses), and FutureLearn (10 million learners,1,000 courses). These developments are important: They help create demand for all forms of online learning and give some credibility to this form of studying. The MOOC strategy 2012–2019 was to build capacity and gain market share. But now they are focused on profitability, which is moving them into the credentials space on a global scale.

2020 and the Pivot to Online During the Pandemic

The global COVID-19 pandemic forced 1.4 billion learners to pivot to some form of remote learning, with many experiencing this form of instruction for the first time. This created challenges and opportunities for new services and new approaches to the market.

MOOCs were already well positioned to respond to the challenge of remote learning. In 2020, Coursera attracted 31 million learners, EdX 10 million and FutureLearn five million. Indeed, according to Class Central's MOOC monitor (Shah, 2020), one-third of all learners who ever registered for a MOOC since they began did so in 2020. What is more, MOOC providers secured in excess of US$900 million in new funding, enabling the major players to rebrand and expand their market base through more targeted programming and the development of subscription-based services (an annual fee for access to a wide range of courses rather than "pay by course"). So successful was 2020 for the entire MOOC sector that Coursera launched itself on the New York Stock Exchange and was able to raise $4.52 billion in its initial public offering. At the time of writing (October 2021), the company shares were trading at US$32.81 indicating that the company is retaining its market value despite continuing to lose money ($46.5 million in the second quarter of 2021) (Shah, 2020).

These developments are shaping aspects of the market: a demand for "on-demand" courses, skills assessments, and credentials; growing demand for short-duration courses and programs that demonstrate to employers that those who complete them have skills and competencies they are seeking; and highly affordable courses and new forms of credentials.

This marketing journey – the building blocks on which current marketing strategies and work are based – demonstrates how agile and nimble providers of online learning have had to be, especially as the market becomes more complex, global, and competitive.

The Process of Marketing Online and Distance Learning Services

There are a variety of approaches to marketing educational services (Kotler & Keller, 2014; Miller, 2017). Experience suggests that there are six key elements for any marketing team seeking to ensure student registrations and growth in overall volumes. In this section of the chapter, we will explore these six elements in detail.

Element 1: Building the Brand Story: Differentiation

The beginning of any marketing effort is the need to build brand identity and brand story in the marketplace. The underlying task of brand development is differentiation – ensuring that the institution is seen to be both a way of meeting a potential student's need and doing so differently from others. Differentiation in the market is the purpose of brand strategy (Porter, 1996).

This sounds straightforward, but it is in fact a difficult challenge. The brand story has to be powerful, different, and effective but cannot be so different from the brand story of other learning providers that it raises questions about whether the brand claims are realistic, out of line with the norms of the sector or just "whacky." In particular, claims about the value of a course or program in terms of employment need especial care – job markets change, as does the value attached to specific programs and the skills needed for employment. The University of Phoenix, for example, has been fined for false advertising related to job placement and employment opportunities linked to its programs. In 2019, these false claims cost the university US$191 million, $141 million of which was paid directly to the students directly impacted by the claims (Brooks, 2019).

Key brand messages include ideas of "smart learning," "flexible learning," "anytime learning," and "quality learning." The brand identity is often presented through individual success stories, testimonials from employers, or others who act as brand ambassadors. For example, the popular comedian and star of award-winning TV show Schitt's Creek, Dan Levy, recently championed the MOOC *Indigenous Canada* offered by the University of Alberta (Bench, 2020). By doing so, he significantly increased registrations but also created what is known as brand presence: ensuring that the University of Alberta was in the MOOC business and that this course was a high-quality experience across a range of public platforms (newspapers, television, and radio) and social media.

One challenge the marketing team has is ensuring that the brand they are building and sharing in the marketplace accurately reflects the experience students have of their courses and the institution. At the Open Polytechnic of New Zealand, the marketing team have invested a considerable amount of energy and time mapping the customer journey in the institution and in identifying the moments of truth in that journey – those experiences which put the brand claims to the test. For example, if a tutor suddenly is unavailable to support the learner at a time of their greatest need or when a tutor takes 2 months to provide feedback on an assignment, what do these moments say about the claim to be "a highly personalized and responsive" learning service? Frequent surveys of student experience, such as First Impressions Surveys (Open Polytechnic, 2020) or focus groups looking at student satisfaction, are all key components of ensuring that the brand story aligns with experience.

Element 2: Target Marketing and Market Segmentation

Blanket marketing campaigns on radio, television, newsprint, or social media are used to create the large brand story, but most student recruitment campaigns are focused on targeted groups in specific communities. Blanket campaigns are expensive and produce some returns on investment, but they are more about brand positioning than recruitment.

For example, a study program focused on upskilling cybersecurity capabilities of people working in the financial services sector or an MBA in Hockey Management or a microcredential in chemicals handling has specific markets that can be directly targeted, and the impact of this investment can be measured in terms of enquiries, applications, and registrations.

To do this well, the marketing team need to have a clear understanding of who a course or program of study is intended for and what the demographics of that target market are. That is, they need to undertake a clear market segment analysis of who is taking the course or program now and how that profile suggests targeted marketing activities. The more we know about how existing students learned about the course or program, what the characteristics of these students are, and what the key factors influencing their decision to register in this program with this institution were, the more accurately the marketing team can target their marketing efforts.

If the program of study is brand new or the mode of delivery so different from how such programs are normally delivered, then a close understanding of the market segment can come from connections with employers, focus groups with potential students, and an in-depth set of conversations with those creating the program. For example, a new program for food service workers who work exclusively in eldercare facilities has a clear target market which, when well researched, can be reached quickly and effectively.

Element 3: Mining Niche Markets and Services

"Mining" a market – aggressively pursuing a specific segment over a long period of time to secure ongoing registrations and repeat business from the same segment of the population – is an established practice. For example, certain professions, like accounting, require both initial certifications through accredited learning and ongoing learning for continuing professional development. Universities and colleges recognize this market and "mine" it as a niche market, making sure that their courses and programs meet certification requirements of the profession, teach to the current practice standards within the profession, and are widely understood to be of quality.

Some examples of these market niches have produced rich returns for online and distance learning institutions:

- Helping practical nurses (PNs) become registered nurses (RNs) and then helping registered nurses secure a degree in nursing (and offering a route to masters and doctoral degrees). There is a range of online programs offered by a variety of institutions and also nursing degrees by assessment of competences and capabilities marketed by the University of Wisconsin and Western Governors University in the USA.
- Helping teaching assistants working in schools qualify as teachers through flexible and online learning. The Open University (UK) pioneered this development.
- Customizing master's degrees for specific organizations. For example, AT&T partnered with Georgia Tech and Udacity to offer a master's degree in computer science through Udacity's MOOC platform. Athabasca University has a customized MBA for those seeking a career in hockey management.
- Courses and programs in mechatronics that begin online and include lab and fieldwork.

Access to specialist data-based partnerships and alliances with professional bodies and unions, using partnerships with lending organizations (banks, financial services) to ensure that those in certain sectors (e.g., IT and creative industries) know about available programs, are all being used as means of securing access to these niche markets.

Element 4: Social Media and Digital Marketing

According to a study by Converge Consulting (Oleson & Kelly, 2016), the majority of potential students for a course or program are significantly influenced in their decision to take the course from a specific institution by social media. Indeed, a variety of studies show that Facebook, Instagram, Twitter, and Snapchat are the "go to" sources that will trigger an inquiry from a potential student – much more than any other media (Ascione, 2018; Credo, 2016; Lytle, 2012). Any modern marketing campaign must leverage these platforms.

The challenge is to know where to invest the available energy and scarce resources: There are so many platforms and so many competing "voices" on these platforms. The resolution, at least for most college and university marketing departments, is to focus on a small number of platforms that produce registrations. In particular, Facebook and LinkedIn are platforms which are most commonly used, especially when mature students are the target market.

The primary uses of these platform are: (a) to share student stories of success; (b) to provide employer testimonials of the value to them of a course or program of study; (c) to be a component in the launch of new programs and courses; and (d) to celebrate milestones and successes of the institution. All of these posts on social media are intended to drive traffic to the college or university website and all of this activity is traceable. Social media are primarily about building awareness and encouraging consideration, though some have been doing more with social media to make the decision to commit easier (Kim, 2020).

Supporting the inquiry process is also key and students expect rapid response to email, text messages, and phone calls. Some marketing departments have deployed artificial intelligence (AI)-enabled chatbots to support recruitment, admission, and financial aid. They are being deployed at American universities such as Purdue University (AtlasRTX), Rockhurst and Georgia State (Nazarenko, 2020), and by several colleges and universities across Canada and around the world. Their primary value is that they operate around the clock and can be trained to offer empathic, accurate, and appropriate advice. This is especially useful for international recruitments across a range of time zones.

Element 5: Focus on Retention Not Just Attraction

A great deal of energy is spent securing a first-time student for a university or college. The real opportunity is to continue to secure registrations in courses and programs from that same student over time. Between the offer of the first distance education course by of Athabasca University in 1973 (the course was *World Ecology*) and 2003, it had secured over 490,500 course registrations. Just 142,681 (29%) had taken five or more courses. The cost of securing each new student in 2003 was approximately eight times that of securing a new course registration from an existing student. Retention is a lower-cost way of ensuring registration growth and of developing a "word-of-mouth" recruitment opportunity.

Ormond Simpson (2005) wrote about this challenge in the context of the UK Open University. He suggested that the cost of each new student recruited at that time was approximately £500 (US$685), with some 30% of the cost of recruitment going to replace students who dropped out. Indeed, the starting point for his analysis is this statement:

> Higher education is a strange business. No other form of manufacturing would take in tested components (new students) and produce a final product (graduates) with a wastage rate of 20% or more. Or at least if such a business existed then it would very rapidly go bankrupt. (Simpson, 2005, p. 34)

These kinds of observations have led to the widespread use of both predictive and prescriptive analytics to reduce dropout (when a student stops studying) and dropdown (when a student delays their studies for a period of time). Predictive analytics shows what will happen in the future, whereas prescriptive analytics recommends which actions to take to improve outcomes (Bilella, 2013).

A typical analytics solution uses both to determine how students respond to different marketing and recruitment campaigns throughout the enrollment cycle and makes suggestions for appropriate intervention. Using such analytics can have a significant impact on retention. For example, Texas Tech University was able to grow their enrolment at 9% annually but also increased student retention by 2.6% using their analytics solution. Others have reported more spectacular results, including a 22% gain in graduation rates at the University of South Florida (Civitas, 2020).

Element 6: Using Analytics and Customer Relationship Management (CRM) Systems to Track Return on Marketing Investment

The growing use of data for evidence-based decisions in marketing is a key characteristic of an effective marketing strategy. The marketing team need to understand the return on investment from the marketing activities in which they are engaged. This requires a highly disciplined use of customer relationship management software like Salesforce, PeopleSoft, Intelliworks, or Azorus and the focused use of analytics from all of the digital activities in which the team is engaged.

Typically, marketing teams will describe the "funnel" – the stages in the journey to registration and completion of a program. There are a variety of versions of the funnel, but the University of Newcastle (UK) has adopted a particular language for their funnel which is insightful. Rather than use the traditional funnel (shown on the left in Fig. 1) they have adopted the language of building brand champions or advocates (shown on the right in Fig. 1).

The aim of the marketing team is to ensure that every student and alumnus is more than satisfied with their learning experience, but is an active brand ambassador. The best form of marketing is "word of mouth" and a recommendation from a graduate to a potential student is the strongest form of marketing, as well as the least expensive. This is why the question "would you recommend this course/ program to a friend or colleague" is a critical piece of data when looking at student satisfaction.

The funnel helps the marketing team understand whether a particular targeted marketing campaign worked and if it did, in which market segments and at what

Normative Funnel	University of Newcastle Funnel
Prospects / Inquiries – securing enquiries and page views	• Consider – a learner explores options and, in doing so, is steered towards Newcastle
Applications – securing applications for courses and programs	• Decision – a learner decides both what they want to learn and where and makes an application
Acceptance – securing an acceptance of an offer	• Adoption – the learner receives an offer and accepts it and begins to adopt the identity of belonging to the university.
Deposit – securing a payment.	• Advocate – the learner becomes an active advocate for the university, its courses and programs and recruits others

Fig. 1 The marketing funnels

cost per registered student. It also helps us see the extent to which alumni and graduates act as advocates and brand ambassadors, championing the work of the institution.

Even After 50 Years, Marketing Still Has to Address Some Persistent Issues

Despite significant investments in marketing and branding of online and distance education over the last 50 years, some issues remain in the public domain that have been difficult to change. Three in particular have challenged every single marketing team.

"Face to Face is Best and Online and Distance are Not as Good"

Despite compelling evidence of there being no significant difference in learning outcomes between online and face-to-face learning (Russell, 1999; Nguyen, 2015) and substantial evidence of the inefficacy of face-to-face instruction (Bernard et al., 2004; Bethel & Bernard, 2010; Tamim, Bernard, Borokhovski, Abrami, & Schmid, 2011), the idea that face to face is better persists in the public consciousness. In part, this is understandable – almost all compulsory schooling is face to face and the bulk of higher education around the world is also face to face. Yet (before COVID-19) registration in face-to-face learning has slowed significantly and in some regions declined, while in North America, online registrations have grown dramatically (Lederman, 2018). In the USA, for example, 6.9 million learners (35.3% of all postsecondary learners) were enrolled in online courses at degree-granting institutions in 2020 (before COVID-19) and the majority preferred this form of learning to face to face (Wallis, 2020). The online market is expanding even more rapidly in the Asia-Pacific region.

There is growing evidence for the efficacy of online learning – higher rates of knowledge retention (Keegan, 2020) and more rapid acquisition of knowledge, skills, and capabilities (Schoox, 2018).

"The Loneliness of the Long-Distance Learner"

This idea – that the student is on their own with little support and has to be a "self -starter to survive" – became a dominant kind of idea in the 1970–1994 period, before the Internet (Robinson, 1989). Sadly, the idea has persisted (Ferguson et al., 2020). Marketing has to be just as much about the range of supports and services and the ways in which help (from technical help to study skills, career guidance, and course choice) is available either by audio or videoconference or through integrated computer-mediated systems.

"It Must Be Easier to Do Online, and Therefore It Should Be Cheaper: After All, There is Not as Much Instruction"

Online and distance education courses that are effective and show significant outcomes are instructionally designed, highly engaging, and involve significant levels of both peer-to-peer and instructor support. Typical expenditure on an Open University UK course before the emergence of the Internet and its widespread use would be in the order of £3–5 million, including television production, radio, and high-quality course packages. The learning was more demanding than many anticipated and there were fewer places to "hide" as a learner. Tutors did know how you were doing and examinations and assessments were substantive. Rather than being easier, the learning and assessments were more comprehensive than in many face-to-face classes. Yet, this meme persisted for some time (and does so today in some markets). The marketing strategy of using academics from other institutions to praise courses as "challenging" and "comprehensive," sharing independent assessments, and using student testimonials has largely countered this narrative.

"It Is Easy to Cheat in an Online Course: So Where Is the Quality?"

The earliest recorded cases of cheating involved a civil service entrance examination in China thousands of years ago. Cheating on exams and bribery for academic honors was written about in *The Book of Swindles* published in 1617. Benjamin Franklin also had to retract a 1756 paper for reasons of inappropriate use of other people's data. It is not a new problem, but the perception in the marketplace is that cheating is rife in online and distance education.

The scale of the problem for all forms of higher education (face to face *and* online) is substantial. A 2018 study from *Turnitin* suggested 16% of the 38.3 million papers analyzed by their software-matched papers developed by essay mills. In an analysis of cheating, Eaton (2018) found between 3.5% and 7.9% of students surveyed across the world admitted to paying for writing services. One study suggests the figure could be as high as 22% (Thomas, 2015), with some students buying more than one paper. Canada ranks fourth in the world for these kinds of purchases (Eaton, 2018). These data relate to all students – there is no compelling evidence that online students cheat less or more than students studying in class or in blended learning. The challenge is that many in the market, especially some influencers, think that online makes it easier to cheat.

These perceptual issues – based on beliefs and a value set supported by some examples – have persisted over a long period of time. Developments in assessment, including the use of biometrics, virtual proctoring systems, AI-based pattern recognition systems, and plagiarism detection software, all make cheating online easier to detect. The evidence of no significant difference in learning outcomes between face to face and online is compelling. But market perceptions persist despite evidence, the development of new tools, and systematic evaluations of the challenges (Fig. 2).

Marketing teams cannot ignore these concerns and memes and others like them. What they need are direct, clear, and unequivocal answers to the challenge or

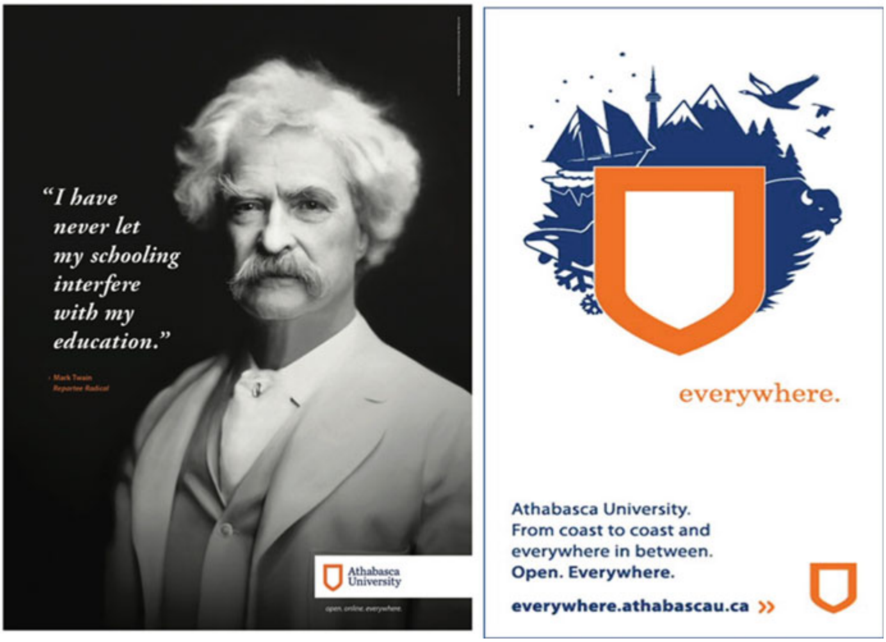


Fig. 2 Advertising materials from Athabasca University (2015), Canada

problem and for this to be the systematic, standard, and consistent response for the institution. Consistent, optimistic, and evidence-based but effective communication is needed to counter these challenges. Humor can also be helpful in this work, as the "tongue-in-cheek" advertisement below from Athabasca University makes clear.

Conclusion

There is a growing evidence base for the effective work of marketing teams, aided now by access to rich analytics and customer relationship management (CRM) tracking data. But marketing is still an art form that commands imagination and creativity. Not every university or college needs to use the image of a student in a cap and gown at graduation as a key component of the brand image of the institution, yet many still use this image. In seeking to differentiate an online and distance education, creative design and imaginative advertising have been used to sharply differentiate this form of learning from more traditional approaches, with varying levels of success. From powerful images, quirky images, and quotations the aim is to catch the eye, imagination and interest of a potential or existing student help them make a commitment to the next step in their learning journey. The ultimate aim is: recruit every student as a member of the marketing arm of the institution as brand ambassador and program recruiter. Creativity, imagination, evidence-based work, and effective communication are the hallmarks of this work.

References

Ascione, L. (2018). Are you using social media for student recruitment? You should be. *eCampus News* (December 3, 2018). https://www.ecampusnews.com/2018/12/03/are-you-using-social-media-for-student-recruitment-you-should-be/

Atlas RTX. *More applications. Higher enrollments. More successful students*. West Lafayette, Indiana: Krannert School of Management, Purdue University. https://atlasrtx.com/solutions/highereducation

Bench, A. (2020). Canadian star Dan Levy signs up for indigenous courses at University of Alberta. *Global News* (August 19, 2020). https://globalnews.ca/news/7285443/dan-levy-indigenous-canada-course-social-media/

Bernard, R. M., Abrami, P. C., Lou, Y., Borokhovski, E., Wade, A., Wozney, L., & Huang, B. (2004). How does distance education compare with classroom instruction? A meta-analysis of the empirical literature. *Review of Educational Research, 74*(3), 379–439.

Bethel, E. C., & Bernard, R. M. (2010). Developments and trends in synthesizing diverse forms of evidence: Beyond comparisons between distance education and classroom instruction. *Distance Education, 31*(3), 231–256.

Bilella, J. (2013). Applying data mining and Google analytics to student recruitment marketing. *Summer Academe: A Journal of Higher Education, 7*. https://doi.org/10.5203/sa.v7i0.506.

Brooks, K.J. (2019). University of Phoenix owner fined $191 million for deceptive ads. *CBS News* (December 10, 2019). https://www.cbsnews.com/news/university-of-phoenix-ftc-settlement-of-191-million-cancels-some-student-loan-debt/

Civitas Learning. (2020). *What really works: A review of student success initiatives*. Austin, TX: Civitas Learning.

Credo. Using social media as a student recruitment tool (December 15, 2016). https://www.credohighered.com/blog/use-social-media-as-recruitment-tool

Eaton, S. (2018). Academic outsourcing: Essay mills, theses-on-demand and contract cheating. Workshop presented at the Taylor Institute of Teaching and Learning, University of Calgary. April 5, 2018. https://prism.ucalgary.ca/handle/1880/106787.

Ferguson, C., Thomas, V. and Light, D. (2020) How to help teenagers transition to virtual learning during COVID-19. *Education Development Centre*, August 3rd. Available at http://cct.edc.org/about-cct/news/loneliness-long-distance-learner

Keegan, L. (2020) *23+ benefits of eLearning you should know*. Available at SkillsScouter https://skillscouter.com/benefits-of-elearning/. Accessed 1 February 2021.

Kim, K. (2020). How the University of Newcastle uses sprout to power their full funnel marketing strategy. June 29, 2020. https://sproutsocial.com/insights/university-social-full-funnel-marketing/

Kotler, P., & Keller, K. (2014). *Marketing management* (14th ed.). New York, NY: Pearson.

Lytle, R. (2012). High school students increasingly use social media for college search. *US News and World Report* (September 28, 2012). https://www.usnews.com/education/best-colleges/articles/2012/09/28/high-school-students-increasingly-use-social-media-for-college-search

Meyer, K. (2015). The closing of the US Open University. *Educause Review* (January 1, 2006). https://er.educause.edu/-/media/files/article-downloads/eqm0620.pdf

Miller, D. (2017). *Building a story brand – Clarifying your message so customers will listen*. New York, NY: Harper Collins.

Nazerenko, Y. (2020). Recruitment chatbots: Employ one and hire faster. *SendPulse blog* (May 14, 2020). https://sendpulse.com/blog/recruitment-chatbots

Nguyen, T. (2015). The effectiveness of online learning – Beyond no significant difference and future horizons. *Journal of Online Learning and Teaching, 11*(2), 309–319.

Oleson, A., & J. Kelly. (2016). Digital advertising: Rethinking practices for recruitment. Presentation available at SlideShare at https://www.slideshare.net/ConvergeConsulting/digital-advertising-rethinking-practices-for-recruitment

Open Magazine (#8, Spring 2008, p. 40). Athabasca University, Alberta, Canada.

Open Polytechnic. (2020). First impressions survey. https://www.openpolytechnic.ac.nz/assets/a-First-Impressions-Survey-PDFS/First-Impression-Survey-T1-2020.pdf

Porter, M.E. (1996) What is strategy? *Harvard Business Review,* November–December at pages 61–78.

Robinson, K. (1989). Quest – The loneliness of the long distance learner. *Nursing Times, 85*(5), 72–73.

Russell, T. L. (1999). *The no significant difference phenomenon: A comparative research annotated bibliography on technology for distance education: As reported in 355 research reports, summaries and papers*. Raleigh, NC: North Carolina State University (mimeo).

Schoox. (2018). *Stunning Statistics That Prove the Power of eLearning.* Blog Post available at https://blog.schoox.com/stunning-statistics-that-prove-the-power-of-elearning. Accessed February 1st 2021

Shah, D. (2020). The second year of the MOOC: A review of MOOC stats and trends in 2020. *The report by class central* (December 14, 2020). https://www.classcentral.com/report/the-second-year-of-the-mooc

Shah, D. (2021). Coursera Q2 2021. *The report by class central (August 4, 2021).* https://www.classcentral.com/report/coursera-q2-2021/

Simpson, O. (2005). The costs and benefits of student retention for students, institutions and governments. *Studies in Learning, Evaluation, Innovation and Development, 2*(3), 34–43.

Tamim, R. M., Bernard, R. M., Borokhovski, E., Abrami, P. C., & Schmid, R. F. (2011). What forty years of research says about the impact of technology on learning – A second order meta-analysis and validation study. *Review of Educational Research, 81*(1), 4–28.

Thomas, A. (2015). Forget plagiarism: there's a new and bigger threat to academic integrity. *The Conversation* (August 19, 2015). https://theconversation.com/forget-plagiarism-theres-a-new-and-bigger-threat-to-academic-integrity-46210.
Turnitin. The Rise of plagiarism: contract cheating. https://www.turnitin.com/products/originality/contract-cheating
Wallis, L. (2020). *Growth in distance learning outpaces total enrollment growth*. State of Oregon Employment Department (August 11, 2020). https://www.qualityinfo.org/-/growth-in-distance-learning-outpaces-total-enrollment-growth
Watters, A. (2021). *Teaching machines – The history of personalized Learning*. Cambridge, MA: MIT Press.

Managing Innovation in Teaching in ODDE 37

Tony Bates

There is nothing more difficult to plan, more doubtful of success, nor more dangerous to manage, than the creation of a new order of things.
Machiavelli, "The Prince," 1532

Contents

T. Bates (✉)
The G. Raymond Chang School of Continuing Education, Ryerson University, Toronto, Ontario, Canada
e-mail: tony.bates@ubc.ca

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_34

Abstract

Innovation is the lifeblood of open, distance and digital education (ODDE), but it has often proved difficult for ODDE institutions to continue to innovate in response to a changing world outside. Innovation though is not "magic" or serendipitous. There are well-established methods by which innovation can be nurtured and managed in ODDE. Following a literature review of innovation in ODDE, the chapter discusses common myths regarding innovation, several barriers to change in ODDE institutions, then offers five strategies to support innovation. A case study is provided that illustrates a number of factors that support sustained innovation in ODDE, and the chapter ends by suggesting that innovation is not an end in itself but is best managed by focusing on the major, long-term goals of ODDE, and the main challenges that ODDE institutions face. In particular, ODDE institutions need to remain innovative to meet increasing competition from the conventional higher education institutions and above all from large, digital technology companies.

Keywords

Management · Innovation · Strategies · Barriers and drivers of change · Technology · Teaching

What Is Meant by "Innovation"?

Most of the literature defines innovation as the implementation not only of new ideas, knowledge, and practices but also of improved ideas, knowledge, and practices (Kostoff, 2003; Mitchell, 2003). Innovation is thus different from reform or change.

The OECD (2016) has suggested that innovation indicators in the education sector should be linked to specific social and educational objectives such as learning outcomes, cost efficiency, equity, or public satisfaction. Indicators in the ODDE field might also include increased access, lower cost, completion rates, equity, and inclusion for learners.

The key point is that innovation should be judged by the extent to which it adds value, either to an institution as a whole, or more specifically for its targeted students.

Why Is Innovation So Important in ODDE?

There are several reasons – or drivers – that make innovation particularly important for ODDE.

Innovation Is Part of the Lifeblood of ODDE

Open and distance education has a long history. Because it originally lay outside conventional education, it was often seen (certainly within the ODDE community) as being radically different and therefore, by definition, innovative.

Another driver of innovation in ODDE is that ODDE has always depended heavily on technology: the postal service, printing, on-demand publishing, radio and television, desktop computers, and then the Internet. The constant change in technology has often been the stimulus for renewed innovation in ODDE.

Another driver of innovation – at least in the past – has been the desire to bring down the cost per unit/student through economies of scale. The large national open universities created in the 1970s are one example. More recently, Massive Open Online Courses (MOOCs) are another. However, economies of scale have not proved always to be compatible with maintenance of quality, at least as measured by completion rates. A better understanding now exists about the relationship between cost and quality (see Daniel, Kanwar, & Uvalić-Trumbić, 2009), but the high cost of postsecondary education remains an issue. Politicians and others outside education still tend to see the potential of open and online learning and the use of digital technologies for reducing the costs of education, but this will require yet more innovation in ODDE.

A further driver of innovation – the "open' part" – has been based on widening access, serving students who have not been well served by conventional institutions. This has resulted in no or lower tuition fees, no prior qualifications being needed for entry to university studies, prior learning assessment, and more recently, open educational resources (OER). Access also has been widened beyond reducing the cost to learners and widening access, to embracing diversity, in race, physical disabilities, and for others marginalized in society, such as prisoners.

However, Covid-19 demonstrated clearly that when all learners need to go online extremely quickly without adequate time for preparation, this can lead to serious problems of inequity, such as lack of access to equipment or adequate bandwidth (see Commonwealth of Learning, 2021). Overcoming such inequities again will require innovation in the delivery of digital services by ODDE if they are to reach the already underserved with digital learning.

So innovation has been – and should continue to be – an essential component of ODDE.

Innovation: Technology or Teaching?

Although there is a long history of innovations brought about by ODDE, nevertheless, there are still challenges. Too often the focus is on technology, but not on improved learning.

A major challenge in the second decade of the twenty-first century is a need to focus on developing the high-level intellectual skills that enable learners not only to meet the rapidly changing demands in the job market due to automation, digitalization, and continuous "churn" in jobs, but also to enable learners to manage their lives and participate more actively and with more autonomy in a digital society, dominated in large part by giant network corporations and increasingly authoritarian governments. Freedom and autonomy in such a context demand a high level of digital literacy in everyone.

Our educational systems are by and large predicated on an industrial model, with a heavy focus on the transmission and acquisition of knowledge, whereas in a digital age, learners need to develop intellectual and practical skills. Students no longer need to study all together at the same time and place. Knowledge, or at least content, is accessible everywhere through the Internet, and increasingly for free. Accessing information is not the problem, but knowing where to find it, how to evaluate it, analyze it, integrate it, and apply it are all skills. This means looking at teaching methods that help develop these, and many other skills, such as independent learning, critical thinking, teamwork, and communication skills. In order to develop such skills in ODDE, it will be necessary to change teaching methods, use of technology, and organizational structures – in other words, it will be essential to continue to innovate.

So, the test for any attempt at innovation in ODDE should not be: Is it different? Instead, we should ask: Will it lead to better learning suitable for a digital age? This will mean focusing on innovation in teaching methods and management practices as much as on the use of new technologies.

Why Is Innovation So Difficult in ODDE?

Innovation in general is often perceived as being difficult. Governments struggle with innovation strategies, many previously well-established companies have disappeared because they were unable to adapt to a changing external environment (think of Xerox or Kodak), and education in general still reflects the structures and organization of the late nineteenth century industrial age.

After a while, all institutions tend to revert to hierarchical structures geared toward rewarding compliance rather than change. ODDE institutions are no exception. Although radical and innovative when first created, open universities, for instance, became much more bureaucratic as their size increased, and complacent as a result of their initial success.

In particular, open universities created around the mass communications of large-scale printing, radio, and television made heavy investments in specific technologies. Also, being the new players in the game, the large open universities needed to demonstrate the quality of their programs. This was done by using an extensive and expensive course design process, made possible by the large numbers of students enrolling: high fixed cost and low marginal cost course development. Because of the size of their departmental budgets, heads of these "production" departments often wielded considerable powers of decision-making and hence tended to resist changes, especially in technology, that may threaten their power within an organization. Success also breeds complacency: Why change if it is working well?

Furthermore, for almost 20 years between 1970 and 1990, new technologies, such as audio and video cassettes, video discs, and even computer-based learning, were successfully integrated by the large open universities, merely supplementing rather than replacing the core technologies of print and broadcasting.

The Internet changed all that. The natural reaction of the large open universities was again to try to integrate the Internet and other digital technology, adding online discussion forums, and desk-top printing, for instance, while still maintaining their core technology of print, especially.

Dual-mode universities that were primarily not only campus-based but also offered selective distance education courses and programs could not match the high-cost, low-marginal cost model of distance education courses of the large open universities. Distance education course enrolment numbers for dual mode institutions were usually much smaller. They therefore needed a lighter and nimbler course development model.

However, it also meant that when the Internet came along, it was easier for dual mode institutions to change their design model to give much more emphasis to fully online courses using html, web pages, and very quickly, specially designed online learning management systems such as WebCT (which later became Blackboard). WebCT was developed by the University of British Columbia, a very traditional, campus-based institution. Dual-mode institutions found the fully online courses quicker to design and launch and provided quicker and more intensive interaction between students and instructors than their former print-based courses. More importantly, it was easier (although still difficult) for dual mode institutions to switch from print to online, because their investment in print and broadcast technologies was much less.

As a result, by 2019, nearly all campus-based universities in Canada, for instance, were also offering at least some fully online courses for credit. Indeed, Université Laval, a campus-based university in Québec, in 2019 had more online course registrations than either Athabasca University or Téluq, two solely distance education universities in Canada. As a general statement, dual-mode universities have been able to move much more quickly and completely to online learning than the large, distance education universities with a heavy prior investment in older technologies.

Some Lessons About Innovation in ODDE

This very brief (and partial) history of innovation in ODDE offers several lessons about innovation.

1. Because the external world is rapidly changing, we need to develop ways of teaching and learning that meet these changing needs. To be of value, innovation must result in better outcomes; this means focusing as much on new ways of learning or different, more relevant, learning outcomes, as in the use of particular technologies.
2. There are at least two kinds of innovation: innovation that sustains existing organizations; and innovation that disrupts organizations. Incorporating, for instance, video cassettes into an organization already using broadcasting is a sustaining use of technology; using the Internet to switch from print-based or

classroom-based courses to fully online courses is a disruptive technology, because it replaces former ways of doing things.
3. Size matters. It is much more difficult to innovate in a large organization or a large department, because there is so much capital (human and financial) invested in maintaining the current system. To encourage and sustain innovation in larger organizations, a much higher level of internal intervention (for instance, an institution-wide, commonly agreed strategic plan for digital learning) or of external threat (for instance, Covid-19) is needed.
4. Innovation is an ongoing need in the field of ODDE, whose main goal is to provide attractive alternatives to the conventional education system. Especially as a result of Covid-19, many conventional institutions are undergoing rapid change and innovation, and this is leading them increasingly into ODDE's traditional territory; therefore, every ODDE institution needs a strategy for supporting and sustaining innovation that distinguishes it from its competitors, if it is to survive.

Literature Review

It would be fair to say that, despite its importance, innovation and change is an under-researched area in ODDE.

Zawacki-Richter, Alturki, and Aldraiweesh (2017), in an analysis of research areas covered by the International Review of Research in Open and Distance Learning (IRRODL) between 2000 and 2015, ranked innovation and change last, with less than 2 per cent of the published articles being on this topic (compared with, for example, instructional design – 18 per cent). A similar study by Wong, Zeng, and Ho (2016) analyzed articles from seven different journals focused on open and distance learning (ODL). They found that in 2015, only 3 per cent of articles (six in total) were about innovation and change (compared with 21 per cent, or 42 articles, on instructional design).

Nevertheless, there have been a few but still significant studies of innovation and change in ODDE. In 2001, Lockwood and Gooley published "Innovation in Open & Distance Learning: Successful Development of Online and Web-Based Learning" which included 19 case studies of successful innovations in ODL. Although the several technology-based innovations reported in the book are now dated, the Introduction by Fred Lockwood and Chap. 2 on lessons from experience and research on innovation in ODL by Bernadette Robinson are as relevant today as they were more than 20 years ago. Their analysis of the factors that support or inhibit innovation will be referred to frequently in this chapter.

Just over 10 years later, Bates and Sangrà (2011) published "Managing Technology in Higher Education." Its subtitle, "Strategies for Transforming Teaching and Learning," indicated its focus on innovation and change. The book was based on 11 cases (6 from Europe and 5 from North America). Although the topic was broader than innovation in just ODL, two of the cases were open universities, and several of the other cases from dual-mode institutions were related to the development of new blended, online, or distance learning programs or strategies. The book looked at the role of leadership, organizational structures, quality assurance, resources, and barriers to change in supporting or inhibiting innovation. Again, some of the key findings from this book will be referenced later in this chapter.

Naffi (2020) conducted interviews with directors or staff at 19 Centers of Teaching and Learning across five countries regarding the role of Centers for Teaching and Learning in the pivot to online learning during the Covid-19 pandemic. The report illustrated the important role of such centers in facilitating and supporting innovation in the move to online teaching and learning.

Lee (2021), using Athabasca University as case study, asked the question: "to what extent can online higher education (HE) be open and innovative at the same time?" Using discourse analysis based on the work of Foucault, an analysis of official and internal documents over the last 40 years, and interviews with current learning designers, Lee argues that there has been an increasing level of discontinuity between the conceptualization of openness and innovation as independent principles and the operationalization of the two: "Being pedagogically innovative by increasing interactivity among students while maintaining the same level of flexibility provided by the independent study model seems very challenging." This chapter also discusses the institutional conditions that make teaching-oriented innovation more difficult to achieve.

Lastly, in recent years, Contact North in Ontario, Canada, has collected over 200 "Pockets of Innovation" in online, blended, and technology-enhanced learning from higher education institutions around the world. It has summarized these in a single report (Contact North, 2019) that includes a section devoted to organizational planning for online learning.

Then there is a whole world of publications that tend to equate technology with innovation, as Bates and Sangrà (2011) noted. One example of this is the OECD (2016) publication "Innovating Education and Educating for Innovation." This report concluded (p.3) that "despite the huge potential of digitalisation for fostering and enhancing learning, the impact of digital technologies on education itself has been shallow." Significantly, it concluded (p.3) that "[education] has not managed to harness technology to raise productivity, improve efficiency, increase quality and foster equity in the way other public sectors have." However, the focus of the OECD report was on school education, and one wonders whether the OECD would have the same view following higher education's response to Covid-19.

There are other areas that apply generally to higher education but nevertheless are also relevant to managing innovation and change in ODDE, such as leadership (see Paul, 1990, 2011), organizational culture (Silver, 1998; Zhu & Engels, 2013), and change management (Bradfield & Clark, undated; Brown, 2013), and some articles that embrace all three (see Setzer & Morris, 2015).

There is indeed a large literature on these topics outside of ODDE, or even education, especially from the business world. One must be careful to avoid assuming that what works in business will work equally well in education, but nevertheless there is still much to be learned about successful innovation from these sources. For instance, Rogers' (1995) "Diffusion of Innovations" is still relevant today. There is much innovation going on at the individual instructor level, but the challenge many times is to move this beyond what Rogers calls "early adopters" into the main teaching body. Similarly, Drucker (2002) commented: "In innovation, there is talent, there is ingenuity, and there is knowledge. But when it's said and done, what innovation requires is hard, focused, purposeful work."

Thus, although the literature on managing innovation in ODDE itself is quite rare, there are many lessons already learned about managing innovation and change, from both within higher education and outside. The findings are surprisingly consistent between the studies, but it would be fair to say that while institutional leaders are sometimes unaware of or ignore these principles, more often they run into common barriers to change which have proved formidable in the higher education sector.

This chapter will attempt to summarize some of the main issues arising from these studies, as well as draw on the author's personal experience of managing innovation and change in three open universities and three conventional higher education institutions, as well as his work on Contact North's Pockets of Innovation.

Five Destructive "myths" About Innovation

Morriss-Olson (2020) states that "*one of the major roadblocks in the way of our success is that over time, institutional leaders have accepted a number of harmful myths about innovation as truths. These myths also play a critical role in limiting our willingness to take risks and to pilot and scale up new initiatives*."

Myth 1. Innovation is "difficult," thus leading to an avoidance of even attempting change. Quoting Drucker, Morriss-Olson points out that most effective innovations start small, are simple, and are focused. This means nurturing a climate that encourages individual, small changes, and welcomes sharing and cross-pollination of ideas. Anyone can innovate – but it needs hard work, trial, and error and also needs to be institutionally supported.

Myth 2. Innovation "just happens." On the contrary, most innovations incubate slowly, over several years, and are the result of many small, incremental changes.

Myth 3. Innovation happens in a vacuum. Isolating innovation within an organization to a nonoperational "research" area or "skunk-works" may help get something new started, but as Morriss-Olson states: Eventually, "*worthwhile innovation initiatives are most likely to succeed over time when they can fully leverage existing organizational assets and capabilities.*" In particular, *"networks that broadly facilitate shared interactions enable ideas to diffuse, circulate, and combine with other ideas*."

Myth 4. Innovation is something only creative geniuses can do. However, Morriss-Olson argues that "*people who are presumed to be "genius" innovators most often earned their success through mundane problem-solving methods: hard work and trial and error. What this means is that any one of us and every one of us has the potential to innovate*."

Myth 5. Innovation is always good. "*Innovation is change. And with change there are always winners and losers*." Also, change can have unexpected and unintended consequences.

Usher (2021) is highly critical of government approaches to fostering innovation based on the idea of "moonshots." Usher argues that governments consider a "moonshot" as "doing something big," such as being the first to land a man on the moon (a literal moonshot) or Operation Warp Speed to develop a Covid-19 vaccine. However, Usher argues that:

> *Moonshots are a by-product of existential threats. Countries don't do moonshots because they wake up one morning and say "hey, let's do big thing", they do it because they are deeply terrified of what will happen if they don't invest heavily in this one complex task.*

In most cases, though, innovation starts much smaller, usually in an attempt to fix a particular problem or to improve service to clients or, in the case of ODDE, to learners.

The message that needs to be taken away from these myths or misconceptions is that innovation is not only possible in any organization, but also manageable, if the right steps are taken.

Barriers to Innovation and Change

Nevertheless, it is important to recognize that there are formidable barriers to innovation and change in all higher education institutions. Bates and Sangrà (2011) identified a number of barriers to innovation from their 11 case studies, and in a totally separate study, involving 426 individuals in multiple ODL projects across 17 countries, Robinson (2000) encountered many of the same challenges:

1. *Lack of effective leadership.* There are several ways leaders can encourage or inhibit innovation in ODDE. Innovation will be supported if there is a clear vision and strategy for teaching and learning that encompasses modes of delivery, learning outcomes, and teaching methods. This provides a context not only for stimulating innovation but also for evaluating it.

Second, diffused leadership – where a range of people at different levels in the organization have responsibilities for innovation and change – is more likely to foster innovation than a charismatic leader or a single individual being responsible for innovation and change. With charismatic leaders, the change becomes personal; when they leave, the innovation often dies without them.

2. *Organizational structure and culture.* Bates and Sangrà (2011, p.129) noted that "one major limitation is the industrial-style organizational structure of universities and colleges, and in particular the silos of academic, administrative and

technological support units." Without a supportive, networked, organizational structure, innovations remain isolated and unsupported.

Schein (2005) defines organizational culture as "a pattern of shared basic assumptions that . . .has worked well enough to be considered valid and is passed to new members as the correct way to perceive, think and feel in relation to these problems." Innovation though can often challenge such basic assumptions – indeed, changing such assumptions may be a direct goal of innovation – but often innovation, especially in teaching, can run afoul of a deeply embedded organizational culture. This particularly applies to what is considered "good teaching" in universities and colleges, such as large lectures (Bligh, 2000), and to power structures, such as the autonomy of the tenured faculty member in deciding what and how to teach. In the worst case, it can result in instructors ignoring the advice of experts in online design, for instance.

3. *Lack of systematic training in teaching.* Bates and Sangrà (2011, p.195) state that "the use of technology [for teaching] needs to be combined with an understanding of how students learn, how skills and competencies are developed, how knowledge is represented through different media, and how learners use different senses for learning." Without such basic understanding, innovation in teaching will not be valid or successful – or at least very difficult – because instructors lack the necessary foundation on which to build successful innovations in teaching.
4. *Managerial incompetence.* Bates and Sangra found in the case studies that program directors, heads of departments, deans, vice-presidents, and vice rectors were often struggling with decision-making regarding the use of technology for teaching and learning. They were often in a position of making decisions without the basic knowledge and understanding of either technology or of basic pedagogy. Without such understanding, it was difficult for such managers to foster or assess potential innovations in teaching. Bates and Sangrà (2011) also noted that there was a tendency to give precedence to IT managers over educators when decisions were needed about technology for teaching, thus ensuring that the innovative technology would be little used by instructors who had not been adequately consulted.
5. *Lack of resources.* Robinson (2000) noted (p.14) that in 63% of the cases she studied, "innovative ODL initiatives were under-resourced in financial and human terms." Bates and Sangrà (2011, p.152)) noted that priority in the allocation of resources understandably goes to supporting the traditional teaching system. This means that innovative teaching is either an addition to the regular work of an instructor, or is done "on the side." However, instructors need time to experiment, innovative teaching often needs to be supported by other specialists, such as instructional designers or media producers, and the innovation needs to be properly evaluated in comparison with traditional methods of teaching.

Both Bates and Sangrà, and Robinson, observed that the relative costs of fully online, blended, and face-to-face teaching were often not well known or understood by managers trying to innovate in ODL. Adequate resources need to be available to support innovation in teaching, if this is a key objective. Bates and Sangrà were clearly critical of the way higher education institutions were approaching innovation and change in 2011. (It should be noted that their criticisms extended as much to ODDE institutions as to more conventional institutions.) There have been some major changes in higher education since then. A good deal of learning has taken place. Thus we need also to look at strategies that have been found to foster innovation and change in teaching and learning.

Strategies to Support Innovative Teaching

Bates and Sangrà (2011), as a result of their 11 case studies, came forward with five strategies to support innovative teaching.

Think Holistically

For innovations to succeed, the full complexity of an organization must be considered. Bates and Sangrà wrote: "At a senior management level, it is essential to think holistically about the management of technology. Senior managers need to have the whole picture about where decisions are made about the use of technology for teaching." Without "the big picture," it will be difficult if not impossible to support and expand innovative teaching beyond the individual instructor.

More significantly, many institutions today either have a strategy for e-learning or digital learning or are developing one for the whole institution. For instance, in 2018, 42 per cent of all public universities and colleges in Canada either had a fully implemented e-learning plan or were implementing one, and a further 29% were developing one (Johnson, 2019). These plans involve decisions at all levels, from the senior executive through deans and heads of departments, to individual instructors and often students. Such plans provide a framework to support and nurture innovation in teaching.

Multiple Visions of Teaching and Learning

Although individual instructors will always find ways to innovate in their teaching, Bates and Sangrà (p.218) argue that this needs to be placed in a broader context where institutions – or at least academic departments – are willing fundamentally to rethink the whole teaching and learning paradigm. "We need to move away from the dominant paradigm of the fixed time and place classroom as the default model for university and college teaching, and think of all the many other ways we could organise and manage teaching. In particular, we need to think very concretely about what teaching and learning should look like in the future. Our reach should exceed our grasp, driven by our assessment of the needs of students in the twenty-first century, and not by the existing institutional requirements that they must fit into. The best place to develop such a vision is at the program level." This though requires individual instructors to work collaboratively to agree curricula, appropriate modes of delivery, and teaching methods, which can again run against the grain of organizational culture.

Strategic Goals for Teaching and Learning

By definition, the results of innovation are often unpredictable. As Morriss-Olson (2020) states, innovation is not always good – or at least not good for everyone. This raises the question then of what we are wanting to achieve in our teaching and learning. Without such a framework or set of criteria, it will be difficult to decide whether or not to support or adopt an innovation. At the same time, as a result of innovation, it may be necessary to rethink or reexamine our academic goals. Bates and Sangrà (2011, p.223) list a whole range of possible academic goals that could be supported by learning technologies, but these need to be defined and agreed particularly at the program level, within an overall academic plan. This leads to the fourth strategy.

An Annual Academic Planning Process That Includes Innovation in Teaching

Bates and Sangrà suggested (p.224-225): "an annual rolling 3- or 5-year planning process for the academic plan which integrates learning technology and academic planning. . . modified each year in the light of new developments."

This is where discussion of the balance between online and face-to-face learning, new teaching methods, such as blended or HyFlex learning, the result of the previous year's innovations, and use and choice of technologies would take place, again, primarily at the program level. Such planning would also focus on supporting and prioritizing innovative teaching in the coming year.

Funding to Support Innovative Teaching

Programs should be encouraged to innovate in their teaching, to look at better ways to deliver and evaluate programs. Funding to support this could be built into the Provost's budget, where additional funds could be earmarked for programs seeking new and more effective ways to teach, as well as funding for individual instructors who wish to try something new in departments or programs that otherwise are not being innovative (you have to start somewhere). Such funding should require a plan for the evaluation and diffusion of the innovation.

The OECD's Solution

The OECD report (2016) suggested a number of strategies to support innovation in education, some of which are just as applicable to ODDE institutions:

- A compelling vision can align internal and external stakeholders around the need for change. Setting ambitious goals, particularly nearly impossible ones, forces the entire system to innovate and drive toward those goals [but see earlier comments about "moonshots" – getting the right balance between "stretchable" and impossible goals is always a challenge].
- Improved measurement must be the foundation of innovation in education. Based on a solid definition of "improvement" at different levels in the system, regular data collection should assess changes over time in improved pedagogical and organizational practices.
- Benchmark and track progress: High-quality data at the program and course level allows senior management – and everyone – to see progress toward the goals. It can also be used by senior managers as a discussion point with deans, heads of departments, and instructors to identify and troubleshoot problems.
- Evaluate and share the performance of new innovation: Innovations need to actually work. For ODDE institutions to encourage quality, there needs to be transparent information on how effective new innovations and technologies are – do they work, over what time period, and based on what criteria?
- Combine greater accountability and autonomy: Devolving authority to the program level can remove barriers to innovation and allow heads of department and instructors the flexibility to explore new approaches. Increased autonomy needs to be paired with increased accountability, in which such managers and instructors are accountable for the choices and results they deliver. This accountability requires greater transparency and clear performance metrics.

While these recommendations are fine in principle, they come from a business perspective and do not reflect the somewhat different culture of educational institutions. The OECD recommendations need to be modified a little for ODDE (see Section "Is innovation 'manageable'?").

A Case Study

To illustrate how different factors, such as adequate resources, leadership, strategic goals, networking across organizational boundaries, and a supportive organizational culture, all influence innovation in an ODDE context, a specific case study will be used, based on the author's personal experience. The case in point is now 25 years old, which is probably an appropriate timeline to judge the success of the innovation.

The University of British Columbia is a large, campus-based research university, with over 66,000 students. In 1994, the provincial government decided to withhold

1.5% of each public postsecondary institution's annual operating budget, and to place it in a province-wide "innovation in teaching" fund. The institutions could then submit proposals for supporting innovation in teaching that if accepted would release the withheld funds. In UBC's case, as a large university with a large budget, the amount withheld was substantial: over $2 million.

The Provost called a special meeting of all the deans and other senior managers to agree on a university-wide proposal to secure the funds (some other institutions left it just to individual faculty to apply for individual innovation grants). Each academic department was asked to develop proposals for innovative teaching, but the Provost also put forward proposals for some central funding, such as a new Centre for Educational Technology. UBC was eventually successful in recovering the full $2 million for its innovating teaching proposal.

Also at the same time, the Dean of Continuing Studies, in consultation with the Provost, hired an external expert in online and distance learning to work, not only with Continuing Studies noncredit programs, but also particularly with the main academic departments that were offering credit- and print-based distance courses, to help move these courses online. The Provost and Dean of Continuing Studies provided a special online course development fund of $1 million for this purpose to be managed by the new Director of Distance Education and Technology.

A young, untenured instructor in the Department of Computer Sciences had also received a small grant from the Innovation Fund to develop an online platform to support his classroom teaching, where he could add text materials and activities for students. This proved to be quite successful, but he needed a relatively small amount of extra money for graduate students to help with the computer programming to turn it into a reliable off-the-shelf platform. The Provost and the Director of Distance Education agreed to allocate some of the online course development money for this purpose, as the platform, called WebCT, could also be modified and used as a standard learning management system for the online courses. WebCT speeded up considerably the design of the fully online courses, as well as supporting the instructor's classroom teaching. WebCT was the world's first widely used course management system for higher education. At its height, it was in use by over 10 million students in 80 countries and was acquired several years later by Blackboard Inc.

The university went on not only to convert all of its existing undergraduate print-based distance education courses to fully online courses, but also to develop a new range of online courses, in particular several fully online, cost-recoverable professional masters programs. These programs were based on a carefully constructed business plan, some of which, following discussions with the Provost, were funded by loans from the university Treasury, which invested unallocated cash for building construction usually in safe investments such as guaranteed investment certificates, but in this case used a relatively small amount of this money to kick-start these cost-recoverable programs.

In addition, the Centre for Educational Technology and the Distance Education unit, which had hired additional instructional and web designers, worked with mainline faculty to use technology in their teaching. For instance, a professor of forest ecology, working with a couple of his graduate students and a media producer from Distance Education, developed an interactive CD-ROM to replace a physical "walk through the forest."

Three years later, as part of UBC's Academic Plan, Trek 2000, a strategic plan was developed on how to facilitate the use of information technology and new media in learning by faculty, staff, and students. This resulted in a report to Senate in 2000 (*University of British Columbia*, 2000), which set a number of goals for the development of learning technologies at UBC. A Centre for Teaching, Learning, and Technology was established by merging the Distance Education Unit from Continuing Studies with the Centre for Educational Technology, which reported to the Provost and supported faculty across all departments.

This burst of successful innovation over a period of 5 years between 1995 and 2000 illustrates a number of key points:

- Adequate resources: The Innovation Fund and the Distance Education course development fund provided a good deal of flexibility and incentive for online and technology-based learning initiatives.
- Leadership: The role of the Provost was critical. He pulled together his deans and other senior managers to develop a plan, followed carefully how the Innovation Fund was being used, brought together key people from different departments to ensure collaboration, but devolved actual decisions about innovative teaching to the departments or individual instructors – he did not try to "pick winners."
- There was a good deal of cross-organizational collaboration, although later this was rationalized to some extent by a reorganization of roles and funding.
- There was a plan – in fact, there were two. The first was a centralized proposal to the government for the Innovation Fund, and the second in 2000 for a university-wide approach to the use of learning technologies.
- There were clear, measurable outcomes that included a world-class Learning Management System; conversion of all print-based courses to fully online courses; the development of new, cost-recoverable online graduate programs; and a university-wide teaching and learning center for faculty development and to support the use of learning technologies.
- Innovation was not a "one-shot trick" but moved forward on several interrelated fronts and was ongoing over many years.

Is Innovation "manageable"?

This is a good debating question, similar to "Can you teach creativity"? By its nature, innovation is somewhat unpredictable, and certainly a heavy managerial approach could be the kiss of death for innovation in ODDE. "Picking winners," a favourite with many national governments, is another approach to innovation, but again, the results are often highly disappointing. True innovation often comes from unexpected sources and in contradiction to current managerial directions.

Nevertheless, there are certain approaches that can foster or encourage innovation, as we saw in the previous sections, but it may need a more indirect approach. For instance, the focus should probably not be on innovation itself, but on the educational goals that an ODDE organization is aiming to achieve. Innovation would be one means by which to achieve such goals.

For instance, if we take the Covid-19 crisis, which struck half-way through the Spring semester in 2020, the main goal of most campus-based institutions was to enable students successfully to complete the semester. Given that students, instructors, or staff would not be allowed to congregate on campus or in face-to-face classes, some other way of delivering courses was needed. The answer was to take a mode of delivery that had previously been very specialized and limited to less than 10 per cent of all students and courses, and make that the standard delivery mode, as a short-term solution. Most instructors and students were totally unprepared for online teaching, but they managed it, because there were easy to use tools that allowed instructors to mainly preserve their mode of classroom teaching but in an online environment, and because both instructors and students wanted to save the semester if possible. Over time, lessons were learned, and the teaching improved – innovation was taking place. The goal was not though to move all teaching online or to "innovate"; it was to safeguard the academic year for students. Emergency remote teaching was the innovation that made the goal possible.

ODDE institutions may need to look at the main challenges they are facing and then look to innovation to help resolve those challenges. For instance, there is increasing demand for "21st century skills" such as critical thinking, knowledge management, and digital literacy, and for shorter, more flexible programs that can meet rapidly changing external conditions, especially but not exclusively in the work force.

In particular, as the Commonwealth of Learning report (2021) indicated, without active intervention, digital learning can increase inequity (see also Collis & Vegas, 2020). How can ODDE institutions innovate to reduce such inequity while at the same time increasing the use of digital learning?

What changes would need to be made to curricula and teaching methods to meet such demand? How can these demands be met for all students, and not just a select few? What technologies or new teaching approaches, and new policies, need to be put in place for successful, quality programs of this type? What advantages (and disadvantages) do ODDE institutions have in meeting these goals compared with traditional institutions?

It should be the educational goals here, particularly increased access and equity and inclusion, that should drive innovation in ODDE institutions. Flexible delivery, new curricula, new or different teaching methods, microcredentials, and low cost, accessible tools could all be innovations needed to meet such goals.

Summary and Conclusion

Innovation is part of the life-stream of ODDE institutions. Once they stop innovating, they risk becoming irrelevant, as conventional institutions are increasingly moving into traditional ODDE territory.

Also, there are now other potential competitors for the ODDE market, particularly the large digital technology companies. For instance, Linked-In Learning (formerly known as Lynda.com but now owned by Microsoft) offers more than 16,000 courses, 9000 of which are in English. Each is broken down into multiple short videos with specific learning goals. Linked-In Learning offers content to those studying for professional certification exams or earning continuing education credits. The platform has 34 certification courses. More importantly, Linked-In Learning can analyze all the data on current employer requirements through their job advertising on the Linked-In platform and use that as a base for identifying the latest requirements for training. Similar competition is coming from MOOC providers such as Udemy and Coursera, and from Google Career Certificates. The UK Open University has responded in part with its own MOOC platform, FutureLearn.

However, managing innovation is not a simple process. There are substantial barriers to change built into all educational institutions, and ODDE institutions are no exception. In the end, though, it comes down to having relevant, challenging strategic goals that move the institution forward. This is what should drive innovation. Innovation is a means to an end: more relevant, high quality education for those learners most disadvantaged and not well served by the traditional system or other external competitors. Focusing on how to do that will inevitably lead to more innovation in ODDE, but it will require the step-by-step hard work that Drucker noted more than 20 years ago.

References

Bates, A., & Sangrà, A. (2011). *Managing technology in higher education*. San Francisco: Jossey-Bass.

Bligh, D. (2000). *What's the use of lectures?* San Francisco: Jossey-Bass.

Bradfield, J., & Clark, C. (undated). *Seven principles for effective change management: Sustaining stakeholder commitment in higher education*. Arlington VA: Deloitte Consulting.

Brown, S. (2013). *Change management in higher education: An empirical approach*. Crete: International Conference on Information Communication Technologies in Education.

Collis, V. & Vegas, E. (2020, June 22). *Unequally disconnected: Access to online learning in the US* Brookings Institute Education plus Development

Commonwealth of Learning. (2021). *Quality and equity in digital learning: A policy brief*. Burnaby BC: Commonwealth of Learning.

Daniel, J., Kanwar, A. & Uvalić-Trumbić, S. (2009). *Breaking higher education's iron triangle: Access, cost and quality* Burnaby BC: Commonwealth of Learning

Drucker, P. (2002). *The discipline of innovation*. August: Harvard Business Review.

Johnson, N. (2019). *Tracking online education in Canadian Universities and colleges*. Halifax NS: Canadian Digital Learning Research Association.

Kostoff, R. N. (2003). Stimulating innovation. In L. V. Shavinina (Ed.), *The international handbook on innovation*. Oxford UK: Pergamon.

Lee, K. (2021). Openness and innovation in online higher education: a historical review of the two discourses. *Open Learning: The Journal of Open, Distance and e-Learning, 36*(2).

Lockwood, F., & Gooley, A. (Eds.). (2001). *Innovation in Open & distance learning: Successful development of online and web-based learning*. Herndon VA: Stylus Publishing.

Mitchell, J. M. (2003). *Emerging futures: Innovation in teaching and learning in VET*. Melbourne: Anta.

Morriss-Olson, M. (2020, August 4). *5 destructive myths about innovation* Gray Associates

Naffi, N. (2020, August 24). *Disruption in and by centres for teaching and learning during the COVID-19 pandemic: Leading the future of higher Ed*. Québec City: L'Observatoire Internationale sur les Impacts Sociétaux de l'IA et du Numerique and the Government of Québec.
Contact North. (2019). *220 Pockets of innovation in online learning*. Sudbury ON: Contact North.
OECD. (2016). *Innovating education and educating for innovation: The power of digital technologies and skills*. Paris: OECD Publishing.
Paul, R. (1990). *Open learning and open management*. London: Kogan Page.
Paul, R. (2011). *Leadership under fire*. Montreal and Kingston: McGill-Queen's University Press.
Robinson, B. (2000). Innovation in open and distance learning: some lessons from experience and research. In F. Lockwood & A. Gooley (Eds.), *Innovation in open & distance learning: Successful development of online and web-based learning*. Herndon VA: Stylus Publishing.
Rogers, E. M. (1995). *Diffusion of innovations* (4th ed.). New York: The Free Press.
Schein, E. (2005). *Organizational culture and leadership*. San Francisco: Jossey-Bass.
Setzer, B., & Morris, H. (2015). *Building a culture of innovation in higher education: Design & practice for leaders*. Boulder CO: Educause +2Revolutions.
Silver, H. (1998). *Organisational culture and innovation in higher education*. Plymouth UK: University of Plymouth.
University of British Columbia. (2000). *The creative use of learning technologies*. Vancouver BC: UBC Academic Committee for the Creative Use of Learning Technologies (ACCULT).
Usher, A. (2021, June 15). Missions and Moonshots, *One Thought to Start Your Day*, Higher Education Strategy Associates
Wong, Y. Y., Zeng, J., & Ho, C. K. (2016). Trends in open and distance learning research: 2005 vs 2015. *Asian Association of Open Universities Journal, 11*(2), 216–227.
Zawacki-Richter, O., Alturki, U., & Aldraiweesh, A. (2017). Review and content analysis of the international review of research in open and distance/distributed learning (2000–2015). *The International Review of Research in Open and Distributed Learning, 18*(2).
Zhu, C., & Engels, N. (2013). Organizational culture and instructional innovations in higher education: Perceptions and reactions of teachers and students. *Educational Management Administration and Leadership, 42*(1).

Transforming Conventional Education through ODDE

38

Mark Nichols

Contents

Abstract

Open and distance education has a long history and rich heritage, its literature affirming that a systems approach based on industrial production is an optimal means of providing education that is accessible, cost-effective, flexible, open, and scalable. This approach to education, based on an asynchronous separation of participants, continues to find its expression in the Internet age. The recent COVID-19 global pandemic necessitated a rapid shift to emergency remote teaching (ERT). This sudden adoption of online education took place more in response to need than careful strategizing. Significantly, the term "online distance education" is often used to describe the mostly synchronous ERT model, even though this is out of step with classic distance education theory. This chapter explores the differences across educational models beneath the terms "conventional education" and "open, distance digital education (ODDE)," and the nature of "transformation" as conventional and distance models of education are

M. Nichols (✉)
Open Polytechnic of New Zealand Limited, Lower Hutt, New Zealand
e-mail: Mark.Nichols@openpolytechnic.ac.nz

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_35

expressed online. Transforming conventional education through ODDE challenges our thinking as to the nature of education practice and the potential of digital technology in the twenty-first-century context. The potential of ODDE – anytime enrolment and assessment, effectiveness and efficiency in tuition, enhancing student success by design and personalized provision – goes well beyond extending the classroom into the online space. For on-campus providers to become effective ODDE providers, a transformation is required. The final part of this chapter deals with the challenges of rethinking the role of the educator and of reformulating a university's operating model.

Keywords

Online distance digital education · Transformation · Operating models · ODDE

Introduction

In education, what does it mean to "go online"? What does it mean to "transform" a university? Does the apparent inevitability of going online require a transformation? And what have the recent challenges of COVID-19 revealed about global readiness for online education? These are complex questions. Not only does "going online" mean more than one thing, but the term "transformation" is also all-too-frequently used to imply any challenging change, even where these changes do not fundamentally alter practice.

The Internet has transformed multiple elements of twenty-first-century life, yet many of the trappings of conventional education practice have remained remarkably similar for hundreds of years. Transformation of practice, it seems, is rare in higher education. This chapter explores why "going online" can fall well short of transformative objectives and suggests how conventional education might move to truly realize the benefits of open, digital distance education (ODDE). Transformation is not a term to use lightly, nor is it an automatic outcome of extending the use of online technologies. In the context of transformation being used as an umbrella term for change, this chapter aims to provide decision-makers with an authoritative vocabulary and pathway toward transformation, in part to assist readers in "resisting the influence of others with limited expertise in online education" (Beaudoin, 2016, p. 17).

Terminology: Conventional Education, ODDE, and Transformation

The challenge of describing how conventional education might be transformed through open, distance digital education (ODDE) is firstly conceptual; definitions tend to be clumsily applied in literature. In his overview of literature related to online and distance education, Paul notes that many authors "take their own terminology for granted" (2014, p. 176). Where does the term "ODDE" sit in the context of terminology including "blended learning," "e-learning," "flexible learning," "technology enhanced learning," and "online education"? Further, how do these terms relate to "distance education" – a term that is descriptive of a wide variety of practice while also serving as the title of a significant field of scholarship? This chapter assumes ODDE as the contemporary phrase used to describe the scholarship and thinking that has classic distance education literature as its heritage. Charles Wedemeyer, Michael Moore, Börge Holmberg, Otto Peters, Sir John Daniel, and Tony Bates – and the editors and authors associated with this book – are among the thinkers and practitioners whose work ODDE builds upon.

Conventional education might be defined as "a teaching method involving instructors and the students interacting in a face-to-face manner in the classroom. These instructors initiate discussions in the classroom, and focus exclusively on knowing content in textbooks and notes" (Li, 2016, pp. 105–106). Conventional education broadly consists of authoritative perspectives and voices (instructors) and interpersonal engagement in real time in a physical setting (the classroom), drawing primarily on reference works (selected by the instructors). Using the term "conventional" to describe this model highlights its apparent normative nature, in that other forms of education are constantly compared with this traditional convention even though it is not necessarily a gold standard.

ODDE is much more difficult to define, mainly because the "distance digital education" part can be applied to *any* form of online education that enables at least some separation from the classroom, even if a classroom still features. ODDE "is complex in nature and scope as it involves a wide range of non-traditional ways of teaching and learning that are mediated by various media and technologies" (Jung, 2019, p. 1). For example, a lecture theater providing a live, streamed option might be validly described as providing a distance digital education option. To "go online," then, is to enter the distance digital education sphere of practice to some degree. However that "online" (or "digital") is not the same as "distance" has been well understood in ODDE circles for some time (Guri-Rosenblit, 2005, 2014). The distinctions between the two are fundamental to any discussion about transformation in education, because distance education as a scholarly discipline has a tradition of accessibility, cost-effectiveness, flexibility, openness, and scalability. Distance education scholarship is rooted in the benefits and practice of print-based correspondence learning. As technology matured, distance education scholarship broadened to complementing correspondence resources with multimedia, and then online discussion through bulletin boards and discussion forums as further dimensions were added to the generations of distance education (Nipper, 1989). As online possibilities extend, the genealogy of this classic form continues to express its largely asynchronous traits.

A spike in journal publications about distance education started in 2004 (Amoozegar, Khodabandelou, & Ebrahim, 2018). At about the same time a distinctive phase of the journal *Distance Education* from 2005 to 2009 is identifiable as being when "online education is beginning to be seen as the new face of distance education... as distance education is becoming about online education, it is quickly becoming fashionable to be in this business" (Zawacki-Richter & Naidu, 2016, pp. 258–259). Since around 2005, when online possibilities became more mainstream, the term "distance education" increasingly became used to describe normal, synchronous practice extended through the Internet. In more contemporary practice, Zoom and Teams provide synchronous contact whereby the trappings of conventional education are extended into "distance education" practice. The terminological difficulty here is obvious: "distance education" is both a description of any practice allowing a physical separation between instructor and learner, and of a scholarly discipline that traditionally promotes distance education as a predominantly asynchronous pursuit in support of the nontraditional, "backdoor" learner.

ODDE, of course, emphasizes the concept of "openness." Unfortunately this is yet another nebulous term; over 30 years ago it was said that "the terms 'open learning' and 'distance learning' have never been used precisely" (Rumble, 1989, p. 28), an issue that still confronts scholars today. Helpfully it is possible to describe various principles of "open and distance learning" that, together, contribute to the uniqueness of ODDE. Open education is motivated by a desire to democratize education as an element of social justice (Daniel, 2019), typically through the development of custom learning materials designed to a high standard. Open and distance learning approaches are also seen as key to breaking the so-called iron triangle of access, quality, and cost of education such that cost-effective, high-quality, mass availability might be possible all at once without the traditional trade-off across these (Daniel, Kanwar, & Uvalić-Trumbić, 2009). Asynchronicity – the ability for tuition to take place independent of time – is a natural feature of the approach, as the voice of the instructor is largely predetermined through specially developed courseware.

It is helpful to consider conventional education and ODDE as having synchronous and asynchronous biases, respectively. In conventional education, the teacher's identity is obvious; they are the face, voice, and presenter of authority, and the institution is designed around their availability through timetabling. However, in open approaches, the teacher tends to be a facilitator; the entire institution is designed around the open model; and the overall approach is designed to operate effectively at scale. Broadly speaking, in conventional education, a teacher is the teaching point of reference; in ODDE, it is a set of learning materials supported by an academic and/or tutor. A conventional education educator is able to work in isolation; an ODDE educator is invariably a member of a team including, at the least, a learning designer. Conventional education tends to promote live instruction; ODDE tends to be predetermined. Conventional education can be easily traced back to the classroom; ODDE can be traced back to classical distance education models.

The distinctions here are best illustrated in their most extreme and appreciative forms. In the paradigm of conventional education:

- The voice of the instructors brings the subject to life, giving the subject a coherent, up-to-date scholarship and interpersonal authority through the instructors' credentials and research.

- The teacher is almost solely responsible for the tuition provided by the student and, at the least, is the primary authority on course-related issues.
- Attendance in the classroom exposes students to the energy, passion, and insight of instructors they may academically aspire to emulate and to one another as a group of peers involved with processing the same ideas at the same time.
- The immediacy of conversation, the opportunity to question instructors, and the artifacts of campus and schedule all serve to stimulate learning and promote the student's sense of academic journey.
- Lecturing/teaching, timetabling, student cohorts, campus services, due dates, and teaching ratios are central to planning.

In the paradigm of ODDE:

- Well-designed and engaging learning materials bring the subject to life, giving the subject a clear, substantial series of explanations in the form of a learning journey.
- The education experienced by students consists of the contribution of multiple specialists, including learning designers, subject experts, media developers, and tutorial support staff.
- Students are in the pursuit of a valid qualification made up of meaningful learning and, for the sake of convenience and access, view engagement with other students as desirable but not essential for their success.
- For whatever purposes including employment and family commitments, real-time attendance at any venue is unlikely to be a priority. Learning materials and institutional success services including academic representation are vital elements of academic tuition.
- Course materials development (and maintenance), the adjunct workforce, online interface UX, success services, and improving flexibility are central to planning.

Additional elements might also be mentioned but the paradigms can at least be differentiated. A summary of the differences, useful as a basis for discussing transformation, is in Table 1.

Significantly, "going online" does not force any change to the table whatsoever. All aspects of the conventional and ODDE paradigms can be facilitated digitally, and, where doing so enables learning to take place outside of the classroom, "digital distance education" might be said to be taking place. ODDE, though, is

Table 1 Differences between conventional and ODDE teaching models

	Conventional	ODDE
Synchronicity	Full	Minimal
Tuition responsibility	Teacher	Team
Instructor voice	Live	Predetermined
Location of instruction	Classroom	Independent
Peer involvement	Conversational	Optional

only properly taking place where *openness* is also apparent, which is where the learning experience is based on asynchronicity and is scalable in ways that break the iron triangle of access, quality, and cost.

Emergency Remote Teaching and ODDE

What would happen if classroom-based, synchronous learners were suddenly independently isolated from their instructor? What would the digital response resemble? In the paradigm of Table 1, the response would likely be an immediate transfer of practice through the application of online tools. Such is the COVID-19 emergency response teaching (ERT) phenomenon, though sadly the mixed success of ERT is often described in terms of online or distance transformation and therefore as proof that "distance education" is a questionable form of education seen as a compromise by students, and as overly demanding by teachers. Unfortunately, this conclusion is a category error; what ERT has demonstrated is the logical outcome of digitally transferring conventional education under urgency. Zoom became foundational to the education experience, highlighting the synchronous, conventional model's transfer into online education. Any slur on the reputation of "distance education" resulting from this online extension is limited to ERT practice and should not be projected across the traditional asynchronous heritage and practice of "distance education" as a scholarly pursuit. ODDE, for the most part, did not need an emergency response; its asynchronous model was already robust enough to cope with closed campuses and lockdowns.

The purpose here is not to disparage the importance of the ERT response and the sincere efforts of those who quickly adapted to new, challenging circumstances. It is sufficient to point out that there was not a sudden uptake of ODDE practice among educators during the pandemic. One systematic literature review concerning the educational response to the pandemic proposes a SWOT (strengths, weaknesses, opportunities, threats) analysis "on the digital transformation to online learning" (Talib, Bettayeb, & Omer, 2021, p. 3). The article concludes that:

> The flexibility and convenience ODE offers and the much-needed push for change it has inspired cannot be denied. However, its efficiency in terms of student outcome as compared to traditional education is still a point of dispute. It is therefore imperative to continue investigating online education. (ibid., p. 21)

What is missing from this summary statement is a recommendation of further context: "…to continue investigating online education *as an extension of the conventional model*." While ERT and ODE (online distance education) might be equivalent, ODE and ODDE (open distance digital education) are not the same thing. Instead, ERT as expressed through ODL might be considered a form of triage appropriate under emergency conditions, never intended as a long-term model of education (Reynolds & Chu, 2020), a view shared by many educators seeking to get back to the way they operated before the pandemic (Erdem-Aydin, 2021). It is unfortunate that "experiences with ERT will, rightly or wrongly, influence perceptions of teaching and learning online for generations to come" (Stewart, 2021, p. 98). ERT, a digital form of conventional education, could never lead to the sustainable, systematic practice of ODDE because ERT is an extension of synchronous practice.

The Nature of Transformation

Thus far, the terminology of conventional education and ODDE is considered. It is clear that these forms of education can both find their expression "online" in terms of Table 1, and so it is proposed that ERT (the response of educators to the COVID-19 pandemic) does not represent a shift from conventional education to ODDE. What, then, is transformation? When should we apply it as a term to describe change to educational practice?

Norris, Brodnick, Lefrere, Gilmour, and Baer (2013, p. 3) remind us that "just because we are changing a great deal does not mean we are transforming." Much effort toward online education is more of a transference of incumbent practice than anything truly indicative of transformation. It is helpful to consider the R.A.T. and SAMR models at this point, both of which seek to describe how technology might influence conventional teaching practice. The R.A.T. framework suggests that technology might Replace, Amplify, or Transform teaching learning and curriculum practice (Hughes, 2021). ERT might be said to Replace conventional education insofar as technology provided a digital means for the same educational practice. Some elements were likely Amplified, as various educators sought to explore how a palette of digital potential might complement their online conventional instruction. The SAMR framework (Puentedura, 2006) describes technology as being applied in ways that *enhance* education through Substitution and Augmentation or *transform* education through Modification or Replacement of practice. Transformation, then, might be seen as a form of change whereby incumbent practice no longer resembles what was before. According to Norris et al. (2013), transformation involves four Rs: Redesign, Redefine, Reengineer, and Realign.

The nature of transformation rests in the scope of what needs to be changed for a new state to come about. In the terms of Norris et al., what needs to be Redesigned, Redefined, Reengineered, and Realigned is the *educational operating model*, defined as "how functions work and interrelate" (Nichols, 2020, p. 145), which can be likened to the institution's DNA (Christensen & Eyring, 2013). An operating model is a description of how an organization actually works, consisting of those operational patterns and constraints that determine – and limit – how things are done. This is equivalent to the systems approach as defined by Moore and Kearsley, which "consists of all the component processes... including learning, teaching, communication, design, and management" (Moore & Kearsley, 1996, p. 5). As such, the operating model touches upon all elements of the institution, which must be designed in such a way as to align in support of the ODDE learner (Minnaar, 2013; Nichols, 2020). An operating model is expressed across both practice and policy and is typically taken for granted as part of the organization's overall context.

Drawing on Norris et al. (2013), a transformation can be defined as a level of change that requires an educational operating model to be redesigned, teaching roles redefined, processes reengineered, and practices realigned with a new vision for teaching and learning.

Some forms of change – Hughes's Replace and Amplify, Puentedura's Substitution and Augmentation – might be said to bend rather than break the parameters of an operating model and so *transfer* existing practice within an existing operating model. Streaming lectures and making additional resources available through an LMS or VLE are changes to conventional education that do encourage study at a distance, but they do not require transformation as defined above. Other forms of change to the conventional education student experience – enabling students to enroll and complete anytime or study completely independently, which are more akin to open education – *would* require conventional education organizations to revisit their operating models and so could be described as truly transformative. Revisiting the conventional education and ODDE paradigms in Table 1, overlaying digital change, suggests a differentiation between transfer and transformation of practice as illustrated in Table 2.

Institutions, rather than individual practice, are configured to provide either conventional or ODDE education. The institutional operating model both determines and limits the approaches to education that can be sustained. The operating model required for conventional education requires a transformation if it is to truly enable ODDE and realize its benefits. In terms of taxonomy, "conventional" and "ODDE" might be considered separate genus of formal education. The differences between the two are such that ways of working are largely incompatible. The five elements of synchronicity, tuition responsibility, instructor voice, location of instruction, and peer involvement are all interrelated; together they form the expectations of and context for the teaching role and the expectations of students. An individual teacher, academic, or faculty member either has full responsibility for the tuition of "their class" or they do not. Either lectures are part of the teaching model, or they are not either a synchronous teaching timetable is required, or it is not.

Transformation of conventional education cannot be so much *through* ODDE as it must be *to* ODDE. The place of conventional education is left in favor of an ODDE destination. Conventional education is different to ODDE *to the extent that they are operationally incompatible*. Table 2 also illustrates why the term "blended" or

Table 2 Digital change to conventional education and ODDE teaching models

	Conventional				**ODDE**
	Digital transfer = = >		**Digital transform**	**< = = Digital transfer**	
Synchronicity	Full	Mostly		Some	Minimal
Tuition responsibility	Teacher	+ Assistance		+ Specialists	Team
Instructor voice	Live	+ Distributed		+ Added	Predetermined
Location instruction	Classroom	+ Distributed		+ Block	Independent
Peer involvement	Conversational	+ Mediated		+ Facilitated	Optional

"hybrid" is not straightforward; underneath any "blended" or "hybrid" practice is an operating model based around a particular teaching role. At its most fundamental, any teaching role either has at its foundation synchronous class time (or not) and reference to a cohort for timetabling purposes (or not). The teaching role determines and limits what a blended or hybrid model might offer students in terms of opportunity and flexibility, and so reflects either a conventional education or an ODDE starting point. The role of the learning designer or learning technologist also differs by starting point; under a conventional education paradigm, such a role will *complement* the teacher or member of faculty. In ODDE, the role is an established part of a course design team.

Conventional education is based on assumptions around education practice that are incompatible with ODDE. The difference is not so much one of "sage on the stage" vs. "guide on the side" or opportunities to study away from a classroom at distance as it is the conventional educator's identity, which is founded on synchronous, timetabled tuition. Conventional education is simply not configured to provide the accessibility, cost-effectiveness, flexibility, openness, and scalability advantages that ODDE is able to further extend through digital practice. At the core, conventional education and ODDE have very different operating model requirements. In the words of Norris et al. (2013, p. 8), "Put simply, institutions have layered technology over existing practices, tinkering with them but not transforming them."

Why Transform?

Providers of higher education cannot ignore the sorts of trends already well underway across the HE sector: increased demand for online distance learning courses, increased competition, pressure on public funding, more use of adjunct staff, "off-the-shelf" learning content, competition across online learning management systems, and the rise of MOOCs are among those apparent almost a decade ago that continue to shape education practice (Amirault, 2012). Despite these trends, higher education has been remarkably unchanged by the disruptive elements of the digital revolution. Sector after sector has been – literally – transformed such that convenient access to banking, travel agencies, music and video media, government systems, taxi services, and consumer goods will never again resemble the commercial dynamics of the twentieth century. Access, convenience, cost-effectiveness, personalization, subscription, customization, and control are increasingly expected by twenty-first-century citizens. Conventional higher education, however, remains wedded to lectures, lecture theaters, timetables, and subject representation by a single expert. The operating model of conventional education universities reinforces these assumptions and perpetuates their longevity. The potential of digital education to provide a quality robust, accessible, cost-effective, flexible, scalable, supported, and personalized education – the very benefits twenty-first-century learners will increasingly expect (Nichols, 2020) – cannot be fully realized by the conventional education model.

The role of open, distance education has long been recognized as improving access and opportunity to education for those who otherwise might never have the opportunity to attend conventional education for whatever reason. Transforming conventional education to ODDE, then, is motivated by issues of social justice (increased inclusion) and continuous improvement (innovation unrestricted by synchronous tuition and timetabling). That such transformation leverages digital technologies is more opportunistic than techno-centric. Transformation to ODDE can take place within an education-centered philosophy, as described in Nichols (2020). ODDE need not require higher education to compromise its ultimate commitment to the standards of the academy.

Facing Up to the Challenges

Transforming conventional education through ODDE requires facing up to several significant challenges facing higher education. Norris, Brodnick, Lefrere, Gilmour, and Baer (2014) propose the following challenges, identified here as they apply to the American higher education experience (transferable to the context of other countries):

Challenge #1: Students and their families can no longer afford a college degree.
Challenge #2: American higher education institutions are facing a sea of red ink – declining state support, burdensome institutional debt, unrealistic instructional costs, plateauing tuition revenues, and intense competition for adult learners.
Challenge #3: American higher education has failed to assess student learning and performance.
Challenge #4: Most institutions lack the organizational agility to meet rapidly changing student learning needs and the needs of the US economy.
Challenge #5: Higher education has been unable to leverage technology to truly transform learning and competence building to be more accessible, relevant, challenging, and aligned with workforce needs.
Challenge #6: Higher education has failed to learn from the disruptive innovations pioneered by the for-profit institutions.

This is not to disparage or dismiss the effectiveness of conventional education. Those students able to attend and willing to pay the costs of tuition and (likely) relocation for a full-time, on-campus study experience no doubt value the direct teaching presence, social and peer engagement, and the buzz and social serendipity that a campus can offer. Such settings will find, though, that further "going online" to increase flexibility and meet the expectations of twenty-first-century learners will likely serve to increase costs and place increasing pressure on teaching operating models. "Going online," after all, places additional expectations on teaching staff and risks an inconsistent online experience for students as they advance from course to course (Nichols, 2020).

Moving from a Supply-Centric Orientation

To be supply-centered is to place the institutional operating model above the flexible preferences of learners. While “online education” is increasingly endorsed as a means by which higher education might be made “cheaper, more accessible, and better” (Beaudoin, 2016, p. 11), it is the starting point of a conventional education or ODDE paradigm that determines whether these are achieved. ERT showed that taking conventional education online does not lead to cheaper and better education alongside accessibility. Incremental changes to the conventional education model may have made education more accessible and better, but certainly not cheaper. ODDE is designed to challenge the iron triangle and so improve access, reduce cost, and improve educational quality. This is demonstrated by one recent study that found online ODDE results in increased revenues because of increased openness, improving student access (Ives & Walsh, 2021). Some also propose that there is a sizable. This matches the impression of some that there is a sizable, likely growing portion of would-be students who are “cost-conscious, pragmatic learners. . . [seeking] Greater openness, flexibility, and adaptability” (Norris et al., 2013, p. 1), to the extent that traditional timetables and the limitations of semesterization are considered barriers to student choice and progress (Nichols, 2020; Norris et al., 2013).

It was mentioned earlier that education is remarkably unchanged by the digital revolution. One central reason for this is the supply-centeredness of conventional education and its inability to cater for the increasingly reasonable expectations of students for anytime, anyplace tuition that flexes around life’s circumstances and students’ individual learning strengths. That students for the main cannot access any higher education course at any time for individual study for a reasonable price, and be personally guided to a successful outcome, is more a matter of design than it is a limitation of education itself. Approaches to learning design, analytics, artificial intelligence, evidence-based improvement, flexible access, interpersonal engagement, and student achievement can all be underpinned by the focused work of education specialists in an education orientation that provides accessible, scalable, and personalized education (Nichols, 2020).

It should not be assumed that digital education involves the transfer of conventional education model online or that such a transfer is progressive. Technology has the potential to entirely replace time-bound and lecture-based education with asynchronous, flexible, and personalized approaches that maintain the integrity of formal education achievement in ways that are both cost-effective and scalable. This disrupted form of education relies on an ODDE operating model, based on the paradigm of asynchronous, team-based, authoritative courseware that can be studied independently by design, with optional peer engagement. Clearly there are elements of most disciplines where interpersonal interaction and practical skills may require some synchronous engagement. However, these supplement, rather than determine, the teaching model. Developing an education orientation by necessity dethrones the teaching- or supply-focus that dominates most traditional or conventional forms of education. Typically the impetus for change is felt more sharply by administrators than by faculties (Norris et al., 2013), though even those in institutional leadership roles "continue to demonstrate a startling lack of insight into the power and promise of, in particular, online education now occurring at all educational levels" (Beaudoin, 2016, p. 11).

Transforming to and Within ODDE

Despite the apparent benefits and student-centeredness of ODDE and multiple indications that transformation is both educationally desirable and strategically sensible (Christensen & Eyring, 2013; Nichols, 2020; Norris et al., 2013, 2014), why is it seldom seen? Reasons such as strong demand for the social rite of passage for full-time university study, academic resistance, lack of vision, and concern as to the quality of online digital distance education are often cited. However, it could be argued that these factors are not as apparent as they may have been. More likely is that higher education favors the incumbent through high barriers to entry (large investment, high compliance requirements, and the need for a quality academic reputation in advance); no crisis of demand (enrolments continue to increase even as tuition costs do); and an operating model built around the scarcity of academic knowledge (Nichols, 2020). Beaudoin points out the "obvious irony in the fact that although the college experience can be transformative for so many people, the learning organization is inherently resistant to transforming itself" (2016, p. 15).

Of course, a further barrier to transformation is that it is a level of change that is incredibly challenging. Leaving a conventional education operating model for an ODDE one requires attending to four major aspects of an institution: strategy, policy, systems, and challenges (Minnaar, 2013). Beneath these headings, which are the major codes from a synthesis study, lie multiple decisions that challenge the conventional assumptions around teaching and learning such that "To move from a face-to-face institution to ODL needs redefining of the institution as a whole" (Minnaar, 2013, p. 87). Further challenges relate to added requirements for policies related to the design and development of courseware and teaching roles. Legal obligations related to intellectual property, copyright, and licensing come to the fore, as do terms and conditions of employment; most critically, a move toward ODDE from conventional education challenges that most fundamental of academic concerns: what it means to teach and be a teacher. Focusing the teaching role is an important component of transforming to ODDE (Minnaar, 2013; Moore & Kearsley, 1996; Seelig, Cadwallader, & Standring, 2019), particularly because "in distance education instructors usually work closely with a number of different people in the development and delivery of the course" (Moore & Kearsley, 1996, p. 127). That this is the case may explain why faculty resistance to online education is so high (Paul, 2014).

A variety of educational roles must be established or, yes, transformed, if ODDE is to succeed. Each of the seven Canadian universities in Ives and Walsh (2021) mentioned the necessity of instructional designers in their move toward online education, whether in support of conventional education or ODDE. In work considering planning successful uptake of open and distance learning, Minnaar points out that in conventional education "individual teachers develop and deliver their own courses. . . Educators try to be everything to everyone and to be experts in communication, curriculum design, course design, assessors, motivators, facilitators, as well as content experts," whereas in ODDE "it is important to move to a system where teachers are the specialists within a system" (2013, p. 102). What this might resemble is illustrated in the Open Polytechnic transformation in New Zealand (Seelig et al., 2019), whereby an ODDE institution further refined its academic role to specialize on subject matter expertise, teaching, and research in the context of other roles concerned with learning design and development, assessment activities, and learning support. That the change required further refinement of the organizational operating model and new practice no longer resembles the incumbent confirms its transformational status.

Managing a Transformation

Vision, leadership, strategy, and change management are core themes across institutions transitioning to online education and ODDE (Ives & Walsh, 2019, 2021; Nichols, 2020), though staff development and information technology infrastructure are also essential for adding digital media to education systems (Bernhard-Skala, 2019). Ensuring adequate resourcing is also an identified aspect of success in literature (Ives & Walsh, 2021). Institutions that appear to have made a positive transition to ODDE include Western Governor's University, Southern New Hampshire University, and New Zealand's Open Polytechnic (Christensen & Eyring, 2013; Seelig et al., 2019), each of whom identified opportunities to improve the access, flexibility, and practice of higher education through the deliberate implementation of digital technologies and rethinking the constraints of conventional education systems.

The complexities of managing change are well documented, and an enduring set of stages is readily available for those considering it (Kotter, 1996). The strategy, policies, systems, and challenges arising from change toward ODDE require significant leadership and managerial coordination (Beaudoin, 2016; Minnaar, 2013). Challenges specific to transforming into ODDE include the likes of expensive start-up costs, developing ways of engaging with new learner groups, adopting a new form of competitiveness, new forms of marketing, and addressing different student support requirements (Minnaar, 2013). Minnaar suggests beginning with strategic planning, followed by policy development and systems design (2013).

Norris et al. (2014) suggest starting with a 5-month design phase, whereby multiple perspectives are invited to address questions related to "what is happening now?", "what is the future in 10 years?", and "what opportunity does this create?" In the sixth and seventh months, these ideas are refined as multiple opportunities are consolidated. In the final 5 months, a convergence of these ideas takes place in the align phase, starting with "several big ideas" and "exploring the strategies" that might be used to implement them and then finalizing the "selected strategies and actions" that bring the entire design to a conclusion.

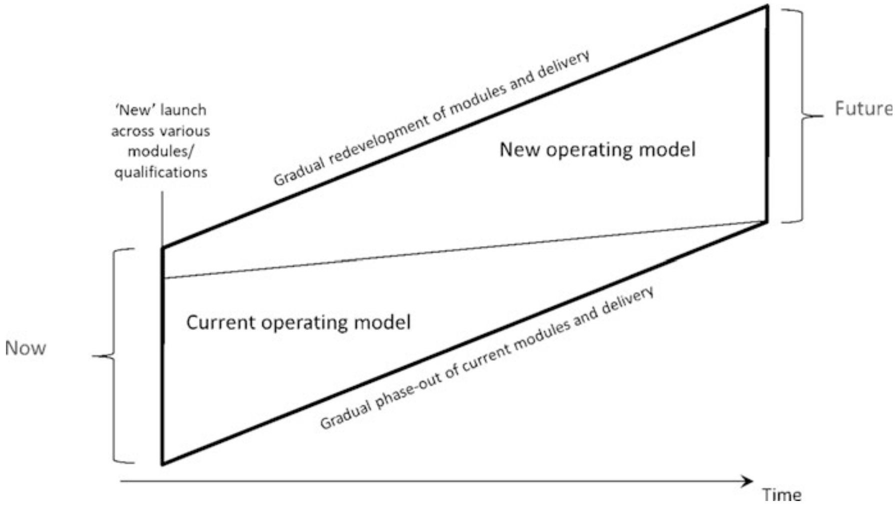


Fig. 1 A gradual adoption of a new operating model. (© The Open University (2017))

There are two main options for transformative change: either reinvent or reshape the core business model or "create a separate disruptive business to develop innovations that will become the source of future growth" (Norris et al., 2013, p. 12) enabling gradual adoption (Fig. 1). Each option leads to very different strategies (Norris et al., 2014), though the latter has the advantage of less risk and the opportunity to encourage further change as success is experienced (Christensen & Eyring, 2013; Minnaar, 2013). The risks of implementing a comprehensive new model of teaching and learning, enabled by a new series of operating processes, make the latter option much more viable. Beginning with tentative, malleable processes enables experience to further shape design in anticipation of more robust, scalable means of working. Regardless of the model employed, transformative change takes a committed investment of time (Minnaar, citing a Commonwealth of Learning report, suggests up to 5 years), funding (most courseware development costs are up-front), and courage.

Conclusion

ODDE is a different paradigm of teaching and learning to that of conventional education. Conventional education providers seeking to realize ODDE benefits, then, must anticipate transformation of their operating models across the dimensions of the timing and responsibility of the education experience, role of the instructor, location of instruction, and the necessity of student peer-to-peer contact. The more fundamental elements of this change relate to the asynchronous bias of ODDE and, therefore, the role of synchronous teaching and the need for a timetable. "Going online," then, does not automatically confer any of the traditional benefits of accessibility, cost-effectiveness, flexibility, openness, and scalability. Without a deliberate redesign of the underlying operating model of education, "going online" results in transfer of practice rather than transformation.

"Hybrid" or "blended" models are also problematic as means of ODDE, in that these tend to betray a conventional education starting point. The underlying operating model, designed to support lectures, contact classes, and timetables, constrains the potential reach toward accessible, cost-effective, flexible, open, and scalable education. Attempting to cater for both conventional education and ODDE at the same time results in increased costs and a blurring of specialist input across the education endeavor. Ultimately the role of the instructor can be traced back to a binary of synchronously in front of a class or asynchronously represented in courseware.

A transformational shift toward ODDE makes sound strategic and educational sense, but change is challenging. Norris et al. describe transformation as requiring:

> a commitment between the board and the president to push the campus community beyond its comfort zone, risking the slings and arrows of campus pushback in order to fulfill the responsibility of stewardship for the future of the institution in the Age of Disruption. (Norris et al., 2013, p. 13)

It is helpful to consider conventional education and ODDE as contrasting starting places, both with different assumptions about how education takes place. However, while conventional education is identifiable through a dedicated teacher and class timetable, ODDE is more varied. If conventional education and ODDE are considered as extremes (or paradigms), the dynamics of transformation become much clearer. Fortunately there are institutions that have successfully made the transition to ODDE, and a mature literature now exists for those seeing to achieve the same.

References

Amirault, R. J. (2012). Distance learning in the 21st century university: Key issues for leaders and faculty. *Quarterly Review of Distance Education, 13*(4), 253–265. Retrieved from http://www.openpolytechnic.ac.nz/library/login?redirect=https%3A%2F%2Fsearch.ebscohost.com%2Flogin.aspx%3Fdirect%3Dtrue%26db%3Dedb%26AN%3D94070855%26site%3Deds-live%26scope%3Dsite

Amoozegar, A., Khodabandelou, R., & Ebrahim, N. A. (2018). Major trends in distance education research: A combination of bibliometric and thematic analyze. Web server without geographic relation, Web server without geographic relation (org): Figshare. https://doi.org/10.6084/m9.figshare.6210536.v1.

Beaudoin, M. (2016). Issues in distance education: A primer for higher education decision makers. *New Directions for Higher Education, 2016*(173), 9–19. https://doi.org/10.1002/HE.20175.

Bernhard-Skala, C. (2019). Organisational perspectives on the digital transformation of adult and continuing education: A literature review from a German-speaking perspective. *Journal of Adult and Continuing Education, 25*(2), 178–197. https://doi.org/10.1177/1477971419850840.

Christensen, C. M., & Eyring, H. J. (2013). *The innovative university: Changing the DNA of higher education from the inside out*. San Francisco, CA: Jossey-Bass.

Daniel, J. (2019). Open universities: Old concepts and contemporary challenges. *International Review of Research in Open and Distance Learning, 20*(4), 196–211. https://doi.org/10.19173/irrodl.v20i3.4035.

Daniel, J., Kanwar, A., & Uvalić-Trumbić, S. (2009). Breaking higher Education's iron triangle: Access, cost, and quality. *Change: The Magazine of Higher Learning*. https://doi.org/10.3200/chng.41.2.30-35.

Erdem-Aydin, I. (2021). Investigation of higher education instructors' perspectives towards emergency remote teaching. *Educational Media International*. https://doi.org/10.1080/09523987.2021.1908501.

Guri-Rosenblit, S. (2005). "Distance education" and "e-learning": Not the same thing. *Higher Education, 49*(4), 467–493. Retrieved from http://www.jstor.org/stable/25068081

Guri-Rosenblit, S. (2014). Distance education systems and institutions in the online era: An identity crisis. In O. Zawacki-Richter & T. Anderson (Eds.), *Online distance education: Towards a research agenda* (pp. 109–129). Edmonton, AB: AU Press. Retrieved from http://www.amazon.ca/Online-Distance-Education-Towards-Research-ebook/dp/B00LI88ATQ/ref=sr_1_1?ie=UTF8&qid=1404419874&sr=8-1&keywords=Online+Distance+Education%3A+Towards+a+Research+Agenda

Hughes, J. E. (2021). Replacement, amplification, and transformation: The R.A.T. model. Retrieved August 14, 2020, from https://techedges.org/r-a-t-model/

Ives, C., & Walsh, P. (2019). Leadership and organizational change in the move to online learning. In *ICDE world conference on online learning*. Dublin. Retrieved from https://wcol2019.ie/wp-content/uploads/presentations/CP_053,IVES&WALSH.pdf

Ives, C., & Walsh, P. (2021). Perspectives of Canadian distance educators on the move to online learning. *Canadian Journal of Higher Education, 51*(1), 28–40. https://doi.org/10.47678/cjhe.vi0.188971.

Jung, I. (2019). Introduction to theories of open and distance education. In I. Jung (Ed.), *Open and distance education theory revisited: Implications for the digital era* (pp. 1–9). Singapore: Springer.

Kotter, J. P. (1996). *Leading change*. Boston, MA: Harvard Business School Press.

Li, Y. W. (2016). Transforming conventional teaching classroom to learner-centred teaching classroom using multimedia-mediated learning module. *International Journal of Information and Education Technology, 6*(2), 105–112. https://doi.org/10.7763/ijiet.2016.v6.667.

Minnaar, A. (2013). Challenges for successful planning of open and distance learning (ODL): A template analysis. *International Review of Research in Open and Distance Learning, 14*(3), 81–108. https://doi.org/10.19173/irrodl.v14i3.1387.

Moore, M. G., & Kearsley, G. (1996). *Distance education: A systems view*. Belmont, CA: Wadsworth.

Nichols, M. (2020). *Transforming universities with digital distance education: The future of formal learning*. New York, NY/London, UK: Routledge.

Nipper, S. (1989). Third generation distance learning and computer conferencing. In R. Mason & R. Goodfellow (Eds.), *Mindweave* (pp. 63–73). Oxford, UK: Pergamon Press.

Norris, D., Brodnick, R., Lefrere, P., Gilmour, J., & Baer, L. (2013). Transforming in an age of disruptive change: Part 1: Back to the future, zooming to the present. *Planning for Higher Education, 41*, 18+. Retrieved from https://link.gale.com/apps/doc/A342177540/PPVC?u=atha49011&sid=bookmark-PPVC&xid=7fc42bb5

Norris, D., Brodnick, R., Lefrere, P., Gilmour, J., & Baer, L. (2014). Transforming in an age of disruptive change: Part 2: Getting started, getting it done. *Planning for Higher Education, 41*(2), 1–28. Retrieved from http://webmedia.jcu.edu/institutionaleffectiveness/files/2016/04/PHEV41N2_Article_Transforming-Part2.pdf

Paul, R. (2014). Organization and management of online and distance learning. In O. Zawacki-Richter & T. Anderson (Eds.), *Online distance education: Towards a research agenda* (pp. 175–196). Edmonton, AB: AU Press. Retrieved from https://www.aupress.ca/app/uploads/120233_99Z_Zawacki-Richter_Anderson_2014-Online_Distance_Education.pdf

Puentedura, R. R. (2006). A model for technology and transformation. Retrieved June 2, 2018, from http://hippasus.com/resources/tte/part1.html
Reynolds, R., & Chu, S. K. W. (2020). Guest editorial. *Information and Learning Sciences, 121*(5/6), 233–239. https://doi.org/10.1108/ILS-05-2020-144.
Rumble, G. (1989). 'Open learning', 'distance learning', and the misuse of language. *Open Learning: The Journal of Open, Distance and e-Learning*. https://doi.org/10.1080/0268051890040206.
Seelig, C., Cadwallader, A., & Standring, D. (2019). Transformational change in delivery at Open Polytechnic, New Zealand. *Journal of Learning for Development, 6*(1), 37.
Stewart, W. H. (2021). A global crash-course in teaching and learning online: A thematic review of empirical emergency remote teaching (ERT) studies in higher education during year 1 of COVID-19. *Open Praxis, 13*(1). https://doi.org/10.5944/openpraxis.13.1.1177.
Talib, M. A., Bettayeb, A. M., & Omer, R. I. (2021). Analytical study on the impact of technology in higher education during the age of COVID-19: Systematic literature review. *Education and Information Technologies*, 1–28. https://doi.org/10.1007/s10639-021-10507-1.
Zawacki-Richter, O., & Naidu, S. (2016). Mapping research trends from 35 years of publications in. *Distance Education, 37*(3), 245–269. https://doi.org/10.1080/01587919.2016.1185079.

Academic Professional Development to Support Mixed Modalities

39

Belinda Tynan, Carina Bossu, and Shona Leitch

Contents

Abstract

This chapter will explore professional development (PD) of academic and teaching staff in the use of technologies to support learning in mixed modalities including blended and online modalities in higher education contexts. The authors will explore current practices in both face-to-face (f2f) and online/distance education contexts. A succinct annotated review of key seminal and recent texts will be provided of current trends in relation to PD of staff and the implications that arise from this research for practitioners. Two very different but relevant examples of PD will be provided to bring the discussion to life: (i) at the Open University, UK, and (ii) at Royal Melbourne Institute of Technology, Australia.

B. Tynan (✉)
Deloitte, Melbourne, VIC, Australia
e-mail: Belinda.tynan@acu.edu.au; belindatynan2@gmail.com

C. Bossu
Open University, Milton Keynes, UK
e-mail: carina.bossu@open.ac.uk

S. Leitch
Royal Melbourne Institute of Technology, Melbourne, VIC, Australia
e-mail: Shona.leitch@rmit.edu.au

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_36

Keywords

Professional development, Academic development, Staff development, Online learning, Distance education

Introduction

With the rise of enrolments through online education across the globe, academic professional development (PD) has never been more important to provide quality learning experiences for learners. There is no single *one-size-fits-all* model; however, there are numerous points of research that provide insight into the practices across higher education institutions which participate in distance education, online education, and all manners of blended modalities. Many universities have centers of learning and teaching which quite often have responsibility for academic PD, while other universities have a more decentralized approach, where PD support and activities are situated in individual faculties. This chapter situates PD through the lens of COVID-19, and while the literature in the field is vast, the authors have included significant and relevant research, augmented with concise case studies of PD in practice. Finally, the chapter concludes with a number of recommendations to practitioners.

Context

2020 was the beginning of a pandemic that most across international datelines could not have imagined. No part of the globe was untouched by the COVID-19 virus and its numerous variants as wave after wave ravaged even the wealthiest of countries. The impact on those most vulnerable, the old, sick, and disabled, those living in poverty and millions of children whose education just stopped will be a legacy that we will all live with for generations to come. It was a crisis unimagined.

Higher education institutions closed their doors and overnight and instantly became providers of online education – or rather what was coined as *remote education* as few were prepared for the requirements of creating an engaging and fulfilling online learning experience. Most were prepared through their digital infrastructures and enterprise learning management systems, but, unless you were already a provider of online education, the disruption was enormous. Students the world over were now in their bedrooms, kitchens, and lounge rooms, in their cars, and in the corner shop or anywhere they could access the Internet.

Teaching and research staff, again unless used to teaching purposefully designed online learning experiences, were seeking whatever PD they could get to support their practice. Staff found themselves setting up home offices, learning how to teach online, and using video technologies to engage with their students. Many were stressed and reported fatigue with being online so much and ill equipped for what was required of them.

Distance education institutions did not escape the impact of the global pandemic, despite many having the digital infrastructures, capacity, and resources already designed for online learning. Many institutions faced staff shortage due to furlough, sickness (COVID-19-related or not), or caring responsibility, which resulted in increased staff workload. The need for student support increased substantially, as many students were vulnerable, lived in shared or abusive homes, and had financial difficulties as many lost their jobs. Some assessment strategies had to be reconsidered or eliminated altogether, as students were not able to attend examinations that usually took place in the distributed distance centers.

This grim picture, however, had some silver linings especially when it came to the PD or academic development as is often coined of the academic workforce. For many years, the debate about the academic development of our academic staff within our tertiary institutions has been one which has been fraught, caught between the discipline qualifications that an academic ordinarily has at postgraduate level and the requirement to be able to teach. There is an old argument that a PhD does not give you a "license" to teach nor does it mean you can teach across a range of modalities. There is a 30 plus year research base for education including learning and teaching across numerous disciplines in higher education. A quick scan of the journals reveals many tomes which have a focus on learning and teaching.

Higher education institutions have long faced this dilemma, and all manners of opportunities for engaging with the art of teaching have been in place. Centralized learning and teaching centers have for years provided seminars, formal certificates, and diploma courses to develop the skills required to teach, underpinned by the theoretical basis for what makes a good learning experience. But, and here is the but, much of that provision is accessed by a small number of academic staff who are interested in learning and teaching, and often those who need the support the most do not engage with such opportunity for support and upskilling. Most of the research literature is made up of small case studies, too numerous to quote here, which reinforce that we still really do not know categorically whether such training has an impact on both what and how our students learn. These cases provide a peek into classrooms of our educators and are primarily "happy" stories of success.

Still, something changed during COVID. Across the globe, there were reports that universities had thousands of their staff sign up for PD. They needed to know how to teach online. Suddenly, it became urgent and necessary to reach out for support and ideas and to skill themselves in new techniques. What might have taken 5 years was done overnight. The debate of whether these staff were *really* teaching online or, as many in the online business would say "they were teaching remotely" of course exists and is completely legitimate. Online teaching requires specialized design and engagement with learnings that is distinctly different to the campus-based experience. It isn't as simple as putting your lectures online and holding tutorials. As we learn more about online learning, the specialized knowledge and pedagogical approaches are becoming more important. Our learners demand more than simply reading a book online.

Interestingly, as countries across the globe emerge from their lockdowns and return to the campus, learning and teaching has altered and probably for good. No doubt, in years to come, we will see research emerge which will fully analyze and report on COVID-19 impacts. Our learners are now likely to experience a mix of campus and online modes. Some of our staff are even saying they prefer being online. And many of our students are asking for the flexibility that online earning gives them. Some of them have opted to enroll themselves in established open and online universities instead. One example of this is the Open University UK, which experienced a 15% increase in the total number of students enrolled for the 2020/2021 academic year. It should be noted however that many of the institutional surveys in Australian institutions have reported significant drops in the national student engagement scores over 2020 and student feedback has been variably related to their experiences over the past 12 months.

While distance and online learning has been the territory of the distance education provider, it has, over the past few decades, been slowly changing. The rise of learning management systems, smarter digital technologies, and the Internet has seen most tertiary institutions engage in blended or online learning to some extent. Distance learning has essentially been replaced by online learning where the infrastructure can support it.

Supporting our staff to embrace technologies now appears to be a thing of the past, and the challenge is how we shift from teaching remotely to designing for online. For many familiar with this literature, this may feel like a flash back to the past. Distance education providers have been entirely familiar with these challenges since their inception a few decades ago. Regardless of where your institution is along the continuum of embracing new technologies in a variety of modes, there is much to learn from what has gone before us.

Literature

From the enormous literature available, the authors have purposefully selected articles that have resonated with the authors and that have recognized standing within the field.

Angela Brew is an Australian expert in academic PD and has written many pieces in this field. She has been a strong advocate for a scholarly approach to PD. In this seminal article, Brew (2010) argues that scholarship should be at the center for both students and teachers to create an environment where research, scholarship, teaching, and learning are viewed as part of one whole. She believes that this integration is key to promote lasting and transformational improvements in learning and teaching in higher education.

However, this integration has implications for academic development. This means that developers need to work in partnership with a range of university stakeholders, including academics, senior and mid-level managers, sessional staff, students, and professional staff, to create a more inclusive, inquiry-focused higher education. This also means that developers need to take into account different contexts and perspectives, as there is no one-size-fits-all solution to the “supercomplex, uncertain and ambivalent world in which we practice” (p. 114).

Discussions and cooperation are required so that a holistic and inclusive approach is developed.

The key lessons from this article are as follows:

(a) The scholarship of academic practice can build capacity of academics.
(b) Developers need to understand and undertake the scholarship of learning and teaching themselves.
(c) Graduate certificates can provide opportunities for academics to engage in scholarship of learning and teaching.
(d) Individual and institutional contexts need to be taken into consideration so that a holistic and inclusive approach is developed.

Daumiller, Rinas, Olden, and Dresel (2021) studied the learning engagement and learning gains resulting from academics undertaking PD and how their own achievement goals are related to such engagement and gains. Findings demonstrated that those who began with positive motivations and goals learned well and had high learning gains; however, substantial differences in the gains were found. The research demonstrated that for those designing and deploying PD, they should not utilize the same methods for each academic and that tailored support is more effectively related to individuals' motivations.

The key lessons from this article are as follows:

(a) The goals academics had related to their achievement in a PD program impacted the learning gains they had.
(b) Those high on work avoidance used minimal resources in a PD program.
(c) Those who were concerned about appearing incompetent and lacking in knowledge achieved lower learning gains.
(d) Understanding the motivation of academics in a PD program can lead to better strategies regarding engagement and allow for more personalized options targeting their own goals and ways of learning.

The research by Evans, Yip, Chan, Armatas, and Tse (2020) examines the data from a Hong Kong university's learning management system (LMS) to examine the effectiveness of a PD course as to how teachers' behavior in an online environment changed and how the skills they learned during the PD were applied when teaching. The research highlights the significant increase in teacher's activity in the LMS during a delivery period including the use of a larger number of tools, particularly those that encouraged and facilitated collaboration. The delivery of the PD course in a blended mode demonstrated positive effects on teacher's future practice in blended modes of teaching.

The key lessons from this article are as follows:

(a) Delivering PD in the same mode as the proposed teaching will take place provided a more authentic experience which allowed staff to "put themselves in their students shoes."

(b) Those who learned in a blended and online mode therefore used more tools and features of the LMS than they had previously done before the PD.

Gregory and Salmon (2013) consider the experiences of an Australian university in designing and delivering an approach to PD for online teaching that could be done at pace and was scalable and also addressed the key skills for teaching online rather than just technical ability or expertise. The researchers utilized a model of online PD delivery which was iterative across cycles within the teaching and learning context. Key principles for the success of the model included the use of a number of intervention cycles ensuring continuous improvement; addressing the institutions' environment and requirements, the commitment to ensuring leadership and mentoring as an ongoing activity; and engaging wider academic cohort participation through encouragement by their colleagues.

The key lessons from this article are as follows:

(a) Having a committed and passionate leadership of PD is essential.
(b) Having distributed and cascaded leadership and mentorship across the university assisted sustainability long terms.
(c) Having academic staff be "champions" to encourage wider participation worked effectively.
(d) Pace and scale can be achieved with the appropriate mechanisms, design, and support.

It is so interesting to go back and read Jamieson (2004) again. He talks about some of the challenges of teaching online in 2004 and the need to build the capacity of an academic workforce that had no experience of either learning or teaching online before. The challenge was even greater as the majority of academics teaching didn't have a teaching qualification nor pedagogical knowledge. An experienced teacher was just someone who taught for many years.

In this work, Jamieson looks at the design and delivery of academic development for a large cohort of teachers at one of Australia's largest universities in an online mode. This research was designed to test an experiential approach to building staff capability in online teaching. Most participants had a first-hand experience in teaching in flexible modes, and the approach was designed to build understanding of and empathy for their online student cohorts by embedding capability development into workplace practice. That is "learning" while on the job. The results were that academics were more engaged and connected to their students' expectations through this method and that it influenced positively their approach to their teaching practice in flexible environments.

As an attempt to bridge this gap in his university (Monash at the time), a Graduate Certificate in Higher Education (GCHE) was developed. In the paper, Jamieson talks about the structure of the program and the units' mode of delivery. The author run a little evaluation after the first unit was offered to participants. Responses were a mix of positive and not so positive insights into their experiences, as some academics were still reluctant to teach and/or adopt online learning.

The key lessons from this article are as follows:

(a) Context and current capability are important when considering the best approach and design for PD.
(b) For experienced practitioners, embedding capability building into current practice and the live teaching experiences promoted engagement.

The research by Macdonald and Poniatowska (2011) has positioned the importance of embedding PD (PD) in a way that is meaningful to ensure engagement by university staff who are a part of connected but diverse community with multiple types of roles within one institution. The design of the PD to be aligned to roles which then directed staff to learning tools was an approach that was successful with staff and provided a more curated and relevant PD learning experience. Utilizing both self-study and cohort opportunities also allowed further personalization with those in a cohort finding the value of such a community important although more opportunities to connect through a wider community of learners in different contexts/roles was desired.

The key lessons from this article are as follows:

(a) PD was needed to cover staff from a wide variety of teaching roles.
(b) Having a learner experience that was more personalized was important.
(c) Learning individually was important but also the need to ensure opportunities for people to connect to others (individuals and groups) wanted and valued.

Whereas Salmon (2004) presents the five-step model for developing online instructors, the model is mostly focused on teaching using LMS/VLE and has two dimensions to it, with a combination of interaction and learning. One dimension develops the instructor's teaching skills, while the other provides the appropriate technological skills necessary to match these with the teaching skills and, hence, accomplish each step of the model. The five steps are "access and motivation, online socialisation, information giving and receiving, knowledge construction, and development" (p. 63).

The key lessons for this chapter are as follows:

(a) Identify e-moderators' key competencies, so that training and development of these moderators can be planned.
(b) Train e-moderators online instead of face-to-face, so that they experience what students will experience.
(c) Use materials and software that can be reused, improved, and expanded to enable economy of scales.
(d) Run evaluations of trainings.

van der Sluis, Burden, and Huet (2017) examine the impact of professional recognition programs, in particular the one offered by Advance HE in the UK, which uses the UK Professional Standards Framework (UKPSF) as a standard by which teaching and professional staff can gain recognition for their teaching practice. Many universities in the UK and abroad can be accredited to offer an in-house version of such scheme. In this chapter, the authors provide a case study of one such institutional recognition scheme and discuss the impact it is having on practice and on practitioners. Their findings suggest that participation in recognition schemes increases engagement with the scholarship of learning and teaching and provides participants opportunities for staff development and reflection on practice, as a result reinforcing commitment to teaching and/or supporting learning.

The key lessons from this article are as follows:

(a) Participation in recognition schemes increase engagement with the scholarship of learning and teaching.
(b) The process helps practitioners to reflect on their current and future practice.
(c) Receiving the fellowship provides participants a sense of reward and achievement.

The seminal work on academic PD by Webb (1996) explores theoretical foundations of staff development and argues that staff development is underpinned by the perspective offered by hermeneutics. This is due to the nature of staff development being about understanding, supporting, and helping others to improve their practice. He states that this perspective "places human relationships centre-stage" (p. 65). This stance has a direct impact on how staff development is planned and designed. Webb argues that such PD should be transformative, encourage critical reflection, instead of being merely practical, where teachers just learn how to use a particular tool or technique.

In addition to suggesting theoretical and philosophical stances for staff development, Webb also recommends in his book that action research was the most influential and the fastest-growing orientation toward staff development at the time. This was due to the fact that it has a focus on action and change for improvement.

The book also discusses the role of educational developers, as experts and supporting/counseling figures as they help their colleagues becoming better practitioners. Webb suggests that developers also need to be developed and have a supportive and collegial network which they can rely on, such as "critical colleagues" or "critical friends." They may offer support in various ways, three of which may be described as restorative, normative, and developmental.

The key lessons from this book are as follows:

(a) Staff development is underpinned by the hermeneutic theoretical perspective.
(b) Staff development activities should be designed with this perspective in mind to encourage critical reflection and change in practice.
(c) Action research could help practitioners and developers to achieve change and improvement.
(d) Developers need to work closely with colleagues to help them to become better practitioners.
(e) Developers also need to be developed.

Webb (2003) further suggests ten key points for quality teaching, including in distance education, that should be considered when developing academic staff. He believes that these points might assist in enhancing students' learning experiences. They are:

- Building relationships between staff and students
- Modeling scholarly values
- Encouraging cooperation
- Encouraging active learning
- Providing appropriate teaching through different teaching approaches to meet different learning objectives
- Providing appropriate assessment
- Providing prompt and helpful feedback
- Encouraging productive use of time
- Communicating high expectations
- Respecting diversity in the background and experience of students (p. 90)

However, before starting planning any academic development activities, there are a few elements that should be taken into consideration within the institution, such as institutional context and appropriate educational policies and strategies for learning and teaching.

The following cases demonstrate the practice and theory in action.

The Cases

Case 1: OU UK – *Applaud*

The first case from the Open University, UK, details an approach to staff PD that is aligned with a national scheme that recognizes teaching experiences at several levels of maturity from early career through to expert. As a scheme, it provides a framework of competencies that supports academics in reflecting on their practice and evidencing impact. As a form of PD, this is very attractive to academics as they are incentivized by certification that is benchmarked globally.

Setting the Stage

PD has been recognized for decades as key to effective organizational change and to improving student learning and experience. This is even more the case today as the need to upskill and build capacity in online learning across the higher education sector has increased. In addition, and particularly in the UK, increasingly universities and professional accrediting bodies (e.g., in nursing) have adopted professional recognition such as the HEA Fellowship as one of the strategies to offer PD and recognition to staff in teaching and learning support roles. This is also the case for The Open University, which is the largest university and online learning provider in the UK and is internationally known for its excellence in learning and teaching.

Applaud is The Open University's institutional scheme for Accrediting and Promoting Professional Learning and Academic Development. In line with the OU distance learning approaches, *Applaud* is a fully online scheme and has been developed to provide PD and recognition of teaching excellence to its teaching and learning support staff. *Applaud* offers individuals the opportunity to gain external recognition as an associate fellow, fellow, or senior fellow of the Higher Education Academy. The fellowship category will depend on an applicant's role, experience, and responsibilities in teaching and supporting learning.

Challenge

Schemes like *Applaud* are accredited by Advance HE (previously known as HEA) every 4 years. The first Applaud-accredited period was from 2016 and ended on August 31, 2020. During this time, the scheme supported over 543 applicants for HEA recognition. Although it has been generally successful, based on participant feedback during evaluation of the scheme, the fluid way that the scheme was running was inefficient and resource-intensive. Candidates could register for the scheme at any time of the year and change their submission deadline basically as often and for as long as they wanted, and this meant that it was unsustainable as the number of candidates applying steadily increased, but completion rates remained stable at around only 20–30% in any given year. One of the key reasons for this increase in registration numbers was a policy change in the UK requiring universities to report their number of HEA Fellowships in the Teaching Excellence Framework (TEF) (van der Sluis et al. 2017). As a result, OU faculties have more aggressively encouraged their staff to get HEA recognition by applying for *Applaud*. In addition, Fellowship of the HEA has progressively become a requirement in job advertisements and renewal of teaching contracts in the UK higher education sector.

Solution

As the *Applaud* team prepared for the reaccreditation of the scheme in 2019, the *Applaud* team saw an opportunity to make the changes needed to create a scheme that provided better support to candidates, had stronger connections with the faculties and related units, and was less resource-intensive.

Some of the main changes adopted were the following:

- *Applaud* now uses a cohort system with 60 candidates per year accompanied by 3 workshops per cohort and a set timeframe for registration and submission of the fellowship application.
- A Triage Page was added to the *Applaud* website to guide and assist candidates to choose the right fellowship category for them. Candidates are asked to complete the Triage Page before registering.
- The development and implementation of a dedicated software that links all elements of the *Applaud* process from registration to submissions and panel decisions to cope with the increased demand and improve efficiency.

- The *Applaud* Quality Steering Group was created. It has representatives from all faculties and key units. They meet twice a year to discuss and oversee *Applaud* high-level strategies.

Two main activities supported the core changes in the scheme. One was an evaluation of the previous scheme through an online survey that was sent to over 450 participants who successfully gained their HEA Fellowship through *Applaud*, with 108 valid responses (n = 108). Despite the challenges presented, the scheme has been somehow successful. Survey responses indicated that the scheme has had a positive impact on participants' practices (81%), as 72% of them were more confident in their role as teachers/supporters of leaning and 66% felt more confidence to undertake scholarship of learning and teaching. We then presented the findings of this survey and the proposed changes in the scheme to key *Applaud* stakeholders across the University during a workshop. The event enabled key stakeholders to discuss and provide feedback on the proposed changes. This workshop was important as it acted to strengthen *Applaud* connections and get buy-in across the University.

Results

The newly accredited *Applaud* scheme started on September 1, 2020 (accredited period 2020–2024). At the time of writing, two cohorts have completed the new scheme (approximately 98 candidates). Asking candidates to self-assess through the Triage process before registering has helped them to select the right fellowship category for their evidence of practice, and, as a result, only six candidates have needed to change categories. The move to a cohort structure has also proven to be the right strategy. The workshops provided to each cohort have been well attended (60–80% attendance), and most candidates have felt more supported. As a result, completion rates have increased to between 70% and 80% a year. More support to candidates has also meant that the quality of submissions has improved, based on the reviewers' feedback. Each candidate is supported by an individual trained mentor.

In total, *Applaud* manages over 115 mentors. Feedback from mentors has also been mostly positive. The cohort structure means that they can choose a particular time of the year that they are available to mentor *Applaud* candidates, helping them to better manage their workloads, instead of the previous ad hoc approach. The dedicated software system has taken longer than expected to be developed, but Cohort 2 submissions and panel review have taken place electronically saving time and effort and increasing accuracy in data handling. So far, the results of the changes implemented in the *Applaud* scheme have been beneficial to most stakeholders, including candidates, mentors, reviewers, and the *Applaud* team. However, an evaluation of the new scheme is being developed to fully capture participants' perceptions and experiences with the scheme. Hopefully, the reaccredited scheme will continue having as positive an impact on participants' practices as the previous. Whether or not student learning outcomes have been improved will require further investigation. Ultimately, the main reason for such a program is to improve the student experience and their learning outcomes.

Case 2: RMIT

Case 2 has a focus on the response to COVID-19 and details the quality approach taken to an end-to-end experience for students and in supporting staff in their PD journey. The imperative here was to provide PD as a "just-in-time" solution in addressing the issue that most of the staff did not have any previous expertise in online learning.

Setting the Stage

Royal Melbourne Institute of Technology (RMIT) is a large dual-sector university in Melbourne, Australia, with a student population of approximately 93,000 based in Australia as well as in other global locations. RMIT is primarily a campus-based university operating in Melbourne, Singapore, and Vietnam. Although RMIT has a subsidiary called RMIT Online, this represents about 10% of the total student cohort.

Challenge

In response to the COVID-19 pandemic and the students impacted by the initial wave of international travel bans, RMIT identified 300 courses across its suite of programs that could be offered via remote delivery to students in impacted countries where students were unable to travel to Australia to commence or continue their studying. With the escalation of the situation in Melbourne and the implementation of staged restrictions related to group gathering sizes and the need for physical distancing, RMIT Melbourne ceased face-to-face lectures in March 2020, and face-to-face tutorials/practicals were moved to online/remote delivery for all courses (3000 approx.). While there were some on-campus activities and assessment during 2020 when restrictions allowed, the majority of the learning took place online for the entire academic year.

Solution

In response to the longer-term requirements, RMIT responded by ensuring standards related to online/remote learning were developed and implemented to ensure a consistent RMIT-wide approach. This was augmented with a quality management semester end-to-end and process-related, to ensure the attainment of student learning outcomes, holistic student support, and staff capability development.

Prior to 2020, RMIT did not have a large-scale expertise across its workforce in the delivery of online or remote learning, and, therefore, there needed to be a direct and clear strategy to support thousands of academics and teachers in transition to a changed mode of paced delivery. Also, the PD also had to be delivered online and have several approaches to be able to accommodate different staff capabilities and mindsets. Also, it needed to support an initial and immediate need as well as having an ongoing approach as a teaching semester progressed.

RMIT therefore utilized a multifaceted approach of:

- Initial online sessions targeting key elements of online learning centered around the RMIT online teaching guidelines designed to support staff in the pre-semester

preparatory period and in the first few weeks as they transitioned the design of their course and the mode of delivery
- An ongoing opportunity to engage with the workshops throughout the semester around key areas that may continue to be challenging to their teaching practice
- A just-in-time online live chat function to get immediate support for an individual and support discrete issues that staff might be experiencing or wanted to seek advice on

Around 40% of staff attended PD sessions; over 50% of these were during the first week of teaching with a further 16% attending in week 2, while the remainder of the semester attendance held steady between 2% and 4% of staff. A total of 153 professional capability sessions were run across a 12-week period.

24/7 live chat sessions were held with a high volume of chat in the second and third week of semester as staff progressed from the workshop sessions to more targeted support. Chat dropped in week 4 before stabilizing for the rest of the period. Technical support for tools and the University Learning Management System (LMS) was where most support was most sought.

Results

In order to determine impact and the success of the approach, staff satisfaction data were collated resulting in a 95% satisfaction rating, as well as the validation of the success of the implementation of the online learning guidelines which the PD supported. This had mixed results, with some key areas such as the design and delivery of assessment in an online environment challenging academics and teachers which was unsurprising due to the large practical nature of RMIT's curriculum and the teaching of vocational educational competencies. Elements of improvement were also identified as required in the provision and type of learning resources. Further data related to student engagement with the learning management system (LMS) was also used to further clarify the outcomes and the potential future strategy of online/blended learning and the PD support that would underpin such a strategy.

The immediate necessity of such PD and the significant staff engagement with these opportunities demonstrated that the approach taken, by providing both depth and breadth in support, as well as scheduled and just-in-time PD was appropriate in the circumstances that presented themselves.

The learnings from this period have significantly changed the environment of RMIT with an appetite and a subsequent strategy to continue the digital uplift of programs and courses utilizing the best of both a physical and digital environment to inspire and deliver flexible and meaningful learning experiences and successful student outcomes. With an enterprise-wide focus, this has also meant the professional learning capabilities and opportunities have been strengthened with a modularized set of blended learning sessions developed that are self-paced, adaptable, and aligned to the pedagogical approach being embedded into curricula, thus creating a more holistic professional learning framework to support future aspirations and strategic directions.

Conclusion

At this point in the chapter comes the difficulty of drawing out key themes and recommendations for the reader. What can we learn, for example, from the intersection of the theory in the annotated readings and the practice found in the cases? Lessons learned for each article are provided for rich reading.

There is no doubt that there is a complexity when it comes to supporting academic staff in their ongoing PD as teachers and pedagogues.

No discussion about staff development is separated from the topic of quality. Waring (2019) goes as far to say that "staff development is a prerequisite for quality" (p. 363). In Australia, the Tertiary Education Quality and Standards Agency (TEQSA) has an expectation that academic staff both are qualified and have currency to fulfill their role as educators and researchers. We note the Quality Code for Higher Education, UK, echoes similarly. No doubt this requirement can be found among quality codes the globe over. As the responsibilities of staff shift in complex higher education environments because of both external and internal drivers, staff capabilities also change to meet new demands. And it was evident during COVID-19 as many universities moved into remote and online teaching that new skills were required. For the learning outcomes of our student cohorts to not be affected negatively, academic staff needed to upskill and develop a deeper appreciation for the pedagogies of online learning quickly.

Jung and Latchem (2008) observe there are key competencies associated with quality online learning to deliver coherent courses and programs. It goes without saying that for learners to "learn," the experience needs to be well planned and designed. The online environment has unique challenges that require a deep understanding of how students learn in this mode. Furthermore, what we may refer to as "the nuts and bolts" such as the technology platforms and standards associated with these add an additional complicating factor. Teachers are required to wrestle with a range of variables such as their organization policy, pedagogy, ICT, administration, student support, and assessment.

As more universities shift into blended and online modalities, workload is another key consideration. As educators balance teaching, research, and often significant administrative and engagement responsibilities, the time required to prepare holistic responses to online learning is certainly squeezed. During COVID-19, one of the main complaints from staff was the increase in workload as courses went online. A quick search reveals numerous examples of staff stress and overload resulting in impacts to their research. Staff have indicated that working from home has also meant a collision between personal and professional lives, and for women, the impacts of this on their academic career are yet to be fully understood. In a work by Ryan, Tynan, and Lamnot-Mills (2014) state that in blended and online environments that there is a lack of acknowledgment of how much effort is required to teach well and that workload models rarely detail the specific workload required for this activity.

The two cases are very different. They tackle PD of staff as a response to both longer-term strategic directions and the immediacy of a crisis to enhance quality education outcomes. The readings provide further cases of practice, and the authors hope that readers find them instructive. As Brew (2010) highlights, there is no fixed approach or one solution that can be applied globally to PD in an institution. However, here we provide a few recommendations that have arisen from the literature and cases as detailed above.

We recommend that:

- Academic PD is framed by the context where it is situated (Brew, 2010; Evans et al., 2020; Jamieson, 2004; Macdonald & Poniatowska, 2011; Salmon, 2004; Webb, 1996, 2003).
- Strategic directions, policies, and guidelines of universities play an important role in determining the capabilities and competencies that are required of its academic staff (Brew, 2010; Jamieson, 2004; Jung & Latchem, 2008; Ryan et al., 2019; Wareng, 2019; Webb, 2003).
- Quality should be at the heart of "why" academic PD is supported and championed (Brew, 2010; Jung & Latchem, 2008).
- PD should be supported within the workload allocations and prioritized against the university's strategy (Jamieson, 2004; Ryan et al., 2019).
- Incentivizing PD through recognition schemes, certification, promotion, etc. should be considered (van der Sluis et al., 2017).
- Providing opportunities for academic staff to reflect deeply and to immerse themselves with peers in professional conversations where they can be reflexive is important for long-term engagement and impact (Brew, 2010; Evans et al., 2020; Gregory, & Salmon, 2013; Jamieson, 2004; Macdonald & Poniatowska, 2011; Salmon, 2004; van der Sluis et al., 2017; Webb, 1996, 2003).
- Allowing staff to personalize their PD and select appropriate modes of learning from and with cohorts to individualize self-paced opportunities ensures that personal learning styles are accommodated improving the chances of positive engagement (Evans et al., 2020; Gregory, & Salmon, 2013; Jamieson, 2004; Janet Macdonald & Barbara Poniatowska, 2011; Salmon, 2004; Webb, 1996, 2003).
- Just-in-time PD for academics is a powerful driver of participation (Brew, 2010; Jamieson, 2004; Macdonald & Poniatowska, 2011).

References

Brew, A. (2010). Transforming academic practice through scholarship. *International Journal for Academic Development, 15*, 105–116. https://doi.org/10.1080/13601441003737618.

Daumiller, M., Rinas, R., Olden, D., & Dresel, M. (2021). Academics' motivations in professional training courses: Effects on learning engagement and learning gains. *International Journal for Academic Development, 26*, 7–23. https://doi.org/10.1080/1360144X.2020.176839.

Evans, C., Yip, H., Chan, K., Armatas, C., & Tse, A. (2020). Blended learning in higher education: Professional development in a Hong Kong university. *Higher Education Research & Development, 39*, 643–656. https://doi.org/10.1080/07294360.2019.1685943.

Gregory, J., & Salmon, G. (2013). Professional development for online university teaching. *Distance Education, 34*. https://doi.org/10.1080/01587919.2013.835771.

Jamieson, P. (2004). The university as workplace: Preparing lecturers to teach in online environments. *Quarterly Review of Distance Education, 5*, 21–27. https://www.proquest.com/scholarly-journals/university-as-workplace-preparing-lecturers-teach/docview/231214258/se-2?accountid=201395

Jung, I., & Latchem, C. (2008). Competencies and Quality assurance and accreditation in distance education and e-learning. In I. Jung & C. Latchem (Eds.), *Quality assurance and accreditation in distance education and e-learning*, London, Routledge (Vol. 21, pp. 231–243).

Macdonald, J., & Poniatowska, B. (2011). Designing the professional development of staff for teaching online: An OU (UK) case study. *Distance Education, 32*, 119–134. https://doi.org/10.1080/01587919.2011.565481.

Ryan, Y., Tynan, B., & Lamnot-Mills, A. (2014). Competencies and quality assurance and accreditation in distance education and e-learning. In A. G. Picciano, C. D. Dziuban, & C. R. Graham (Eds.), *Blended learning research perspectives* (Vol. 2). Routledge.

Salmon, G. (2004). *E-moderating in higher education*. Hershey, PA: Idea Group. https://www.academia.edu/17506049/E_Moderating_in_Higher_Education

van der Sluis, H., Burden, P., & Huet, I. (2017). Retrospection and reflection: The emerging influence of an institutional professional recognition scheme on professional development and academic practice in a UK university. *Innovations in Education and Teaching International, 54*, 126–134. https://doi.org/10.1080/14703297.2016.1273790.

Waring, S., Ellis, R., & Hogard, E. (Eds.). (2019). Out of hours: Online and blended learning. Routledge's.

Webb, G. (1996). *Understanding staff development*. Open University Press. https://files.eric.ed.gov/fulltext/ED415730.pdf

Webb, G. (2003). *Planning and management in distance education*. Kogan Page.

Part V

Infrastructure, Quality Assurance, and Support Systems

Introduction to Infrastructure, Quality Assurance, and Support Systems of ODDE

40

Tian Belawati

Contents

Abstract

Distance education (DE) has evolved over numerous generations, from correspondence study to the most recent online education, which is classified as open, distance, and digital education (ODDE). DE advances in line with technological advancements, and DE generations often correspond to the pre- and post-Internet eras. This classification also affects and prescribes the learning environment required to ensure the educational and learning process' effectiveness.

The pre-Internet period of DE was marked by a vast physical infrastructure, including a physical network of regional, local offices, and learning centers, as was widely implemented by distance teaching universities. Soft infrastructure, such as a digital learning environment, characterizes the ODDE in the Internet era. Despite the differences in ODDE infrastructure before and after the Internet, library services and a quality assurance system have always been essential components of the ODDE system. The global open movement has had an impact

T. Belawati (✉)
Universitas Terbuka (Indonesia Open University), Jakarta, Indonesia
e-mail: tbelawati@ecampus.ut.ac.id

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_87

on ODDE practice, expanding learning resources beyond those generated by ODDE providers. The open education movement has given ODDE more supporting infrastructures, allowing it to become more powerful and cost-effective. Finally, the burgeoning metaverse appears to be destined to become the future ODDE platform, elevating ODDE practice to new heights. This chapter discusses some trends and debates about the nature of institutional infrastructure before and after the Internet era, a cross-generational supporting infrastructure related to quality assurance, as well as learning resources particularly those related to the open educational resources (OER) and open licenses, and some thoughts on the metaverse as an emerging trend in education.

Keywords

Distance education · Pre-Internet distance education · Distance education infrastructure · OER · CC · Metaverse

Introduction

Open, distance, and digital education (ODDE) refers to a distance education model that is based on and delivered using digital technologies. Distance education (DE) itself has been evolving through several generations starting from the era of correspondence study to the latest one known as online education. Following the correspondence model, Taylor (2001) categorized DE generations into five which correlate to the type of dominant technologies being used to deliver the education: (1) the correspondence model, (2) the multimedia model, (3) the tele-learning model, (4) the flexible learning model, and (5) the intelligent flexible learning model. The last two generations were born as the result of Internet technology, and therefore DE models can easily be viewed as those in the pre-Internet era (conventional DE) and the post-Internet era (online DE). It is in Taylor's fourth generation that terms such as e-learning, mobile learning, ubiquitous learning, virtual learning, and ODDE were born and, to some extent, are being used interchangeably. With the vast use of online technology, the DE generation continues to be related to connectivism, which assumes that learning occurs within an interrelated network of data and information, best exemplified by the connective massive open online courses (cMOOCs) model. According to Siemens (2013), cMOOCs are based on a connectivist pedagogical model that views knowledge as "a networked state and learning as the process of generating those networks and adding and pruning connections" (p. 8). Thus, **learning happens within a digital network**, where learners use various **digital platforms (e.g., blogs, wikis, social media platforms)** to make their own connections with learning resources including content and learning communities to create and construct knowledge.

The aforementioned categorization of DE generations demonstrates that each generation needs its own infrastructures, support systems, and quality standards to ensure the learning and teaching process's effectiveness. Pre-Internet DE infrastructure was dominated by physical buildings and facilities for management offices and learning support systems; printed materials, multimedia, and radio/television broadcast as teaching media; and quality was correlated with media effectiveness in delivering learning content when compared to traditional face-to-face teaching. In the post-Internet DE, infrastructure is significantly replaced by information and communication technologies (ICTs) both for administration and the teaching and learning process, making the entire process virtual and, theoretically, globally connected. As a result, quality in the Internet DE encompasses concerns about issues such as digital learning environment, learning engagement, and learning achievement, among other things.

The Organization of Section 5

Because infrastructure is so vital, it is important to keep track of how it evolves over time to better anticipate future development requirements. Several organizational/institutional infrastructures, including learner support systems, faculty support systems, administrative support systems, program, and course evaluation, and information and library services, appear to be essential to DE practices, regardless of which generation they belong to. As part of the institutional infrastructure, quality assurance (QA) appears to be a cross-generational necessity. This section focuses on the infrastructure features and issues as interpreted by selected authors who are well-known in the field and have gained experience in the relevant subjects. The authors come from a variety of countries and areas, including Asia, Europe, Africa, and North America.

To open the section on Infrastructure, Quality Assurance, and Support Systems of ODDE, this chapter will discuss some trends and debates about the nature of institutional infrastructure before and after the Internet era, a cross-generational supporting infrastructure related to quality assurance, as well as learning resources particularly those related to the open educational resources (OER) and open licenses, and some thoughts on the metaverse as an emerging trend in education.

Institutional Infrastructures in the Pre- and Post-Internet Era

Infrastructure for Course Materials Development and Student Support Services

In its simplest form, DE management in the pre-Internet era consists of two main elements of activities: course materials development [and delivery] and student support services (Mcdougall & Apan, 2003). It is those two main elements that make the pre-Internet distance education usually requires substantial initial capital investment for producing and delivering the print-based course materials and for providing face-to-face and in-person support services, as well as for administering pencil-paper student assessment.

The best illustration of the pre-Internet DE is undoubtedly the distance teaching university (DTU) model, which includes the open university paradigm. The DTU's early teaching strategy consisted of pre-written course materials that are heavily tailored for print, complemented by multimedia resources, broadcast television, and radio programs, as well as in-person tutoring in study centers. Students at DTUs, including those with special needs, were expected to study independently using the course materials, complete the assignments, as well as participate in (optional) in-person tutorials and pass the exam anywhere. A chapter co-authored by Kocdar and Bozkurt emphasizes that ODDE is inclusive by nature and should envision equity, equality, and justice for all learners, including those who have special needs; thus, DTUs should use student support service strategies that can assist students with special needs in overcoming their challenges. To deliver these services, DTUs usually establish service centers, often referred to as regional offices, learning centers, etc., in their regional serving areas. As a result, it is customary for a DTU to have a vast physical network of facilities for its operations.

Because of the availability of ICTs and the Internet, course materials development and delivery no longer necessitate large-scale production facilities, as they can now be done electronically through the Internet. Similarly, online platforms are gradually being used to conduct and provide learning assessments and support services for students. These modifications eliminated the need for large physical facilities and networks, lowering the number of study centers required. Physical study centers at DTUs in the Internet era have changed their functions to become more promotional and symbolic of physical presence.

The evolution of ODDE's institutional infrastructure is an inevitable result of the growth and advancement of ICT. To sustainably ensure and improve the quality of its services, DTUs must be able to modify their infrastructures in line with emerging ICTs. Benke and Widger's chapter in this section further examines how the ability to dynamically develop services can be instilled within the institutional infrastructure for ODDE. It examines parts of the field's evolution, including the development of structures that support scalability, affordability, and sustainability. It also presents an overview of institutional infrastructure and models for ODDE, followed by a review of the evolving delivery strategies, institutional infrastructure, and the demand for IT infrastructure support.

Technological Infrastructure

DTUs have always had a strong technological infrastructure, as seen by their vast physical hardware, which included mainframes in specialized computer facilities/buildings and personal PCs as working stations. DTUs' massification of DE necessitates a strong technology-based academic administration system, such as a comprehensive student record system, which has become the backbone of all operations and learning support services. The student record system keeps track of data that is manually entered from completed printed papers.

When the Internet became available for general usage, the Flexible Learning Model promises to combine the advantages of high-quality multimedia with increased engagement. The social contact between students and teachers as well as each student's interaction with teaching-learning resources has been enhanced by the Internet (Bates, 1995). This has highlighted the notable distinction between learning through DE before and following Internet use. According to Tait (2000), the ICTs revolution was the advancement of open and distance learning from "print at the core of a range of media" to virtual environments delivered via the Web. Internet use in ODDE has an enormous influence on the infrastructure needed to facilitate both the provision and the process of learning. With the change in the way students access the course materials and interact with both the instructors and other students, the need for massive physical infrastructure was dramatically decreasing. All functions that need physical buildings and room in an older ODDE practice can now be conducted with and by a computing system. Computer mainframes that used to be the physical storage of data have now also been replaced by cloud computing. Practically, the ODDE infrastructure in the Internet era is dominated by computer databases, platforms, and applications within a digital learning environment (DLE).

The infrastructure required to support both the delivery of and the process of learning is significantly impacted by Internet use in ODDE. The demand for extensive physical infrastructure was severely declining because of the change in how students access the course materials and communicate with both the teachers and other students. According to Panda's chapter, as globalization, technology, and perceptions of twenty-first-century learners and learning change, DTUs also gradually alter their delivery methods and learner support systems: from course design and learner support being separate to both being an integral part of blended teaching-learning; from a more physically and geographically based operation to a more technologically enabled networked operation; from behaviorist to more of constructivist and connectivist models of course design and learner support; and from a humanistic support system to more of strategic support system. Almost all operations that required physical structures and space in an older ODDE practice can now be carried out with and by a computing system. Cloud computing has now replaced computer mainframes, which were formerly the physical storage of data. Practically, computer databases, platforms, and applications within a digital learning environment (DLE) make up most of the ODDE infrastructure in the Internet era.

In 2005, Anderson created a framework to assist institutions in creating online learning (at the time known as e-learning) systems. He emphasized that quality online learning should be built within the secure fulfillment of five elements: (1) information technology (IT) infrastructure, (2) technical standards, (3) content characteristics, (4) pedagogical design, and (5) institutional management. Davis, Little, and Stewart (2011) further highlighted that quality online learning should be deployed using a learning management system (LMS) that delivers course content and resources as well as the strategies/pedagogies of the teaching and learning. Students may access their courses and all other learning resources and services with a single login owing to a user-friendly portal system that connects them to the LMS and related support services. This shows that a learning experience platform, such as an LMS, is important to online learning and is regarded as such. The LMS is where students interact with the learning materials, with teachers and tutors, and with other students. For ODDE providers, the LMS metadata may be used as important learning analytics to increase student success. Over the past 10 years, learning analytics has grown to be a crucial component of the ODDE architecture. ODDE providers can gain a better understanding of student behaviors and their connections to learning success based on the digital data (of learning activities) captured within the LMS, students' background information in the university database, and the use of computational analysis techniques from data science and artificial intelligence.

In more recent years, the online learning system has further evolved and become a digital learning ecosystem (DLE), which is an online setting that makes use of a system's technical affordances to improve instructional experiences. DLE promotes improvements in resource sharing and collaboration, student retention, and the standardization and reduction of the supporting infrastructure (Brown, Dehoney, & Millichap, 2015). In other words, DLE functions similarly to how ODDE functioned before the Internet by serving as a virtual representation of the whole online education infrastructure. It is an ecosystem for universities in a digital form that is increasingly cloud-based. This, however, does not eliminate the physical infrastructure as most ODDE institutions still maintain their physical basic offices for management and computing center purposes.

Cross-Generational Infrastructures: Library Services and Quality Assurance

Several parts of institutional infrastructure, such as library service and quality assurance, have been crucial to the creation and implementation of DE and ODDE systems and practices across time, whether before or after the Internet entered the picture.

Library Service and Digital Library

For any university, the library has long served as the main hub of educational resources. In reality, the library building would be the most recognizable structure on every campus in the world. A library service would include book loans, interlibrary loans, as well as reading areas. The name "library" creates the illusion of bookshelves. Except for the "physical" component, a digital library is very similar to a standard conventional library. A digital library is more than just a digitized collection with information management tools, and it involves several activities that "bring together collections, services, and people in support of the full life cycle of creation, dissemination, use, and presentation of data, information, and knowledge." (Sun & Yuan, 2012, p. 13).

Since DE students are required to conduct independent study, the importance of digital libraries in ODDE cannot be overstated. DE providers typically provide supplemental materials using a digital platform, even in a more traditional DE where learning does not take place in the digital platform and is instead supplied through a pre-produced learning materials package. The digital library is typically one of the first electronic services created as part of learning support services as the use of ICT increases. All students should be able to access the educational materials in the digital library collections using a variety of technological tools. Consequently, a digital library comprises a web interface in addition to being a computer-based system for collecting, organizing, searching, and distributing digital items for end-user access. According to Sun and Yuan (2012), the digital library should offer quick and effective access to the materials with a variety of access modes, because it is intended to serve a specific community or collection of communities. A chapter in this section co-authored by Owusu-Ansah and Rodrigues further discusses that a collaboratively implemented digital library service will significantly improve distance learning library services by considering the importance of collaboration in strategic planning and policy development, the provision of digital collections and information services, and the development of technological infrastructure and skill sets in the context of distance education. The chapter suggests that adopting a collaborative model of digital libraries in ODDE can guarantee wider acceptance and utilization in ODDE.

Quality Assurance

Government officials, institutional administrators, academic personnel, and students all have various ideas about what quality in DE means (Jung, Wong, Li, Baigaltugs, & Belawati, 2011). Therefore, to decide on the quality criteria and standards by which to evaluate the quality of input, process, and output of DE, quality assurance activities often strive to consider all those diverse perspectives (Jung et al., 2011). Quality assurance (QA) has always been a crucial component of every ODDE system, despite the various ways that stakeholders define quality. Among ODDE practitioners, QA has long been a topic of conversation. Partly, it is due to the dynamic nature of the QA system to accord to the always-changing practices of ODDE. To capture the dynamics of the QA system, we present five chapters related to QA in this section.

As discussed in Jung's chapter, QA in DE and ODDE has been the subject of numerous national, regional, and international initiatives throughout the years. These endeavors lead to the creation of numerous so-called quality assurance standards, guidelines, and statements of best practices (Jung et al., 2011). Although those guidelines and standards may have different styles and elements, they address several fundamental QA areas that remain constant throughout time. For instance, the QA framework for the Asian Association of Open Universities (https://www.aaou.org/quality-assurance-framework/) lists policy and planning, internal management, learners and learners' profiles, infrastructure, media, and learning resources, learner assessment and evaluation, research and community services, human resources, learner support, program design and curriculum development, and course design and development as areas of internal quality assurance. Similarly, the European Association for Quality Assurance in Higher Education (ENQA) states that institutional policies for e-learning shall include institutional support, course development, teaching and learning, course structure, student support, faculty support with compulsory e-learning training for new members of staff, technological infrastructures, student assessment, and certification, as well as electronic security measures (Huertas et al., 2018). A chapter co-written by Ubachs and Henderikx focuses on the latest development of a QA framework for European DTUs that aligns with the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG). Ubachs and Henderikx report that due to the growing importance of e-learning, the European Association of Distance Teaching Universities (EADTU), the ENQA, and leading universities in Europe have collaboratively developed specific guidelines that operationalize the most relevant ESG standards for application in digital education including a third version of the E-xcellence manual and instrument for blended and distance learning. In addition, a more recent publication from the International Council for Open, Distance Education – ICDE reported that an effective QA and quality enhancement appears to be multifaceted, dynamic, mainstreamed, representative, and multifunctional (Ossiannilsson, Williams, Camilleri, & Brown, 2015).

Specifically for open universities (OUs), Jung (2005) identified that although some institutions put different emphasis on different QA areas, core areas of QA across the mega universities were in the course and program development and delivery. ► Chapter 45, "Program and Course Evaluation in Open, Distance, and Digital Education," by Bandalaria specifically discusses how quality in ODDE has been and is expressed concerning curriculum and courses and how they are evaluated for quality to identify any gaps that need to be filled to help eliminate that notion of inferior quality. According to Bandalaria, program and course evaluation methodologies can lead to innovations and improvements if they are guided by QA Frameworks and take advantage of the data that technology can produce, as in the case of learning analytics, which served as the foundation for the suggestions made. To illustrate the implementation of QA frameworks, a chapter co-authored by Darojat and LI examines how QA programs are developed and continuously conducted at two mega universities, Universitas Terbuka and the Open University of China. Both institutions constantly develop QA systems and use systematic QA programs, which over time have improved the quality of learning. A different ► Chap. 47, "Accreditation and Recognition of Prior Learning in Higher Education," by Conrad focuses on how recognition of prior learning (RPL) may and does play a significant part in the certification of higher institutional learning, which is advantageous for students, employers, and society. Conrad asserts that by acknowledging and respecting a variety of learning possibilities, RPL helps to mitigate concerns of quality in terms of fairness, diversity, and inclusion in education.

In summary, QA has been an important element of ODDE infrastructure to continuously improve services and ensure student success. More than ever, QA has taken the lead role in ensuring that educational emphasis is placed on both learning outcomes and high-quality teaching and learning. Additionally, the significance of employing QA to improve inclusivity, equity, and lifelong learning has been emphasized by the United Nations Sustainable Development Goals (Martin & Stamenka, 2021).

The Sharing Paradigm: Open Educational Resources and Creative Commons

One of the greatest impacts of the global open movement in education is the birth and development of various "open" and "open-source" products that are freely available to be used by educational institutions. Because everyone may publish and share content on the second generation of the Internet, a new paradigm of sharing and sharing culture has emerged (Wiley, 2011). As a result, not only were numerous informational and instructional resources created but the entire openness phenomenon was also developed and fostered. Open education, which was previously understood to mean accessible to everyone, everywhere, at any time, has been further defined as unrestricted access to knowledge. The idea of openness has been elevated to a whole new level by the definition of open content as having the freedom to 5R: retain, revise, remix, reuse, and redistribute (Wiley, 2014).

The open content movement was also made popular when the Massachusetts Institute of Technology (MIT) opened up all its lecture materials and made them available to the public in 2001. It further gained momentum when UNESCO introduced the term OER in 2002. Many educators, policymakers, and governments are drawn to open education. At about the same time, a group of US lawyers created the Creative Commons (CC) open license framework, which makes it easier for creators to share their knowledge and information by allowing them to select the rights they want to provide to users. In many institutions and nations, the use of this CC scheme is now required for the practice of ODDE. ODDE now has a new set of infrastructures that are built on the sharing of educational resources attributable to the open movement. As this is a process of cultural transformation, Teixeira underlines in one of the chapters in this section that DTUs should work to create an open ecosystem by encouraging the usage, reuse, and remixing of OERs and guaranteeing universal accessibility and digital inclusion.

The open-source movement has altered the way educational resources are created and delivered. The sharing paradigm has had a big impact on ODDE's infrastructure since distance education universities may now take benefit of a variety of learning resources without having to produce everything from start or constantly deal with publication concerns. As a result, they are no longer required to have their production and distribution facilities, which frees up space in their budget to address other urgent demands. Nevertheless, the widespread acceptance, usage, sharing, and future development of OER in the practice of teaching and learning in ODDE are frequently perceived as being hindered by the lack of openness on the quality of OER. A chapter authored by Zawacki-Richter, Muskens, and Marin gives an overview of

OER quality assurance mechanisms from a global viewpoint and faculty members' assessments, both of which are in line with the UNESCO Recommendation on OER. Then, based on an empirical investigation, the Instrument for Quality Assurance of OER, a quality framework, and validated instrument, is offered for the evaluation and quality assessment of OER (IQOER). The chapter further examines how such an instrument might be incorporated into a quality assurance procedure that considers the various objectives, obligations, and responsibilities of the participating stakeholders. It becomes obvious that for OER to be accepted more widely, a culture shift toward open educational practices (OEP) is also required.

The Future: Metaverse-Based ODDE

A metaverse is the convergence of virtually enhanced physical reality and physically persistent virtual space (Collins, 2008), a 3D network that forms virtual worlds that focuses on social connection (Newton, 2021). Virtual worlds can be used for everything from corporate communication and planning meetings to offering a platform for instructors, staff, and students to engage in a safe and secure environment, delivering student services on a virtual campus. This type of immersive learning is not totally new. In 2005–2006, a company named Linden Labs created "Second Life," a technology that allowed universities to create a virtual environment (Schroeder, 2021). Although it is still theoretically operational, it did not take off beyond its experimental stage, and it may now perhaps find a "second life" in the growing metaverse (Drozdowski, 2022).

If used appropriately, the metaverse is an immersive environment that can, in theory, bring the best digital technologies to bear on education (Hirsh-Pasek et al., 2022). The best educational metaverse applications can help develop engaging and immersive learning environments for students in various educational institutions (Howell, 2022). Flashy and exciting digital experiences can be transformed into ones that are instructive with genuine social interaction at their center by learning how to use active, engaging, meaningful, socially interactive, iterative, and joyful environments to support learning goals. As an illustration, Barry, Kanematsu, and Fukumura (2010) experimented with using metaverse to deliver a problem-based learning scenario and discovered that by catering to the variety of learning styles, metaverse learning might make up for the loss of socialization in e-learning. It appears that the "real-life" learning experiences that many people feel are absent in conventional online learning systems, such as LMS, can be provided by metaverse-based online learning. Students, instructors, and staff at the University of Miami use immersive technology to connect in a network of virtual worlds to explore innovative approaches to solve problems and enhance education after 4 years of research (Tannen, 2022).

The metaverse will certainly grow much quicker, along with its myriad problems that are currently unclear and mostly unregulated, as the COVID-19 pandemic has increased the use of online learning approaches in all types of educational practice. Therefore, it is essential to use a cautious application strategy. Kye, Han, Kim, Park, and Jo (2021) stress the importance of taking the required precautions to protect student data privacy and safety when creating an educational metaverse platform. Additionally, to use the metaverse for education, instructional designers and teachers must first comprehend the technical peculiarities of each form of the metaverse and then create lessons that enable students to cooperate to solve issues or accomplish tasks.

Although the ideal metaverse for education has not yet arrived, we already know that DE has altered the way we view higher education and that the metaverse's existence will have a similar impact. While it cannot replace traveling to campus in the real world, attending university in the metaverse alongside other "avatar" students and professors may enhance the authenticity of the experience. As the "great unbundling" of higher education accelerates due to the move to the metaverse, students may increasingly prefer only that core teaching and learning product, forgoing more traditional university requirements like dorm living, campus dining, library carrels, football games, and playing on a verdant quad (Drozdowski, 2022). Therefore, the infrastructure of the metaverse would resemble that of a standard physical campus, transforming not only ODDE but also conventional in-person teaching methods. As a result, a strong DLE furnished with cutting-edge AI, ER, XR technologies, and educational products (learning materials, laboratory experiments, etc.) would significantly replace the necessary educational infrastructure. Organizationally, the structure would also require modification from a workforce that was heavily weighted with management to one that was more computer-savvy.

Conclusion

ODDE has come a long way from the correspondence model to the latest one that is based on and delivered through an online platform. The characteristics of ODDE over time have impacted the need for supporting infrastructure. The pre-Internet era of ODDE (or most adequately term as just DE) that was massively practiced by open universities is characterized by large physical infrastructure including a multimedia production studio, an enormous warehouse, a bulky computing and examination center, and a physical network of regional, local offices and learning centers. The ODDE after the emergence of the Internet is more characterized by soft infrastructures such as a digital learning environment including LMS and learning analytics. Nevertheless, despite the different characteristics of ODDE infrastructure before and after the arrival of the Internet, digital libraries and quality assurance systems have always been integral parts of the ODDE system.

Another noticeable aspect of ODDE infrastructure is those impacted by the open education movement. The open education movement has provided ODDE with additional supporting infrastructures that have allowed ODDE to be more powerful and cost-effective. Among others, OER have provided ODDE with richer quality learning resources and collaboration opportunities. Finally, with technology constantly evolving, the so-called metaverse is likely to become a future learning environment platform that combines the virtual world and the real world, facilitating various learning and social life needs like on a physical campus to provide a rich and engaging learning experience.

References

Barry, D. M., Kanematsu, H., & Fukumura, Y. (2010). *Problem based learning in metaverse.* ERIC ED512315. Retrieved April 4, 2022, from https://eric.ed.gov/?id=ED512315

Bates, A. W. (1995). *Technology, open learning, and distance education*. New York, N.Y.: Routledge.

Brown, M., Dehoney, J., & Millichap, N. (2015). The next-generation digital learning environment: A report on research. Next generation digital learning environment initiative. *EDUCAUSE*, Apr. 2015. Retrieved from https://library.educause.edu/~/media/files/library/2015/4/eli3035-pdf

Collins, C. (2008). Looking to the future: Higher education in the metaverse. *EDUCAUSE, 3*(5), 51–63.

Davis, A., Little, P., & Stewart, B. (2011). Developing an infrastructure for online learning. In T. Anderson (Ed.), *The theory and practice of online learning* (2nd Ed., pp. 121–142). Edmonton, AB: Athabasca University Press. Retrieved from https://read.aupress.ca/read/the-theory-and-practice-of-online-learning/section/6bbdc252-6d4f-41f7-98c5-206f8dabab5a#ch05

Drozdowski, M. J. (2022, March 15). Higher education in the metaverse. Retrieved from Best Colleges: https://www.bestcolleges.com/news/analysis/2022/03/15/higher-education-in-the-metaverse/

Hirsh-Pasek, K., Zosh, J. M., Shwe Hadani, H., Michnick Golinkoff, R., Clark, K., Donohue, C., & Wartella, E. (2022). *A whole new world: Education meets the metaverse*. Brookings. Retrieved from https://www.brookings.edu/research/a-whole-new-world-education-meets-the-metaverse/

Howell, J. (2022). *Top 5 metaverse applications*. Retrieved from 101 Blockchains: https://101blockchains.com/top-metaverse-applications/

Huertas, E., Biscan, I., Ejsing, C., Kerber, L., Kozlowska, L., Ortega, S. M., Laur I. L, Risse, M., Schörg, K., & Seppmann, G. (2018). *Considerations for quality assurance of e-learning provision* (Report from the ENQA working group VIII on quality assurance and e-learning occasional. Papers 26). Brussels, Belgium: European Association for Quality Assurance in Higher Education. Retrieved from https://www.enqa.eu/wp-content/uploads/Considerations-for-QA-of-e-learning-provision.pdf

Jung, I. (2005). Quality assurance survey of mega universities. In C. McIntosh & Z. Varoglu (Eds.), *Perspectives on distance education lifelong learning & distance higher education* (pp. 79–96). Paris, France: Commonwealth of Learning & UNESCO.

Jung, I., Wong, T. M., Li, C., Baigaltugs, S., & Belawati, T. (2011). Quality assurance in Asian distance education: Diverse approaches and common culture. *The International Review of Research in Open and Distributed Learning, 12*(6), 63–83. https://doi.org/10.19173/irrodl.v12i6.991.

Kye, B., Han, N., Kim, E., Park, Y., & Jo, S. (2021). Educational applications of metaverse: Possibilities and limitations. *Journal of Educational Evaluation for Health Professions, 18*, 32. https://doi.org/10.3352/jeehp.2021.18.32.

Martin, M., & Stamenka, U. (2021). *A new generation of external quality assurance. Dynamics of change and innovative approaches. New trends in higher education*. Paris: UNESCO – International Institute for Educational Planning. Retrieved from: https://unesdoc.unesco.org/ark:/48223/pf0000377497

Mcdougall, K., & Apan, A. (2003). Operational infrastructure for quality distance and online geospatial programs. *Cartography*, June 2003. https://doi.org/10.1080/00690805.2003.9714232. Retrieved from https://www.researchgate.net/publication/228695530

Newton, C. (2021). Mark Zuckerberg is betting Facebook's future on the metaverse. In *The Verge*. https://www.theverge.com/22588022/mark-zuckerberg-facebook-ceo-metaverse-interview

Ossiannilsson, E., Williams, K., Camilleri, A. F., & Brown, M. (2015). *Quality models in online and open education around the globe: State of the art and recommendations* (The ICDE reports series). Oslo, Norway: ICDE.

Schroeder, R. (2021, November 23). The history of higher education and the Metaverse. Retrieved from Helix Education: https://www.helixeducation.com/resources/enrollment-growth-university/what-the-metaverse-means-for-higher-education/

Siemens, G. (2013). Massive open online courses: Innovation in education? In R. McGreal, W. Kinuthia, & S. Marshal (Eds.), *Open educational resources: Innovation, research and practice* (pp. 5–15). Vancouver, BC: Commonwealth of Learning and Athabasca University.

Sun, J., & Yuan, B. (2012). Development and characteristics of digital library as a library branch. *IERI Procedia, 2*, 12–17. Retrieved from https://www.researchgate.net/publication/269954368_Development_and_Characteristic_of_Digital_Library_as_a_Library_Branch

Tait, A. (2000). Planning student support for open and distance learning. *Open Learning, 15*(3), 287–299.

Tannen, J. N. (2022, January 20). *University community leaps into the 'metaverse'*. Retrieved from News@TheU: https://news.miami.edu/stories/2022/01/university-community-leaps-into-the-metaverse.html

Taylor, J. (2001). *Fifth generation distance education* (Higher education series. Report no. 40). Retrieved from http://www.c3l.uni-oldenburg.de/cde/media/readings/taylor01.pdf. 16 Sept 2021

Wiley, D. (2011). *Introduction to openness in education: Open content*. Retrieved from http://openeducation.us/open-content

Wiley, D. (2014). *The access compromise and the 5th R*. Retrieved from

Institutional Infrastructures for Open, Distance, and Digital Education

41

Meg Benke and Laura Widger

Contents

M. Benke (✉)
School for Graduate Studies, SUNY Empire State College, Saratoga Springs, NY, USA
e-mail: meg.benke@esc.edu

L. Widger
School of Education and Lifelong Learning, South East Technological University, Waterford, Ireland
e-mail: Laura.WIdger@setu.ie

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_37

Abstract

Infrastructure for open, distance, and digital education (ODDE) needs to have the capability to dynamically develop to accommodate varying models for the delivery of the curriculum and the changing needs of students and institutions. The capability to dynamically develop can be instilled within the institutional infrastructure for ODDE which includes areas such as information technology (IT), emerging technologies, marketing and recruitment, student prospect lead management, registration, educational materials, libraries, and student supports. Organizationally, infrastructures to support affordability, scalability, sustainability, and support must be developed. Open questions and directions for future research on institutional infrastructure for ODDE along with implications for ODDE practice that arise from this research are included.

Keywords

Online learning infrastructure · Distance learning information technology · Online marketing · Online user services

Dynamic Development of Institutional Infrastructures

While the core function of education remains unchanged, the needs of students and educational institutions are constantly evolving according to changes in sociocultural, political, demographic, and technological domains. It is essential that the infrastructure for open, distance, and digital education (ODDE) has the capability to dynamically develop to accommodate varying models for the delivery of the curriculum and the changing needs of students and institutions. This chapter will explore how the capability to dynamically develop services can be instilled within the institutional infrastructure for ODDE. It will review some of the evolution in the field such as structures to support affordability, scalability, sustainability, and support. An overview of institutional infrastructure and models for ODDE will be presented. This is followed by a discussion of evolving delivery approaches and institutional infrastructure and the need for IT infrastructure supports. The authors will produce open questions and directions for future research on institutional infrastructure for ODDE along with implications for ODDE practice that arise from this research.

Overview of the Institutional Infrastructure for ODDE

The institutional infrastructure for ODDE is complex and its core components include marketing and recruitment systems, IT and learning management systems, and administration platforms for student services, educational materials, and libraries including open education resources. The requirements for infrastructure depend upon the institutional mission, strategy, and associated business models combined with the characteristics and size of the intended student audience, variety of academic programs, proposed learning outcomes, and other program development needs. The needs of infrastructure will differ for stand-alone open and distance programs offered in an online mode when compared with those which are more integrated into a traditional campus. Underlying the core components and associated requirements for institutional infrastructure for ODDE is the tension from competing strategic priorities, limited budgets, and staffing resources.

Standard Institutional Infrastructure Model for ODDE

Infrastructure as an area has been intensely examined as part of professional exchange at conferences. However, there has not been significant formal research particularly related to infrastructure in distance education. A special issue of the International Review of Open and Distance Learning (2001) presented case studies of seven different international institutions identifying the drivers of organizational and infrastructure models. Building the infrastructure for online learning has had significant open science or open scholarship exchange in many countries, as an example of that conducted in Ireland with the Irish Journal of Technology Enhanced Learning (Concannon, Costello, & Farrelly, 2019).

Figure 1 presents a model developed by Davis, Little, and Stewart (2008) to illustrate several of the areas of the institutional infrastructure for ODDE.

This model assumes starting with a business plan and the learning plan related to course content and teaching and learning strategies. Starting with the left-hand column, learning outcomes (i) must be developed by the faculty or instructional staff and ideas considered for pedagogy and course content. There is a development unit of instructional designers who share the responsibility with faculty to translate the pedagogical strategies and learning content into a learning management system (ii). There also needs to be an interface with registration and advising, library and other academic services, and digital or open resources (iii, iv, v). Attention must be paid to areas such as authentication and security, a student portal and interface, and the student information system (vi, vii, viii) and, finally, quality review (ix).

Evolving the Institutional Infrastructure Model for ODDE

A more recent evolution has been the creation of a unit and/or a chief officer for innovation. The responsibility for different components of the infrastructure for ODDE has typically been spread across multiple departments and vice presidents within an institution, especially in institutions where open and distance learning is only a part of the overall business model. The specialized position of chief officer for innovation has been developed to address the struggles between standardization and innovation and separation of control between academic and administrative computing. This position often straddles academic and administrative infrastructure and

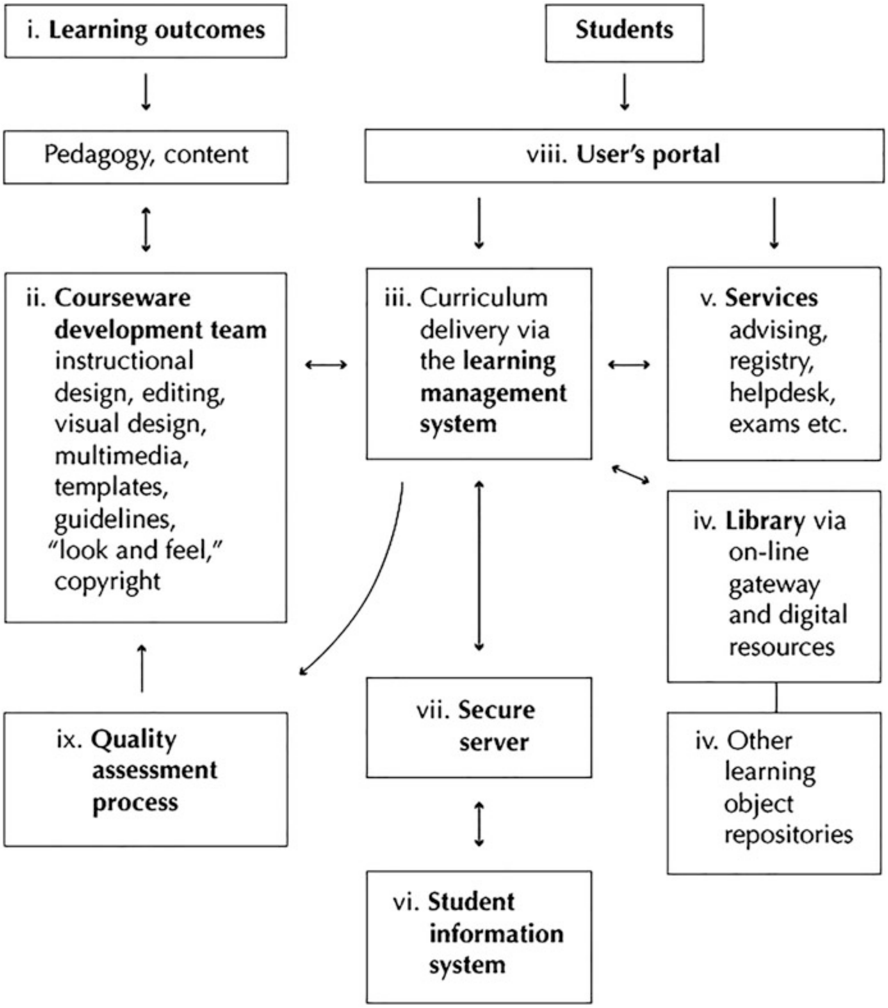


Fig. 1 Developing an infrastructure for online learning (Davis, Little, and Stewart, 2008, n.p)

serves as a conduit for promoting innovations in efficiency, improving learning and student retention, increasing scale, and reducing cost. Research conducted by Entangled Solutions (Selingo, 2018) showed at least 400 colleges in the United States having this title at the Vice President level or as a core role in either academic affairs or in IT. These positions balance priorities such as working with academic affairs on student success, working with finance on return on investment, and working with IT on data analytics and decision-making related to innovation and technology investments.

There are two important aspects related to infrastructure from the development of the innovation unit approach. Firstly, these units often have a greater external perspective and the capability to consider partnerships or shared service models.

Early open and distance programs often had a "build your own" infrastructure. As the field has matured, shared services with companies may be less resource intensive. Secondly, these innovation units often build systems that promote the review for innovation in academics, technology, or services. They help build more of a problem solving or design thinking approach (Selingo, 2018). Selingo (2018) did research on various approaches to support innovation and came up with three models. The most common model is a skunk works or autonomous entity which is in place at Southern New Hampshire University or Arizona State University. In this model, a separate innovation unit is resourced and staffed within the institution, having relatively less impact on the rest of the institution and more freedom to innovate. The second model was labelled by Selingo as the Internal Consultancy. This innovation unit stands alone but consults with willing departments across the university. The third is an integrated model that is more prevalent at a smaller institution, where innovation is integrated into the existing structure.

Considerations for an Integrated Institutional Infrastructure for ODDE

Infrastructure for Planning, Marketing, and Recruitment of Programs for ODDE

Once the institutional strategy for ODDE is developed, the institution needs to either create a stand-alone functional office for planning, marketing and recruitment, registration, and financing or to make sure that other functional offices embed the ODDE needs into those office functions. During the Covid-19 transition, many traditional dual-mode institutions moved quickly to the delivery of these types of services from their functional departments. Post-Covid-19, dual-mode institutions new to distance delivery need to more reflectively consider the need for infrastructure for these important functions. Other sections of this handbook explore organizational structures and change management, but there are infrastructure provisions to consider. The marketing approach for ODDE has matured into professional practices for generating leads related to potential students, lead generation, lead follow-up and management, research on the success of leads, and CRM integrated platforms to support the whole student life cycle. In the last decade, some institutions partnered with online program management companies (OPMs) as the institutions did not have the internal expertise. This can be quite successful when the institution has little experience with distance marketing and cannot build the infrastructure. The strategy of using an OPM can be effective for quickly ramping-up a program, but the revenue sharing process proved to be taxing for some institutions because the share is significant.

A more recent development has been insourcing these services with consortiums of institutions in more of a shared services model. The earliest developments in this area were for libraries and information technologies, often for shared purchasing to increase scale and get better pricing. Examples in the United States include NJEdge (https://njedge.net/) which works with school districts, colleges, and healthcare systems to share high speed data for research, networking, cybersecurity, and other IT needs. In the United States, centralized infrastructure shared services for libraries, IT, instructional design, marketing, recruitment, registration, and student services exist in states such as New York (https://www.sunyonline.edu) and Georgia (https://ecore.usg.edu/about/how-does-it-work) for course delivery support. One such example of successful shared service for ODDE operating at a national level is HEAnet, which was established in Ireland in 1983 by the Irish Universities with the support of the Higher Education Authority and now serves as a national education and research network delivering "high-speed internet connectivity and IT shared services to all levels of the Irish education sector." An important aspect of this work is for institutions to be able to analyze the return on investment in lead generation but, correspondingly, to connect this to the learning analytics to make sure that students who are recruited to the institution are successful. Registration learning analytic platforms have emerged which assist institutions to better predict successful registration patterns for students. Of particular interest is systems to support less prepared or less historically advantaged students. Student services platforms to deliver academic supports and library systems should also be integrated. All of these systems require significant integration to best understand the profiles for a successful student life cycle from an operational perspective. The institution also needs to have a strategy related to the creating of these systems increasingly outsourcing or sharing these services.

Institutional Infrastructure for Libraries and Educational ODDE Materials

In the United States, the Association of College and Research Libraries has standards for distance delivery of library services which were developed in 2006 and updated in 2016 (American Library Association, 2016). Infrastructure for library provision and services requires a platform for delivery of educational resources and adequate financial support so that distance students and faculty get access to similar library services as any other student of the institution. Services are now delivered primarily through the web, either by the institution, a consortia of institutions, or a commercial provider. A physical library is not required; however, it is important that students have access to books, references, and journals databases and that any fees are similar to the provision for other students. Staffing for librarian research assistance and often librarian services are embedded directly in the programs or courses. Concerns that should be addressed by library infrastructure are the timeliness, ease of access by students, and the cross-cultural perspectives.

Historically, many distance learning institutions managed or partnered with commercial providers for the physical distribution of books or other instructional materials for students such as lab kits or other supplemental materials. Increasingly, institutions are providing open education or digitally delivered resources. Early initiatives were developed course by course, but more recently institutions have moved whole programs or the entire institution to open education. This was not only to save costs for the student, but institutions were finding that a portion of the students do not actually purchase or use the books provided or purchased outdated materials. From an infrastructure perspective, this means that institutions investing in sharing low cost digital or open education resources need to create or outsource platforms to share these resources. Commercial providers and professional associations have emerged to share these resources. Data from these platforms allow faculty and staff to better track on usage, effectiveness, and improvements.

Institutional Infrastructure to Support Research in ODDE

The advent of the Covid-19 pandemic highlighted shortcomings in educational institutions in their ability to conduct timely research on students' experiences of ODDE. Research focused on the institutional infrastructure for ODDE is essential as institutions work through which aspects of blended and online delivery should be retained in the short term: What are the areas for longer term strategic development? How do institutions plan, fund, and operationalize these changes? It will be crucial that students and staff are engaged throughout the research process. Mc Vitty, Jackson, and Hutchens (2021) confirm that students are open to retaining the majority of elements of online delivery in some form but do not always know which modes will best support their learning. There is a need for further investigation in the infrastructural requirements for ODDE to provide a consistently engaging online learning experience. Most of the research on students experiences of ODDE takes place at an individual module or course level and is not used to inform institutional decision-making for the short-term or long-term investment in institutional infrastructure for ODDE. Individual faculty investigates delivery approaches or the use of a particular software or other technology. Multiple campus program research or multi-campus approaches could better inform the needs for investment in instructional infrastructure. Tyton Partners has tracked faculty adoption and use of digital software and tools and recommend developing common frameworks for evidence-based research and sharing (Fox et al., 2021, June 22).

One model for sharing research related to the infrastructure for open education is the COUP framework developed by the Open Education Group (2021). COUP allows researchers on open education to share findings related to costs, outcomes, usage and perceptions. The dimensions of cost and usage are particularly important to the area of infrastructure. This research group has developed a calculator application to look at a range of cost metrics for students and institutions such as:

- Costs of textbooks previously assigned
- OER support fee models
- Changes in campus bookstore revenue
- Changes in tuition revenue due to changes in drop rates
- Changes in tuition revenue due to changes in enrollment intensity
- Changes in tuition revenue due to changes in persistence
- Changes in access to performance-based funding due to changes in drop, enrollment intensity, and persistence

The adoption of open educational resources can impact a range of financial and cost metrics for students and institutions. Research shared using this model shows that the use of open resources will save K-12 school districts' money or in the case of higher education save students' money (Open Education Group, 2021). Correspondingly, however, there can be possible losses in institutions getting shared revenues from bookstores. The IT area needs to determine effective ways to share open education resources through repositories or other related services to promote ease of access for students.

Institutional Infrastructure to Support Evolving ODDE Course Delivery

The institutional infrastructure for ODDE naturally matured over the last two decades, but it has also changed due to significant disruptions in the ways in which courses are being delivered. One substantial disruption was the emergence of Massive Open Online Courses (MOOCs) which had both significant successes and expressed concerns. MOOCs have been an important development in ODDE, and their popular growth has demonstrated a possibility for informal and inexpensive or free education. MOOCs also were supported in ways that expanded the use of technology in online education; investments were made in higher-quality video and adaptive technologies which allowed for much larger technology-supported courses at less per person expense. The growth in MOOCs demonstrates how advances in information and communications technology encourage the move to online learning and are continually facilitating new modes of delivery. For example, MOOCs are being used as a method of disseminating key research findings from research projects. MOOCs demonstrate how the infrastructure for open and distance learning needs to have the capability to evolve with the changing needs of students, institutions, and models for the delivery of the curriculum.

Institutional IT Infrastructure for ODDE

Developing Institutional Infrastructure for ODDE

Large open universities in many countries were strategic in developing and harnessing the efficiencies of advanced technologies for more scalable and lower cost delivery (Guri-Rosenblit, 2019). Covid-19 and the evolution into online and other digital technologies have made the use of advanced technologies more ubiquitous throughout higher education. Guri-Rosenblit suggests that the large open universities may need greater investments as far as infrastructure to support digital and online, along with the more complex faculty and support needs. In many dual-mode institutions, IT infrastructures are merged with campus-based infrastructures. There is little literature related to specific IT infrastructure for ODDE. Instead, literature relies on models for traditional institutional IT infrastructure. One useful model for administrators to use for the institutional IT infrastructure for ODDE comes from Broadbent and Weill (1997) that ties IT capabilities to help to achieve organizational goals. Broadbent and Weill define three areas of infrastructure services necessary to enhance business processes: the IT component, the human infrastructure, and shared IT services. The results of their study named 23 infrastructure services which may contribute in helping an organization to reach goals. In 1999, Broadbent, Weill, and Clair (1999) and Broadbent, Weill, and Neo (1999) refined these 23 services into application management, communication management, data management, research and development, services management, security management, standards management, and IT management. In distance education, additional crossover broad impact areas such as data analytics, knowledge management, and business process mapping have emerged as areas of practice.

Several models exist to support the integration of IT into teaching and learning, but these tend to operate at an individual course or module level. The ADDIE five step model (Dick, 2001), Laurillard's Conversational framework (Laurillard, 2002), SAMR (Puentedura, 2006), TROHA (Troha, 2007), and Salmon's Carpe Diem (Salmon, 2011) constitute a sample of the models that can be used to guide the implementation of IT in education. The ADDIE instructional design model involving five stages, namely, analysis, design, development, implementation, and evaluation provides a framework to implement IT into distance learning. Laurillard's conversational framework is both a learning theory and a practical framework for designing online learning environments and involves four main components: teachers' concepts, teachers' constructed learning environment, students' concepts, and the students' specific actions. The Substitution, Augmentation, Modification, Redefinition or SAMR model was developed by Puentedura (2006) to enable educators to identify different ways in which they could integrate technology within the teaching and learning portfolio. The SAMR model provides a continuum from novice to advanced level of technology integration to encourage educators to seek ideal ways to embed technology to support and enable the learning experience. The Troha model provides a more systematic experience, while Salmon's Carpe Diem model provides a framework to integrate technology while redeveloping an entire unit of study. The aforementioned models favor an approach where an instructional designer is working with an individual instructor on individual learning units or modules but provide limited guidance on a collaborative coordinated and strategic approach to the integration of IT across a program, faculty, or educational institution. This can result in a splintered approach with instructors at varying stages of technology adoption on a single program and/or across a faculty or academic department.

The Impact of Advancements in IT on the Institutional Infrastructure for ODDE

There are several significant developments and advancements in IT which have had a substantial impact on the institutional infrastructure for ODDE. These include cloud computing and software as a service; bring your own cloud; artificial intelligence, adaptive learning, and learning analytics; and mobile learning.

Cloud Computing and Software as a Service

The increasing availability of the Internet has facilitated the development of cloud computing where software and computing services are delivered over the Internet. This has allowed for greater integration of technology systems and sharing of data across systems resulting in the provision of Software as a Service. The data environment for ODDE has evolved to an ecosystem with the integration of customer relationship management systems, learning management systems, and the student information system. In Software as a Service, the databases and the software are accessible online through the cloud. New technologies and pilots can be implemented in a more agile and scalable way (Anderson, Marlaire, & Shean, 2020). Institutions no longer need to manage an on-premises data center to provide their own servers to store and process data as most of these activities can be outsourced to external providers. Varying capital expenses, often consumed with replacing aging physical IT hardware, have shifted toward predictable monthly or quarterly expenditure. Compared with on-premises data centers, additional resources can be easily deployed in a cloud infrastructure at peak times, e.g., during examination periods, etc. The costs are allocated through the cloud, and the institution is charged only if the services are used. These shared services provide an alternative to higher cost in-house IT infrastructure. Moving to a cloud computing infrastructure and utilizing Software as a Service can release the in-house computing team to concentrate on the long-term IT strategy. The overall support and development of the IT infrastructure requires specialist skills. Careful consideration needs to be given to the continuing development of the skillset of in-house computing team to ensure they have the expertise to adapt as required and redirect their focus to developing different areas of IT infrastructure.

Bring Your Own Cloud

Many institutions pre-Covid-19 were developing and implementing “bring your own device” (BYOD) policies to respond to the demands of users and facilitate those who were able to supply their own device to support their learning within both the traditional on-campus and online learning environments. Closures of campus and restrictions on the movement of people forced a radical change, almost overnight, in work and learning practices. Many educational organizations struggled to accommodate the needs of users who now required immediate remote access and support for a variety of software and services to support the learning environment. In response to restricted access to the physical and virtual campus during Covid, and as a workaround to difficulties accessing Institutional Learning Management Systems and/or virtual classroom technologies, many staff and students started to build their own clouds to support their learning and teaching. “Bring your own cloud” (BYOC) is a concept that can apply in an educational context as students and staff are piecing together institutional or third-party cloud software and services to perform certain tasks. Personal cloud storage solutions are being used to store and share key learning resources. Academic staff are using free versions of virtual classroom technologies such as Zoom to facilitate their online engagement with their students independent of the institutional supplied systems. Widespread access to WiFi is improving, and students are willing to use personal mobile data plans to access the Internet both on and off campus. Much of this practice can be considered "rogue IT" where unsanctioned IT resources are being used to support the activities of an organization. Tensions can exist when users expect institutional support services to trouble between users and support services. Many institutions have invested heavily in installing WiFi networks on campus and on licenses for a range of software platforms to support distance learning. BYOD and BYOC practices pose serious risks to the security of student data. Responding to, and accommodating, BYOC and BYOD practices presents significant opportunities and challenges for institutional infrastructures for ODDE.

Artificial Intelligence, Adaptive learning, and Learning Analytics

Institutions are now moving forward to greater technology tools to support students. Artificial intelligence is being applied to personalize learning and services, particularly when working with students across multiple time zones. Software to support the development of academic writing and assist in detecting plagiarism are continuously integrating artificial intelligence to improve their offering. Chatbots are now available on many websites which can serve student with routine questions related to courses, financial aid, and registration or library or book services. Chatbots are replacing the first layer of end user troubleshooting and support for various IT systems such as the VLE and are also provided in courses to assist as a resource related to particular topics.

Adaptive learning platforms have emerged to better support learners on individualized pathways and to support scale. There has been significant investment in promoting success, particularly in first year courses. The Gates Foundation has funded research into the efficacy of proprietary adaptive learning platforms working with educational institutions to examine the cost/benefit analysis and the potential for improvements in learning (Yarnell, Means, & Wetzel, 2016, April). The results of these early projects were mixed, with four of fifteen projects indicating a positive return on investment related to the use of different adaptive platforms. More recent work at some institutions has shown improvement in learning and student success by combining adaptive courseware and learning analytics, particularly in first year or gateway courses (Dziuban, 2020). It is a maturing field with potential. Partnering with an adaptive partner for technology allows for algorithm-based routing of learners, and there are a variety of company software platforms available such as Realizeit, Aleks, MyLabs, etc.

Learning analytics is an area of significant growth in strategic importance in the past 5 years. "Technologies for improving analysis of student data" was listed as one of the top 10 strategic technologies in the 2019 EDUCAUSE Horizon report as were "learning analytics for student success (institutional level)," showing the importance of this work to institutions (Alexander et al., 2019). As previously mentioned, cloud computing and Software as a Service are facilitating the continuing development of an integrated IT ecosystem. The data used in these systems can also be combined with teaching and learning software including video usage data. Educational providers now have the capability to better analyze if the use of technology is improving student performance or making the organization more efficient. Many of the newer IT systems include the ability to present user data in a visual way to indicate underlying usage patterns and trends in large or small user populations. Some systems allow for data to be amalgamated from multiple platforms. Institutions can use analytics from registration and learning platforms to predict successful registration patterns for students. Improvements in the visualization and use of data need to be balanced against the users, both students and staff, right to privacy. All staff with administrative access to these systems should be provided with training on the ethical and appropriate use of the data. Educational institutions need to ensure that the benefits of learning analytics are realized. Analytics need to be used to answer pertinent questions that will inform the evolution of the infrastructure for ODDE to underpin a consistent and engaging learning experience. The aforementioned role of the chief officer for innovation can be useful in integrating learning analytics into institutional decision-making in a timely manner.

Mobile Learning

Mobile learning refers to the use of mobile devices to access and engage with learning content wherever and whenever a student has a mobile device connected to the Internet. Many students own their own smartphone or mobile device, and most platforms incorporate a responsive design and/or have specialized apps to improve the user experience when accessed from a mobile device. The benefits of mobile learning are based on convenience, flexibility, and learning dependence. Mobile learning increases the availability of education as students can access the learning environment and associated resources once they have a suitable mobile device. The capital expenditure associated with the provision of computers on campus for students has shifted to implementing BYOD and BYOC policies and supporting staff in developing content that is also accessible on mobile devices. Many mobile devices incorporate push technology which can be used in the learning context to send notifications and reminders to students about key learning tasks. Learning analytics amalgamates a wide range of information from mobile devices that can inform decision-making around the institutional support needed for mobile learning. Software for learning analytics can collect data from mobile devices to detail usage patterns by mapping and comparing a range of data points including time of access, Internet service provider, geophysical location, type of device including make and model, duration and frequency of access, etc. The addictive dimension brought about by the ubiquitous presence of digital devices and integration of push technologies poses a risk to the engagement of the learner (Pedro, Barbosa, and Santos, 2018). In a similar vein to remote working, institution infrastructure for ODDE may need to accommodate the rights of staff and students to disconnect from the learning environment. This will present a significant challenge as students and staff are using a variety of mobile devices to support their learning and teaching. There is a need for further research on the impact of mobile technologies on the engagement of the learner and the teaching and learning process.

The Impact of the User Experience on the Institutional Infrastructure for ODDE

The discussion of infrastructure services for ODDE must also consider the user experience. Determining how to assess the user experience has become more complex as technology and systems have moved into the cloud and as the systems have become more integrated. The effective use of learning tools is dependent on the perspective of the users, defined as students, faculty, and the institutions. In looking at the IT systems, the technology acceptance model has been used in studies to assess the impact of the user experience related to technology. The model has been updated to reflect some criticisms related to its inefficiency in justifying the social influence on the acceptance of technology (Straub, 1997). It incorporates other factors like “social influence” and “self-efficacy” (Al-Maroof, R., 2020 and “perceived enjoyment” (Salloum et al. 2019). Al Kurdi et al. (2020) expanded the model to include these influences. The critical factors were subjected to a statistical analysis which showed social influence, perceived enjoyment, and computer self-efficacy maintain a positive and strong effect upon, perceived ease of use, and perceived usefulness. Additionally, behavioral intention to use the E-learning system is significantly affected by the perceived usefulness and perceived ease of use. Various other research studies assessed the positive influence of social influence, perceived enjoyment, and computer self-efficacy on perceived ease of use, perceived usefulness, and E-learning acceptance. A continuing critical concern is the cross-cultural perspective related to the acceptance and use of education technologies and the integration in countries where there are issues related to bandwidth or other connectivity (Al-Maroof, 2020).

Institutions have also evolved as to how the students are supported through help desks, call-centers, and support services that are managed by the institution or outsourced partners. Analyzing the data on the user experience has become complex, including reviewing response times, dropped call rates, web statistics and other analytical tools to improve services. Similar to IT infrastructure acceptance models discussed, review of how diverse learners or learners with less access to resources get access to support services is important.

Impact of Covid-19 on Institutional Infrastructure for ODDE

The transitions after the worldwide Covid-19 pandemic has had institutions around the world looking at institutional infrastructure supports for ODDE. The impact of Covid-19 meant that many traditional institutions without experience immediately had change their course delivery models, student support services, and work practices to pivot to blended and fully online learning. Campuses around the world worked together to learn and deliver education.

Implementation of a national strategy for remote working will remove some of the barriers to engagement with ODDE and increase the demand for flexible and online learning. Institutions should be reviewing their infrastructure for ODDE, including their planning, marketing, and student recruitment systems, IT systems, and course delivery models and remote working policies for staff, to ensure that their organizations are evolving the institutional infrastructure to respond to the changes in work and study practices as a result of Covid-19. In Ireland, the recently published National Remote Work Strategy 2021 acknowledges the seismic shift in remote working and aims to legislate for the right to request remote working, review tax and expenditure for remote working, make home and remote work the norm for 20% of public sector employment, invest in a network of remote working hubs, develop a code of practice for the right to disconnect, and accelerate the provision of high-speed broadband to all parts of Ireland (Department-of-Enterprise-Trade-and-Employment 2021). Remote working hubs could easily become remote working and study hubs. Wonkhe and Pearsons' research on "Students' experiences of study during Covid-19 and hopes for future learning and teaching" confirmed that there are very few elements of online learning and teaching that the students surveyed in England and Wales would not like to see continue after the pandemic (Mc Vitty, Jackson, & Hutchens, 2021). Most agreed that they would like to see the continued provision of recorded lectures, core materials in the learning management system, online access to support services such as well-being and careers, and online tutorials or check-ins with tutors. Students have experienced and recognized the benefits of a more flexible approach, and the institutional infrastructure for ODDE will have to evolve and purposefully draw on the best of both online and face-to-face learning. Many will return to classroom-based learning, but many will continue in online and will need to build more solid infrastructures and student services. A survey of attitudes to upskilling conducted by the Irish Higher Education Authority reported that more than one-third of people (37%) are considering upskilling or reskilling due to the Covid-19 pandemic, and almost half the respondents would like to retrain to work in a more progressive and evolving sector (HEA, 2021). There is emergent work to share insights from building shared services for infrastructure post-Covid, one such example from China related to open education repositories (Huang et al., 2020) and infrastructure systems for both higher education and regular schools (Xue, Li & Xu, 2020).

Infrastructure Supports for Emergent Areas

It is important that institutional infrastructure for ODDE can support emergent areas. Educause conducts research through Horizon reports on IT trends in education, a number of which are related to infrastructure. The 2019 report identifies multiple areas related to open and distance learning infrastructure (Alexander et al., 2019). Short-term trends indicate the increased interest in mobile and adaptive learning. Midterm trends include mixed reality, artificial intelligence, virtual digital assistants, and block chain. Open education resources and digital courseware also are innovation developments which continue to be expressed by IT representatives from around the world.

Since 2012, the Open University has produced an annual Innovating Pedagogy report to "explore new forms of teaching, learning and assessment in an interactive world to guide teachers and policy makers in productive innovation." Each report proposes innovations that are due to become more widespread and have the potential to provoke a shift in educational practice. Several of the pedagogies singled out in the 2021 report will have a significant impact on the institutional infrastructure for ODDE if the adoption of these pedagogies become widespread (Kukulska-Hulme et al., 2021). "Best learning moments" and "enriched realities" with the use of technologies such as augmented reality and virtual reality top the list.

Concluding Remarks: Open Questions and Directions for ODDE Practice

Despite innovations in parts of higher education, the traditional models of distance delivery in higher education have remained substantially similar. In order to scale innovations, infrastructure needs to be flexible and adaptive to support these innovations. The profession is also actively interested in infrastructure models and particularly ways to increase scale, improve student success, and reduce costs. This has been particularly driven by new entrants to the market.

Questions remain for how the institutional infrastructure for ODDE can evolve:

- How can personalization and customization for users continue to advance through developments in adaptive learning, mobile, and artificial intelligence?
- How can data analytics be used more effectively to support learner success through identifying just-in-time support services?

Further research is required in the following areas:

- Sharing models for effective deployment and training of technology staff to support the ecosystem for ODDE

- Sharing models linking ODDE strategy with organizational structures, infrastructure, and any shared services
- The cross-cultural implications related to technology use, support services, and learning environments
- The infrastructural requirements for ODDE to provide a consistently engaging online learning experience
- The cost/benefit analysis related to the decision to use a third-party service to share costs for infrastructure, particularly when these services are proprietary
- Adaptive and artificial intelligence to examine the possibilities of changing the pace of education and improving learning
- The impact of mobile technologies on the engagement of the learner and the teaching and learning process
- The investment needed to make sure that there is a seamless experience for users, particularly related to infrastructure for IT, library, educational materials, and other academic services

The state of infrastructure models in ODDE are poised for new developments, particularly as software and other services have moved to the cloud and new technologies have emerged. In addition, the developments of shared services and outsourced models will influence future practices. Also, most importantly, user influence and the capability to make greater choices regarding opportunities post-Covid-19 will impact models for services and academic programs.

References

Alexander, B., Ashford-Rowe, K., Barajas-Murphy, N., Dobbin, G., Knott, J., McCormack, M., Pomerantz, J., Seilhamer, R., Weber, N. (2019). EDUCAUSE Horizon Report: 2019 Higher Education Edition, EDUCAUSE. Retrieved from https://library.educause.edu/-/media/files/library/2019/4/2019horizonreporthttps://library.educause.edu/-/media/files/library/2019/4/2019horizonreport

Al Kurdi, B., Alshurideh, M., Salloum, S. A., Obeidat, Z. M., & Al-dweeri, R. M. (2020). An Empirical Investigation into Examination of Factors Influencing University Students' Behavior towards Elearning Acceptance Using SEM Approach. *International Journal of Interactive Mobile Technologies* (iJIM), 14(02), pp. 19–41. https://doi.org/10.3991/ijim.v14i02.11115

Al-Maroof, R. A., Arpaci, I., Al-Emran, M., Salloum, S. A., & Shaalan, K. (2020). Examining the acceptance of whatsapp stickers through machine learning algorithms. In *Recent advances in intelligent systems and smart applications*. Springer, Cham, pp 209–221. Retrieved from https://doi.org/10.1007/978-3-030-47411-9_12

American Library Association (2016, September) Standards for distance learning library services. Retrieved from http://www.ala.org/acrl/standards/guidelinesdistancelearningDocumentID:afcce136-a64c-6094-6de0-7ad1550814c4

Anderson, D., Marlaine, C., & Shean, A. (2020). Moving into the technology mainstream. In G. E. Miller & K. Ives (Eds.), *Leading the eLearning transformation of higher education* (2nd ed., pp. 155–177). Stylus, Sterling, VA.

Broadbent, M., & Weill, P. (1997). Management by maxim: how business and IT managers can create IT infrastructures. *Sloan Manag Rev, 38*, 77–92. Retrieved from http://layoftheland.net/archive/web/mis-575/course_docs/topic_9/boardbent.weill.infra.pdf.

Broadbent, M., Weill, P., & Clair, D. (1999a). The implications of information technology infrastructure for business process redesign. *MIS Quarterly*, *23*(2), 159–182. Retrieved from https://doi.org/10.2307/249750

Broadbent M, Weill P, Neo BS (1999b) Strategic context and patterns of IT infrastructure capability. *The Journal of Stratergic Information System*, *8*(2), 157–187. Retrieved from https://doi.org/10.1016/S0963-8687(99)00022-0

Concannon, F., Costello, E., Farrelly. (2019). Open science and educational research: an editorial commentary. *Irish Journal of Technology Enhanced Learning*, *4*(1), ii–v. Retrieved from https://doi.org/10.22554/ijtel.v4i1.61

Davis, A., Little, P., & Stewart, B. (2008). Developing an infrastructure for online learning. In T. Anderson (Ed.), *The Theory and practice of online learning* (2nd ed., pp. 121–142). AU Press, Athabasca, Alberta, Canada.

Department-of-Enterprise-Trade-and-Employment (2021) *Making remote work: national remote work strategy. Online Government of Ireland*. Retrieved from https://assets.gov.ie/119312/299c21e9-9ec6-4dab-a7fe-71bd0da3e1d0.pdf

Dick, W., Carey, L., & Carey, J. (2001). *The systematic design of instruction* (5th ed.). Boston, MA: Alleyn & Bacon.

Dziuban, C., Howlin, C., Moskal, P., Muhs, T., Johnson, C., Griffin, R., & Hamilton, C. (2020). Adaptive analytics: it's about time. *Current Issues in Emerging eLearning, 7*(1), Article 4. Retrieved from https://scholarworks.umb.edu/ciee/vol7/iss1/4.

Fox, K., Khedkar, N., Bryant, G., NeJame, L., Dorn, H., & Nguyen, A. (2021). Time for Class – 2021.Tyton Partners. Retrieved from https://tytonpartners.com/wp-content/uploads/2021/06/Time-for-Class-2021.pdf

Guri-Rosenblit, S. (2019). Open Universities: Innovative past, challenging present, and prospective future. *Int Rev Res Open Dist Learn, 20*(4) http://www.irrodl.org/index.php/irrodl/article/view/4034/5168.

Huang, R., Tlili, A., & Chang, T. W., et al. (2020). Disrupted classes, undisrupted learning during COVID-19 outbreak in China: Application of open educational practices and resources. *Smart Learning Environment*, *7*(19). Retrieved from https://doi.org/10.1186/s40561-020-00125-8

International Review of Open and Distance Learning. (2001). *International Review of Research in Open and Distance Learning*, *1* (2). Retrieved from http://www.irrodl.org/index.php/irrodl/issue/view/10

Kukulska-Hulme A, Bossu C, Coughlan T, Ferguson R, FitzGerald E, Gaved M, . . . Zhang S (2021) *Innovating pedagogy 2021: Open University Innovation Report 9*. Retrieved from Milton Keynes: https://ou-iet.cdn.prismic.io/ou-iet/4e498b2d-4ed4-4991-ae20-e1e0f5975cfd_innovating-pedagogy-2021.pdf

Laurillard, D. (2002). *Rethinking University teaching. A conversational framework for the effective use of learning technologies*. London: Routledge. https://doi.org/10.4324/9780203160329.

Mc Vitty D, Jackson A, Hutchens B (2021) *Students' experiences of study during Covid-19 and hopes for future learning and teaching*. Retrieved from Online: https://wonkhe.com/wp-content/wonkhe-uploads/2021/02/Wonkhe-Pearson-expectation-gap-II-Feb-2021.pdf

Pedro, L. F. M. G., Barbosa, C. M. M. d., & Santos, C. M. d. (2018). A critical review of mobile learning integration in formal educational contexts. *International Journal of Educational Technology in Higher Education* (15). Retrieved from https://doi.org/10.1186/s41239-018-0091-4

Puentedura, R. (Producer). (2006). Transformation, technology, and education. Retrieved from http://www.hippasus.com/resources/tte/puentedura_tte.pdf

Salloum, S.A., et al., (2019). Exploring students' acceptance of E-Learning through the development of a comprehensive technology acceptance model. IEEE Access, *(7),* 128445–128462. Retrieved from https://doi.org/10.1109/ACCESS.2019.2939467.

Salmon, G. (2011). *E-moderating: the key to online teaching and learning* (3rd ed.). New York: Routledge.

Selingo, J. (2018, January). *The rise of the chief innovation officer*. Entangled Solutions. Retrieved from https://www.entangled.solutions/portfolio/the-rise-of-the-chief-innovation-officer-in-higher-education/

Straub, D., et al. (1997). Testing the technology acceptance model across cultures: a three country study. *Inf Manag, 33*(1), 1–11.

The COUP Framework. (2021, June). Open Ed Group. Retrieved June, 2021, from https://openedgroup.org/coup

Troha, F. (2007). *Bulletproof blended learning design: A proven guide for corporate learning and development professionals*. Sandy, UT: Aardvark Global Publishing.

Xue, E., Li, J., & Xu, L. (2020). Online education action for defeating COVID-19 in China: an analysis of the system, mechanism and mode. *Educational Philosophy and Theory*. Retrieved from https://doi.org/10.1080/00131857.2020.1821188

Yarnell, L., Means, B., & Wetzel, T. (2016, April). Lessons learned from early implementations of adaptive courseware. SRI Education. Retrieved from https://wcet.wiche.edu/sites/default/files/lessons-learned-adaptive-courseware.pdf

Quality Assurance in Online, Open, and Distance Education

42

Insung Jung

Contents

Abstract

Over the past few decades, online, open, and distance education (ODE) has enjoyed phenomenal growth across different regions, and with the spread of the COVID-19 virus, its use has adopted more quickly and widely at all levels of education in both developed and developing countries. There has also been a surge in trans-institutional online courses and programs. Despite this surge in widespread practice of ODE, an image problem that perceives ODE as a second-rate education, indicated by Daniel (Quality assurance and accreditation in distance education and e-learning: Models, policies, and research. Routledge, New York, 2011) a decade ago, still exists, meaning that there is a need for even stronger measures to ensure that ODE is as good as in-person education and that quality assurance (QA) systems are in place as it enters the mainstream of education.

Applying QA to ODE processes and outcomes is a relatively new phenomenon. Drawing upon previous literature on quality and QA in ODE, including institutional case studies, this chapter examines various definitions of quality and

I. Jung (✉)
Education Research Institute, Seoul National University, Seoul, Republic of Korea
e-mail: isjung33@gmail.com

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_39

QA in ODE practice, difficulties, and challenges presented by QA in ODE and the role of stakeholders in QA in ODE. It then discusses how different ODE institutions judge and assure the quality of their courses, programs, and services and what values and assumptions underpin such QA approaches. It finally draws conclusions about what still needs to be considered and actioned.

Keywords

Accreditation · Best practices · Performance indicators · Quality in higher education · Quality assurance · Quality standards

Introduction: Defining Quality and Quality Assurance in ODE

Harvey and Green (1993) view quality as excellence (something exceptional and distinctive), as perfection (something perfect or consistent), as fitness for purpose (something fulfilling needs or requirements), as value for money (something worth investing), and as transformative (something empowering or enhancing). These five disparate ways of explaining quality in higher education definitely help conceptualize quality as being five interrelated ideas in ODE, but at the same time they make it difficult to univocally and explicitly define the concept of quality in relation to ODE.

Quality, moreover, in ODE may be judged in different ways depending on who defines it (Latchem, 2016). Students, governments, or employers, for example, who pay for ODE may define quality of ODE in terms of value for money, while educators might tend to focus on excellence and consistency, and researchers may highlight transformative aspects of ODE. Likewise, QA may be understood quite differently by different stakeholders as Jung and Latchem (2007) argued. Governments may be interested in the socioeconomic benefits and public accountability of ODE (Koul, 2006), while ODE institutions seek assurance in quality across planning and management, design, development and delivery of course and course materials, learner support, and assessment and completion/graduation rates (Jung, 2005). Researchers may highlight the depth and extent of learning (Ehlers, 2004) and the development of self-directed lifelong learning skills as an important aspect of QA in ODE (Paul, 1990). Students are more concerned with well-designed ODE courses and materials, support, and logistics (Daniel, Kanwar, & Uvalić-Trumbić, 2008), the applicability or relevance of assignments (Conrad, 2002), clear instructions especially related to grading policy and feedback (Song, Singleton, Hill, & Koh, 2004), and ensuring their competitiveness in the workplace (Kihwelo, 2013).

While quality is perceived as a value to be pursued for the enhancement of higher education, not everyone concurs that QA is a good thing. Seyfried and Pohlenz (2018) argue that internal and external reviews within a QA system are not always reliable and valid in evaluating the quality of teaching and learning and thus may not be a strong basis for important management decisions concerning quality enhancement. Beerkens (2018) claims that the majority of QA policies have not focused on student learning and thus it is still unknown whether all QA efforts and reforms have resulted in better learning performances of graduates.

Considering the complexity involved in defining quality and QA in ODE, Jung and Latchem (2007, 2011) categorize the varying definitions of quality in five ways:

- *Quality as conforming to the standards set for conventional education*. Here, the same criteria and standards are used to judge quality in ODE and conventional campus-based institutions' teaching and learning, management, resources, and outcomes. This approach, however, may fail to take into account unique aspects of ODE (Phipps & Merisotis, 1999; Stella & Gnanam, 2004), but as ODE is fast becoming a main delivery mode in conventional education, the difference between conventional campus-based education and ODE in higher education may not be as big as it used to be.
- *Quality as fitness for purpose.* Here, quality is judged by the extent to which ODE programs or institutions fulfill their predetermined purposes. But the problem is that this approach may fail to address conflicting purposes of ODE as defined by the various stakeholders discussed earlier.
- *Quality as meeting customers' needs.* Derived from business sectors, this approach values customer satisfaction. Some ODE institutions have adopted ISO9001 and implement course satisfaction surveys to assess the quality of their courses and services (Aisyah, Samsiyah, Wulandari, & Juliana, 2019). One problem with this approach is that it may fail to address varying needs of different customer groups.
- *Quality as continuous improvement.* Here the focus is on quality enhancement, following the cycle of input, implementation, output, and back to input. Institutional research to support and improve quality for ODE is highly valued, but the problem is that findings from QA research do not necessarily guarantee the improvement of practice.
- *Quality as compliance with national/regional/international standards and requirements.* Here, ODE institutions seek accreditation or recognition from highly regarded regional, international, or transnational agencies, often to eliminate ODE's "second-class education" image within their society. Problems with this approach include possible conflicts with national priorities and extensive reporting requirements during the evaluation process.

The above shows that quality in ODE is a relative, complex, multifaceted, and culture-related issue, as is QA (Schindler, Puls-Elvidge, Welzant, & Crawford, 2015; Zuhairi, Raymundo, & Mir, 2020). In defining quality in ODE, some (e.g., Stella & Gnanam, 2004) claim that the quality of ODE cannot be judged using conventional quality concepts as ODE is structurally different in many ways; while others (e.g., Huertas et al., 2018; Jung, 2011; Ossiannilsson, Williams, Camilleri, & Brown, 2015) argue that while some universal principles of quality can apply to both traditional face-to-face education and ODE, there are unique features to ODE that should also be noted in a different way, such as technology-based asynchronous interactions, openness in admission and learning paths, and flexibility in teaching and learning. Compared with traditional education, recent ODE relies to a greater extent on students' self-directed learning and technology competencies as well as their engagement in interaction and collaboration, making it difficult to define and judge the quality of ODE (Beaudoin, Kurtz, Jung, Suzuki, & Grabowski, 2013; Ferreras-Garcia, Ribas, Sales-Zaguirre, & López, 2021; Jung, 2011).

These difficulties and differing views in defining quality in ODE have contributed to the discussions and development of various QA models at international, regional, national, and institutional levels. In analyzing the QA models applied in ODE worldwide, Ossiannilsson et al. (2015, p. 5) concluded that while each QA model serves specific purposes in a given time and context, it defines QA in ODE as:

- *Multifaceted*. The QA model includes "a multiplicity of measures for quality" and often considers "strategy, policy, infrastructure, processes, outputs and more so as to come to a well-rounded view of holistic quality."
- *Dynamic*. The QA model integrates flexibility in its system in order "to accommodate for rapid changes in technology, as well as social norms."
- *Mainstreamed*. The QA model is "intended to trickle down throughout the institution and be used as a tool for reflective practice by individual members of staff in their daily work."
- *Representative*. The QA model seeks to "balance the perspectives and demands of various interested stakeholders, including students, staff, enterprise, government, and society at large."
- *Multifunctional*. The QA model aims to "serve a triple function of instilling a quality culture within an institution, providing a roadmap for future improvement, as well as serving as a label of quality for outside perspectives" (Ossiannilsson et al., 2015, p. 5).

Recognizing the complexity of defining and judging the quality in ODE, Kihwelo (2013, p. 4) argues that definitions of both quality and QA should be open to change and evolution as information in ODE, challenges faced, and understanding of those challenges in the context of ODE are constantly emerging and changing. Keeping this argument in mind, attention must be turned to various models and guidelines for judging and assuring quality in ODE.

Judging and Assuring Quality in ODE

Accreditation and QA Frameworks at National, Regional, and International Levels

As Latchem (2016, p. 10) pointed out, in most countries, ODE is subject to laws, regulations, and practices imposed by national, regional, and/or international QA and accreditation agencies together with other professional and academic organizations.

At the national level, accreditation of an ODE institution or program, after internal and external reviews into the quality of the institution or program, is granted by one or more national quality and accreditation agencies for higher education and hence recognition or license is offered to the said institution. For example, in the UK, the Quality Assurance Agency oversees QA and accreditation of all higher education institutions, including ODE institutions. But in some countries, QA and accreditation for ODE and conventional education are conducted by different agencies or units; an example of this is in India, where conventional universities are accredited by the University Grants Commission (UGC), while ODE institutions are assessed and accredited by a separate unit: the Distance Education Bureau (DEB) of UGC.

Accrediting and QA agencies have developed standards, performance indicators, and procedures to guide higher education institutions during the internal and external review processes and also to guide continuous improvement. Examples of national quality and accreditation agencies that have developed accreditation and QA standards or guidelines for ODE include:

1) The UK's Open and Distance Learning Quality Council which assesses providers in order to enhance quality in ODE and to protect the interests of distance learners and the Quality Assurance Agency which provides various resources on the quality of online learning including *Online Delivery & Student Experience* (https://www.qaa.ac.uk/en/news-events/support-and-guidance-covid-19/online-delivery-student-experience) and *Getting Your Teaching Online* (https://www.qaa.ac.uk/scotland/en/focus-on/technology-enhanced-learning/getting-your-teaching-online)
2) The US Commissions on Higher Education which published *Best Practices for Electronically Offered Degree and Certificate Programs* (http://www.c3l.uni-oldenburg.de/cde/found/wiche2.pdf); the US Distance Education Accrediting Commission, recognized by the US Department of Education and the Council for Higher Education Accreditation as a national accrediting agency for ODE, which offers the *DEAC Accreditation Handbook* (https://www.deac.org/UploadedDocuments/Handbook/DEAC_Accreditation_Handbook.pdf); and the US Quality Matters (QM) which offers various standards including *Higher ED Rubric Standards* (https://www.qualitymatters.org/qa-resources/rubric-standards) for online and blended courses
3) India's Distance Education Bureau of UGC which publishes *Recognition of Open and Distance Learning (ODL) Institutions* (https://www.ugc.ac.in/deb/pdf/RecognitionODLInstitutionsHandbook2009.pdf)
4) The Malaysian Qualifications Agency which publishes Code of Practice for *Programme Accreditation: Open and Distance Learning* (https://www2.mqa.gov.my/qad/garispanduan/COPIA/2019/Final%20COPPA-ODL%202nd%20edition%204.12.19.pdf)
5) Australia's Tertiary Education Quality and Standards Agency which provides *Quality Assurance of Online Learning: Discussion Paper* (https://www.teqsa.gov.au/sites/default/files/quality-assurance-online-learning-discussion-paper_0.pdf?v=1575861233) and *Toolkit* (https://www.teqsa.gov.au/sites/default/files/quality-assurance-online-learning-toolkit_0.pdf?v=1575861567) and *Online Learning Good Practice* (https://www.teqsa.gov.au/online-learning-good-practice) during COVID-19
6) South Korea's Ministry of Education and Korea Education and Research Information Service (KERIS) which publish QA regulations and guidelines including *Standards for Evaluation and Accreditation of Cyber Universities* (available only

in Korean) and *A Manual for the Management of Academic Affairs in Cyber Universities* (available only in Korean)

In some countries across Africa, QA and accreditation systems in higher education are relatively new or do not yet exist at the national level. In such cases, regional agencies offer QA guidelines and training opportunities to support the institutions in such countries.

At the regional level, various agencies and organizations offer QA guidelines and resources for ODE institutions and programs in their region, including (1) the European Association for Distance Learning (EADL) which requires its members to follow EADL's *Quality Standards* (https://www.eadl.org/quality-standards/); (2) the African Council for Distance Education (ACDE) which promotes research, policy development, and quality in ODE across African region; (3) the Harmonisation, Accreditation and Quality Assurance in African Higher Education (HAQAA) Initiative with support from the European Union which has created *African Standards and Guidelines for Quality Assurance in Higher Education (ASG-QA)* (https://haqaa2.obsglob.org/wp-content/uploads/2020/06/ASG-QA_Manual_en_09.FINALE-with-License-1.pdf) and included a set of guidelines for ODE; (4) the Latin American and Caribbean Institute for Quality in Distance Higher Education (CALED) which develops guidelines and instruments for QA in ODE and promotes quality culture in ODE throughout the Latin America region; and (5) the Asian Association of Open Universities which provides *Quality Assurance Framework* (https://www.aaou.org/quality-assurance-framework/) for ODE institutions in Asia.

At the international level, guidelines on quality in transnational ODE are offered by such agencies as (1) UNESCO/OECD's *Guidelines on Quality Provision in Cross-Border Higher Education* (http://www.oecd.org/education/skills-beyond-school/35779480.pdf), (2) International Council for Open and Distance Education (ICDE)'s *Quality Resources* (https://www.icde.org/quality-education), and (3) the UK Quality Assurance Agency which provides UK Quality Code for Higher Education Part B: Assuring and Enhancing Academic Quality Chapter B10 – *Managing Higher Education Provision with Others* (https://www.qaa.ac.uk/docs/qaa/quality-code/chapter-b10_-managing-higher-education-provision-with-others.pdf?sfvrsn=8c02f781_8).

From a look at QA frameworks at national, regional, and international levels, it is clear that globalization and the advancement of technology and transnational ODE have led to similar QA standards and procedures in ODE across the board. However, as Jung (2005) and Jung and Latchem (2007) indicate, while many ODE institutions share some similar QA features, they operate QA in rather different ways depending in part on their resources, size, organizational structure, and culture of quality. Now, let's delve into QA systems operated in different ODE institutions and programs.

Institutional QA Systems

In order to meet the challenges and demands relating to public funding, social accountability, and the satisfaction of various stakeholders, not to mention the competitiveness of the education offered, higher educational institutions have come to realize the crucial role played by QA. In recognizing the importance of QA practice, many higher education institutions, including ODE institutions and ODE programs, have established QA systems in compliance with national QA and accreditation frameworks, and some have even gone as far as adopting regional and/or international QA systems.

QA management systems. There are three QA management systems identified in ODE institutions and programs, namely, centralized, collective, and dispersed (Jung & Latchem, 2007, p. 241).

Centralized QA systems are run by QA centers or senior managers who oversee the whole QA process, often to be seen in relatively large-scale ODE institutions such as Universitas Terbuka in Indonesia, Open Universities of Malaysia and Sri Lanka, Allama Iqbal Open University in Pakistan, Botswana College of Distance and Open Learning, and The National Open University of Nigeria, to name but a few. Latchem (2016) reports that over 70 of 100 commonwealth universities, including both dedicated ODE institutions and ODE programs within conventional universities, have a centralized QA unit or staff dedicated to QA for their ODE programs.

Collective QA systems are, invariably, operated by committees, councils, and/or boards which play distinctive roles in the different aspects or stages of QA, an example might be that the quality of ODE programs and courses are adjudicated and approved by a program committee or program review team, whereas learning outcomes are evaluated by an Examinations Office. Several ODE institutions such as Indira Gandhi National Open University in India, Anadolu University in Turkey, and the Open University of Hong Kong adopt this collective QA management system.

In contrast, dispersed QA systems share the QA responsibility across various management units. Korea National Open University makes every administrative office and academic unit accountable for quality. The Open University UK, Athabasca University in Canada, and the Open University of China also have adopted the dispersed QA system.

While there is, as yet, no evidence demonstrating and comparing the relative effectiveness and efficiency of the different QA management systems, it is noted in Jung (2005) and Jung, Wong, and Belawati (2013) that a centralize system may be the most effective when an institution first introduces the QA system and a dispersed or collective QA system might work better once the QA system is in place and a quality culture has had time to develop at institutional level.

Focus areas of QA. Most institutional QA systems are focused on the input and process variables such as planning, management, courses and course materials, curriculum, teaching and learning, learner support, staff support, assessment and evaluation, and technology infrastructure – the assumption being that if an institution is adequately resourced and properly managed, it will be in a position to ensure the quality of the collective output. Unfortunately, this is not the case, and as a result, output and outcome variables such as the learning performance of students, career advancement of graduates, and/or contribution to community services have begun to be included in some QA systems (Darojat, 2018).

In defining QA focus areas, some institutions follow a regional or international QA agency's framework; an example of this is Indonesia's Universitas Terbuka, which has adopted AAOU's QA framework and specifies ten QA areas (https://www.ut.ac.id/en/content/quality-assurance): (1) policy and planning; (2) human resources; (3) internal management; (4) students and student profile; (5) design and development education program; (6) design and development course; (7) learning assistance services; (8) infrastructure, media, and learning resources; (9) assessment and evaluation of student; and (10) research and community services.

Other ODE institutions have followed the path of developing their own guidelines. One example is the Open University of Catalonia (OUC) in Spain which, since 2007, has implemented an Internal Quality Assurance System (IQAS) tasked with managing the internal QA process. Its IQAS specifies assessment indicators using a matrix of six standards (https://www.uoc.edu/portal/_resources/EN/documents/qualitat/SGIQ/Annex_VI._Processos_i_dimensions_i_estxndards_d_avaluacix_EN.pdf): (1) review and improvement of the IQAS, (2) design revision and improvement of training programs, (3) support systems for learning and orientation to students, (4) teaching staff, (5) material resources and services, and (6) public information, across three processes, strategic, operational, and support.

Yet other institutions follow QA frameworks for conventional higher education. Canada's Athabasca University, which is accredited by the US Middle States Commission on Higher Education (MSCHE) adopts seven standards (https://www.athabascau.ca/provost-vice-president-academic/msche-self-study/index.html) specified by the MSCHE:

Standard I: Mission and goals
Standard II: Ethics and integrity
Standard III: Design and delivery of student learning experience
Standard IV: Support of student learning experience
Standard V: Educational effectiveness assessment
Standard VI: Planning, resources, and institutional improvement
Standard VII: Governance, leadership, administration

Each standard specifies a set of quality criteria. Pakistan's Allama Iqbal Open University uses two QA frameworks: Pakistan Higher Education Commission's 11 institutional performance evaluation standards (https://www.hec.gov.pk/english/services/universities/QAA/Pages/Institutional-Performance-Evaluation.aspx) and the Commonwealth of Learning Review and Improvement (COL-RIM) model of 10 quality indicators (http://oasis.col.org/bitstream/handle/11599/602/COL-RIM_Handbook_2014.pdf?sequence=1&isAllowed=y) (Zuhairi et al., 2020).

Due to the nature of ODE, particular attention has been paid to input variables such as the design, development, and delivery of courses and programs and learner support (Jung & Latchem, 2007; Latchem, 2016; Zuhairi, 2020). Examples include the Universitas Terbuka in Indonesia and the Indira Gandhi National Open University in India which specify detailed structures and components of design and development within ODE course packages, learning activities, and assessments and require several procedural steps of internal and external reviews of those components (Darojat, 2018; Samdup & Nembiakkim, 2013).

Standards, best practices, and performance indicators. The terms *standards*, *criteria*, *components*, *best practices*, and *performance indicators* are used confusingly in different QA frameworks. For the purposes of this chapter, a QA framework is defined as "a system specifying a set of QA standards consisting of best practices or sub-standards across the focus areas of QA." Several ODE institutions do indeed use best practices to guide and assess institutional quality across a set of QA areas or standards. For example, under "policy and planning," one of the ten QA areas (https://www.aaou.org/quality-assurance-framework/) in Universitas Terbuka in Indonesia, best practices state the following: (1) *The institution has a well-defined vision and mission statement which incorporates the internal and external educational environment, its potential, national development agenda, and international trend in education*. (2) *The institution has vision and mission that are shared by all management and staff members*. On the other hand, under "learner support" (one of the QA standards of Quality Matters that universities in the USA widely use to assess the quality of their online and blended courses/programs), substandards state the following: (1) *The course instructions articulate or link to a clear description of the technical support offered and how to obtain it*. (2) *Course instructions articulate or link to the institution's accessibility policies and services*. (3) *Course instructions articulate or link to the institution's academic support services and resources that can help learners succeed in the course*. (4) *Course instructions articulate or link to the institution's student services and resources that can help learners succeed*.

Performance indicators, meanwhile, are used to assess output and outcome performance, often based on numerical data. Common performance indicators for ODE are course/program registrations, course/program completion and graduation rates, collaborative course development and delivery with other ODE institutions, graduate students' satisfaction, employer satisfaction, and the economic impact of an ODE institution on its local community (Shale & Gomes, 1998) and grades earned on individual assignments, course final grades, discussion board participation and thread initiation, and standardized test scores (Alstete, 2004).

From the abovementioned examples, best practices or substandards can be seen tending to focus on input and process variables and are often stated in qualitative terms, whereas performance indicators focus on the measurement of output and outcome variables and often call for quantitative data collection. While the output/outcome-based approach to QA is highly recommended, difficulties in identifying performance indicators for ODE and quantitatively measuring the quality of ODE need to be considered (Alghamdi & Alanizan, 2018; Shale & Gomes, 1998). Critical, also, is consensus among different stakeholders regarding benchmarks and performance indicators for there to be reliable and valid internal and external evaluations of both outputs and outcomes (Robinson, 2004).

QA procedure. QA is, in effect, a cyclical process in which an institution either as a single entity or as a summation of individual units undertakes self-evaluation, undergoes internal review, and seeks external review and (re)accreditation. This process is often referred to as quality audit and carried out in compliance with national QA requirements.

Quality auditing within an ODE institution starts with self-evaluation, self-study, or self-monitoring. The institution in question collects and analyzes up-to-date information on its education and services and communicates the results to its members and the outside world. Some ODE institutions, such as Universitas Terbuka Indonesia, carry out self-evaluation on a continuous basis, while other institutions, such as Athabasca University in Canada, conduct self-study every few years in preparation for accreditation by a chosen external agency. Allama Iqbal Open University in Pakistan employs annual confidential reports based on staff performance evaluations by section heads; conversely, the Open University of China and Open University Malaysia adopt student evaluations to measure the quality of their courses and services (Jung & Latchem, 2007). In any case, self-evaluation addresses several questions related to QA areas such as the following as listed in the Malaysian Qualifications Agency's Code of Practice for Programme Accreditation: Open and Distance Learning (https://www2.mqa.gov.my/qad/garispanduan/COPIA/2019/Final%20COPPA-ODL%202nd%20edition%204.12.19.pdf) (p. 63):

1) What actions are undertaken in relation to each of the QA standards? Why were these actions taken? Are these actions appropriate?
2) How is their effectiveness measured? What performance indicators are available? Are the indicators appropriate?
3) What subsequent action should be taken as a result of the review?
4) Can the degree of achievements be measured? What are the actual outcomes?
5) Can the existing actions be improved, even those that are already effective?

QA standards and guidelines specifically for online education can be found in *A Guide to Quality in Online Learning* (https://www.tonybates.ca/wp-content/uploads/Guide_Quality_Online.pdf) (Butcher & Wilson-Strydom, 2013).

In order to answer the kind of questions posed above, ODE institutions collect and analyze data obtained from student surveys, including teaching effectiveness surveys, satisfaction surveys, and freshmen/graduates' surveys, and interviews with staff and other members, enrollment, re-enrollment figures, exam pass and dropout data, and percentage of graduate students, along with other data related to the evaluation of institutional effectiveness and efficiency. The results of the resulting self-evaluation are often published as reports and shared with the governing body of the institution and outside organizations such as the relevant Ministry of Education and national QA agency.

The purpose of an external review is to verify the self-evaluation reports and other related documents by external review teams made up of independent experts who are carefully selected having fulfilled certain criteria and training by the national QA agencies. A common model of external review can be found in the European Association for Quality Assurance in Higher Education's Considerations for Quality Assurance of E-learning Provision manual (https://www.enqa.eu/wp-content/

uploads/Considerations-for-QA-of-e-learning-provision.pdf). It specifies a number of methods for external review, including (1) a self-assessment or equivalent, (2) a site visit, (3) a report resulting from the external assessment, and (4) a consistent follow-up (Huertas et al., 2018, p. 18). For the self-assessment component, several indicators are suggested including the institutional strategy, pedagogical approaches, and virtual learning environment, the innovation and quality of instructional design, the qualifications and experience of academic staff, and the quality of the online courses/programs. For the site visit, indicators such as the institution's technical infrastructure, virtual learning environment, classrooms, e-library, and interviews with various stakeholders are suggested (Huertas et al., 2018, p. 19). Based on the findings of the self-assessment and the site visit, a report (or reports) is prepared by the external reviewers, and follow-up improvements with a (re)accreditation or audit decision are requested.

Some argue that quality audit conducted through internal and external reviews is pointless and bureaucratic because it tends to focus on input factors mostly in the areas of teaching and research (Cheng, 2010), use data that are not always reliable and valid (Seyfried & Pohlenz, 2018), and often exclude students' involvement (Ryan, 2015). Conversely, others report QA processes as having positive aspects; Schwegler, Altman, and Bunkowski (2014), for example, reveal that faculty members who participated in the Quality Matters peer review process for their institution's online courses thought that peer reviews were helpful for them to improve the quality of their courses, acquire new techniques with online technology, and better understand the issue of quality in online education. These contrasting studies indicate the need for more attention to be paid to QA strategies that maximize the positive and minimize the negative.

QA manual and staff training. Development and utilization of QA manuals are not common across ODE institutions. Latchem (2016) reports that only 36% of the ODE institutions surveyed use QA manuals while carrying out the QA activities. A typical QA manual contains QA standards, best practices or substandards, and performance indicators for important QA areas; it lists QA procedures to follow and resources and actions needed for quality enhancement and improvement. In carrying out its internal QA activities, OUC in Spain follows the *Internal Quality Assurance System Manual* (https://www.uoc.edu/portal/_resources/EN/documents/qualitat/SGIQ/Manual_SGIQ__v.1_per_Llengua_EN_20190219_PORTAL.pdf) developed in 2017. The Manual explains OUC's internal QA system and includes various appendices which specify OUC's QA processes, dimensions, and standards along with responsibilities. Universitas Terbuka in Indonesia uses over 200 QA manuals as working guides for all of its QA components (Belawati & Zuhairi, 2007). Each manual outlines a flowchart of all processes, steps to complete a certain task, the person in charge, timeline, and output quality indicators for each activity (Hardini, Sunarsih, Meilani, & Belawati, 2013, p. 86). To support ODE institutions in carrying out internal reviews, the Commonwealth of Learning's Quality Assurance Toolkit for Distance Higher Education Institutions and Programmes (http://oasis.col.org/bitstream/handle/11599/105/pub_HE_QA_Toolkit_ web.pdf?sequence=1&isAllowed=y) offers QA standards, best practices, and performance indicators (Clarke-Okah & Coomaraswamy, 2009).

Several ODE institutions have provided training programs, or sessions, to develop staff competencies with a particular focus on course design and development, and more recently, the focus has shifted to online interactions and the use of various online technologies to ensure managers and staff are fully trained in QA principles and methods (Jung & Latchem, 2007); an instance of this is the Staff Training and Research Institute of Distance Education at IGNOU, which offers staff training with a manual for course/program design and multimedia development, while the Digital Media Center in collaboration with the Institute of Distance Education at Korea National Open University provides training for online course development and implementation to its academic staff. The Centre for Distance Education at Athabasca University in Canada and the eLearn Center at OUC in Spain offer both professional training sessions and MA and PhD degree programs for further postgraduate education. Many conventional universities also offer faculty training and professional development sessions aimed at improving their faculty competencies in online and blended education via the Center for Teaching and Learning or a similar unit.

Conclusion: Future of QA in ODE Institutions

This chapter has shown that ODE institutions and national, regional, and international bodies are seeking to ensure quality in ODE and develop appropriate QA and accreditation models for ODE, but also that there is still a need for more balanced, effective, and yet flexible QA frameworks and guidelines for the ever-changing landscape of ODE. For just such QA systems, Jung (2010, p. 25) suggests an ecological QA framework that "emphasizes inter-relation transactions between elements, i.e., providers, learners, cultures, and policies and systemic integration of those elements, and stresses that all these elements, within a QA system, play an equal role in maintaining the balance of the whole." The ecological QA approach argues that ODE institutions should build *an all-stakeholder-oriented QA system* as the existing provider-centered QA approach tends to focus mostly on providers' perceptions and ignore the inter-relational and dynamic nature of the QA system. It also highlights the importance of creating *a globally oriented and yet locally adaptive QA system* to reflect socio-cultural diversity in QA concepts and practices.

While ODE institutions should undoubtedly consider both internal and external accreditation and QA requirements and standards in various areas, they need to place *quality in pedagogical dimensions* such as course design and development, learning support, and assessment and evaluation at the center of the accreditation and QA system as these dimensions define the quality for student learning (Conrad, 2002; Daniel et al., 2008; Marciniak, 2018). This can be achieved by specifying procedures for courses/material design and development; involving both internal and external experts; considering changing needs and demands of learners; offering suitable training for faculty, tutors, and other support staff on a regular and continuous basis; and relating teaching and learning and learner supports to learning outcomes (Jung, 2013).

As Bradley (2005) argues, many QA models tend to encourage accountability and conformity rather than innovation, diversity, and inclusion. Future QA needs to consider ways to attend to, and negotiate with, a wide range of needs, values, and perspectives of stakeholders (Ryan, 2015) while addressing diverse learning paths and delivery modes in the QA process as the convergence of on-campus and online education becomes ever more widely adopted in higher education and the awareness of consumer rights is heightened. We still see many ODE institutions that have flaws in applying QA standards and guidelines regularly and consistently in both course and material design and development, assessment and evaluation methods, and learner and staff support, despite having well-established technology infrastructure and producing good reports for external QA reviews. To overcome such flaws, the ODE institutions need to move from the existing control framework to *a culture creation framework* and integrate QA activities into their institutional cultures and everyday practices.

As discussed above, ODE institutions have tended to pay more attention to input and process variables and have ignored output/outcome variables such as learning outcomes. Recent years have seen a growing demand for review by and approval of learning outcomes from various QA agencies and society in general as these can be used to guide students' learning paths, design focused learning activities, and thus improve course/program design and also provide effectiveness of a course, program, or institution. Gallavara et al. (2008, p. 12) argue that learning outcomes are "a tool to describe and define a learning and assessment process and its product, which can lead to improved pedagogical practice in education and improved student learning practice." We are observing a paradigm shift in QA in some innovative ODE institutions such as the Open University of Sri Lanka and Universitas Terbuka in Indonesia (Latchem, 2016; Zuhairi et al., 2020), with movement from applying a criterion/standard-based approach to the design, delivery, and assessment of ODE courses/programs/materials to *an outcome-based QA approach* focusing on learning performance. Yet despite the above, further elaboration of accreditation and QA indicators measuring varied types of learning outcomes and the development of outcome-based quality culture would help ODE institutions integrate the outcome-based approach into their existing QA system.

References

Aisyah, S., Samsiyah, S., Wulandari, F. R., & Juliana, A. (2019). *Quality assurance in open and distance education: Experience from Universitas Terbuka*. In International Conference on Open and Innovative Education (ICOIE) 2019, 10–12 July 2019, The Open University of Hong Kong.

Alghamdi, M., & Alanizan, S. (2018). Performance indicators, motivations and barriers in online distance courses: A case study at Arab Open University. *International Journal of Teaching and Education, VI*(2), 46–60. https://doi.org/10.20472/TE.2018.6.2.003.

Alstete, J. (2004). Performance indicators in online distance learning courses: A study of management education. *Quality Assurance in Education, 12*(1), 6–14. https://doi.org/10.1108/09684880410517397.

Beaudoin, M., Kurtz, G., Jung, I. S., Suzuki, K., & Grabowski, B. (2013). *Online learner competencies: Knowledge, skills and attitudes for successful learning in online and blended settings* (The Ibstpi series). Charlotte: Information Age Publishing.

Beerkens, M. (2018). Evidence-based policy and higher education quality assurance: Progress, pitfalls and promise. *European Journal of Higher Education, 8*(3), 272–287. https://doi.org/10.1080/21568235.2018.1475248.

Belawati, T., & Zuhairi, A. (2007). The practice of a quality assurance system in open and distance learning: A case study at Universitas Terbuka Indonesia (The Indonesia Open University). *International Review of Research in Open and Distributed Learning, 8*(1). https://doi.org/10.19173/irrodl.v8i1.340.

Butcher, N., & Wilson-Strydom, M. (2013). *A guide to quality in online learning*. Dallas: Academic Partnerships. Retrieved from https://www.tonybates.ca/wp-content/uploads/Guide_Quality_Online.pdf

Cheng, M. (2010). Audit cultures and quality assurance mechanisms in England: A study of their perceived impact on the work of academics. *Teaching in Higher Education, 15*(3), 259–271. https://doi.org/10.1080/13562511003740817.

Clarke-Okah, W., & Coomaraswamy, U. (2009). *Quality assurance toolkit for distance higher education institutions and programmes*. Vancouver: Commonwealth of Learning/UNESCO.

Conrad, D. (2002). Engagement, excitement, anxiety, and fear: Learner's experiences of starting an online course. *American Journal of Distance Education, 16*(4), 205–226.

Daniel, J., Kanwar, A., & Uvalić-Trumbić, S. (2008). *Achieving quality in distance education*. Vancouver: Commonwealth of Learning/UNESCO. Retrieved from http://oasis.col.org/bitstream/handle/11599/1274/2008_Daniel_Achieving_Quality_Transcript.pdf?sequence=1&isAllowed=y

Darojat, O. (2018). How are the results of quality assurance programs used to inform practices at a distance higher education?. *Turkish Online Journal of Distance Education*, *19*(1), 75–88. Retrieved from https://files.eric.ed.gov/fulltext/EJ1165889.pdf

Ehlers, U. (2004). Quality in e-learning from a learner's perspective. *European Journal of Open and Distance Learning*, *I*. Retrieved from https://old.eurodl.org/?p=archives&year=2004&halfyear=1&article=101

Ferreras-Garcia, R., Ribas, C., Sales-Zaguirre, J., & López, E. S. (2021). Competencies in business degrees: A face-to-face and online comparative study. *Journal of Education for Business, 96*(2), 71–81. https://doi.org/10.1080/08832323.2020.1751025.

Gallavara, G., Hreinsson, E. M., Kajaste, E., Lindesjöö, C., Sølvhjelm, A. K., Sørskår, M., & Zadeh, S. (2008). *Learning outcomes: Common framework – Different approaches to evaluating learning outcomes in Nordic countries*. Joint Nordic Project 2007–2008. European Association for Quality Assurance in Higher Education (ENQA) occasional papers 15.

Hardini, S. Y. P. K., Sunarsih, D., Meilani, A., & Belawati, T. (2013). Ensuring the quality of management processes in Indonesia's Universitas Terbuka. In I. S. Jung, T. M. Wong, & T. Belawati (Eds.), *Quality assurance in distance education and e-learning: Challenges and solutions from Asia*. New Delhi: Sage Publications.

Harvey, L., & Green, D. (1993). Defining quality. *Assessment and Evaluation in Higher Education, 18*, 9–34. https://doi.org/10.1080/0260293930180102.

Huertas, E., Biscan, I., Ejsing, C., Kerber, L., Kozlowska, L., Marcos, S., . . . Seppmann, G. (2018). *Considerations for quality assurance of e-learning provision*. ENQA occasional papers 26. Retrieved from https://www.enqa.eu/wp-content/uploads/Considerations-for-QA-of-e-learning-provision.pdf

Jung, I. S. (2005). Quality assurance survey of mega universities. In C. McIntosh & V. Zeynep (Eds.), *Perspectives on distance education: Lifelong learning and distance higher education* (pp. 79–98). Vancouver/Paris: Commonwealth of Learning/UNESCO.

Jung, I. S. (2010). Toward a systemic approach to quality assurance in e-learning: An ecological perspective. *Educational Technology International, 11*(2), 25–41.

Jung, I. S. (2011). The dimensions of e-learning quality: From the learner's perspective. *Educational Technology Research and Development, 59*, 445–464.

Jung, I. S. (2013). Concluding remarks: Future policy directions. In I. S. Jung, T. M. Wong, & T. Belawati (Eds.), *Quality assurance in distance education and e-learning: Challenges and solutions from Asia* (pp. 275–288). New Delhi: Sage Publications.

Jung, I. S., & Latchem, C. (2007). Assuring quality in Asian open and distance learning. *Open Learning, 22*(3), 235–250.

Jung, I. S., & Latchem, C. (Eds.). (2011). *Quality assurance and accreditation in distance education and e-learning: Models, policies and research*. New York/London: Routledge.

Jung, I. S., Wong, T. M., & Belawati, T. (Eds.). (2013). *Quality assurance in distance education and e-learning: Challenges and solutions from Asia*. New Delhi: Sage Publications.

Kihwelo, P. F. (2013). Quality assurance systems in open and distance learning: A search for normative judgement. *Huria*, *14*. https://www.ajol.info/index.php/huria/article/view/110764/100513

Koul, B. N. (2006). Towards a culture of quality in open distance learning: Present possibilities. In B. N. Koul & A. Kanwar (Eds.), *Perspectives on distance education: Towards a culture of quality* (pp. 177–187). Vancouver: Commonwealth of Learning.

Latchem, C. (2016). *Open and distance learning quality assurance in Commonwealth universities*. Vancouver: Commonwealth of Learning. Retrieved from http://oasis.col.org/bitstream/handle/11599/2046/2016_Latchem_ODL-Quality-Assurance.pdf?sequence=3&isAllowed=y

Marciniak, R. (2018). Quality assurance for online higher education programmes: Design and validation of an integrative assessment model applicable to Spanish universities. *International Review of Research in Open and Distributed Learning, 19*(2). https://doi.org/10.19173/irrodl.v19i2.3443.

Ossiannilsson, E., Williams, K., Camilleri, A., & Brown, M. (2015). *Quality models in online and open education around the globe. State of the art and recommendations*. Oslo: International Council for Open and Distance Education. Retrieved from https://static1.squarespace.com/static/5b99664675f9eea7a3ecee82/t/5bb8e80f652deaada670aee8/1538844696866/icdequalitymodels22.pdf

Paul, R. H. (1990). *Open learning and open management: Leadership and integrity in distance education*. London: Kogan Page.

Phipps, R., & Merisotis, J. (1999). What's the difference? A review of contemporary research on the effectiveness of distance learning in higher education. Retrieved from https://files.eric.ed.gov/fulltext/ED429524.pdf

Robinson, B. (2004). Governance, accreditation and quality assurance in open and distance education. In H. Perraton & H. Lentell (Eds.), *Policy for open and distance learning* (pp. 181–206). London/Vancouver: Routledge Falmer/Commonwealth of Learning.

Ryan, P. (2015). Quality assurance in higher education: A review of literature. *Higher Learning Research Communications, 5*(4). https://doi.org/10.18870/hlrc.v5i4.257.

Samdup, P. E., & Nembiakkim, R. (2013). India's Indira Gandhi National Open University. In I. S. Jung, T. M. Wong, & T. Belawati (Eds.), *Quality assurance in distance education and e-learning: Challenges and solutions from Asia* (pp. 169–181). New Delhi: Sage Publications.

Schindler, L., Puls-Elvidge, S., Welzant, H., & Crawford, L. (2015). Definitions of quality in higher education: A synthesis of the literature. *Higher Learning Research Communications, 5*(3). https://doi.org/10.18870/hlrc.v5i3.244.

Schwegler, A. F., Altman, B. W., & Bunkowski, L. M. (2014). Beliefs regarding faculty participation in peer reviews of online courses. *Internet Learning*, *3*(1), 95–116. Retrieved from https://pdfs.semanticscholar.org/bf7a/d9f5dceccaaf5195898c1d1754518d589c81.pdf?_ga=2.246969411.691696804.1615875455-399240701.1615875455

Seyfried, M., & Pohlenz, P. (2018). Assessing quality assurance in higher education: Quality managers' perceptions of effectiveness. *European Journal of Higher Education, 8*(3), 258–271. https://doi.org/10.1080/21568235.2018.1474777.

Shale, D., & Gomes, J. (1998). Performance indicators and university distance education providers. *Journal of Distance Education*, *13*(1), 1–20. Retrieved from https://www.learntechlib.org/p/86788/

Song, L., Singleton, E. S., Hill, J. R., & Koh, M. H. (2004). Improving online learning: Student perceptions of useful and challenging characteristics. *Internet and Higher Education, 7*, 59–70.

Stella, A., & Gnanam, A. (2004). Quality assurance in distance education: The challenges to be addressed. *Journal of Higher Education, 47*(2), 143–160.

Zuhairi, A. (2020). The operational aspects of open and distance learning and its quality assurance system in Universitas Terbuka. *Jurnal Pendidikan Terbuka Dan Jarak Jauh, 20*(2), 74–89. https://doi.org/10.33830/ptjj.v20i2.122.2019.

Zuhairi, A., Raymundo, M. R. D. R., & Mir, K. (2020). Implementing quality assurance system for open and distance learning in three Asian open universities: Philippines, Indonesia and Pakistan. *Asian Association of Open Universities Journal, 15*(3), 297–320. https://doi.org/10.1108/AAOUJ-05-2020-0034.

Quality Assurance at Mega Universities

43

Ojat Darojat and Wei Li

Contents

Abstract

Within the community of distance and online education, quality and quality assurance have been one of the most talked and discussed areas. This is especially true within the context of mega open universities where policies are always designed to optimize the openness, flexibility, and accessibility of the system. Even though distance education had initially been associated with opening access to education, the quality of education has become more and more important in

O. Darojat (✉)
Faculty of Education, Universitas Terbuka, Indonesia Open University, Jakarta, Indonesia
e-mail: ojat@ecampus.ut.ac.id

W. Li
The Open University of China, Beijing, China
e-mail: liwei@ouchn.edu.cn

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_40

line with the advancement of technology use throughout the system. It is within this quality paradigm that quality assurance (QA) has become one of the key aspects in planning and managing open, distance, and digital education (ODDE). This paradigm has also brought many ODDE providers including the mega open universities to reformulate their visions, missions, and strategies to address quality issues more adequately (Belawati & Zuhairi, 2007). This chapter explores the implementation of quality assurance (QA) programs at two mega universities, Universitas Terbuka and Open University of China, which have developed QA system and implemented systematic QA programs consistently, resulting in their enhanced quality of learning over the years. The discussion will start with a general overview about the universities, followed by their internal QA systems and implementations. The two exemplary QA systems and practices would illustrate how mega open universities undertake the quality assurance programs to ensure continuous improvement as well as to develop quality cultures within the respective institutions.

Keywords

Quality assurance · Mega university · Quality standard · Open and distance learning

Introduction

The twenty-first century brings higher education institutions to focus on quality in response to stakeholders' demand and global competitive landscape. The competitive pressures on quality are also faced by distance teaching universities (DTUs) including mega universities. Mega universities are universities with student body of over 100,000 (Daniel, 1999), and many of those are open universities. Among the 62 largest mega open universities, 8 are located in Asia and are serving nearly ten million students (Belawati & Bandalaria, 2019). Those open universities have been the most significant higher education providers in Asia (Belawati & Bandalaria, 2019).

The adoption of open and distance learning by many countries in Asia is related to the issue of equity and equality for education, especially at tertiary level. Many countries are under pressure to increase the accessibility of people to quality and affordable higher education. Therefore, the issue of quality in open universities is very strategic and political as it represents the commitment of the authority to provide quality higher education to the masses (Belawati & Zuhairi, 2007).

Open universities have always been very keen with quality and quality assurance (Jung & Latchem, 2012). However, there is no standardized nor obligatory system of quality assurance. The study by Jung and Latchem (2012) shows that there are many approaches and systems that are being adopted and implemented by different open distance education (ODE) institutions. This chapter describes the development and the employment of QA programs at two mega universities in Asia, namely, Universitas Terbuka (UT) and Open University of China (OUC).

Universitas Terbuka (UT) is one of the leading open universities in Asia. At UT, quality assurance (QA) program has been placed as the central node for every policy, regulation, as well as academic and administrative services to the students. The strategic value of QA for UT is in line with the provision of mass higher education that has become an important policy in Indonesia (Belawati & Zuhairi, 2007). Indonesia is a developing country in Southeast Asia, and it has been regarded as the world's biggest archipelago country. Indonesia has a large population, more than 268,000,000 people as of 2020, scattered all over Indonesia's 17,000 islands. Therefore, providing quality higher education for people residing in remote islands has been regarded as one of the strategic issues. For that purpose, UT has been designed by the government to increase and equalize access to higher education, for people who for some reasons do not have access to conventional campus-based higher education including those who live in remote areas. UT is now 36 years of age with massive student body and has consistently adopted and implemented QA programs as its commitment to promoting quality education.

Open University of China (OUC) is the largest university in China, and perhaps in the world, and serves as the main open distance learning (ODL) provider in China. Quality assurance (QA) has always been the strategic focus of OUC. And, as a national public university directly managed under the Ministry of Education, OUC accepts quality supervision from the Ministry of Education in various ways and means. The Open University of China (OUC) has played an important role in the expansion of higher education for the last decades. The number of students at OUC has increased from 1.15 million in 2000 to 4.6 million in 2020 (Ju, 2020). In the next 5 years which corresponds to the China 14th Five-Year Plan period, the government proposes that the higher education should be transformed from a quantity-based strategy to a quality-based strategy. High-quality education is put forward at the core. Quality becomes the key point and focus of OUC's development.

Quality Assurance at Universitas Terbuka (Indonesia Open University)

General Overview of Universitas Terbuka

Established in 1984, UT is a state university and was until recently the only university using an open and distance learning system in Indonesia. UT has been intended by the Indonesian government to deliver higher educational services for those in society who for some reasons cannot join conventional higher education (Belawati & Zuhairi, 2007). UT has set a vision to become a world-quality open and distance higher education institution. UT was named as one of the mega universities in the world (Daniel, 1999) with a student body of more than 300,000, mostly residing in Indonesia but some overseas (in about 43 countries). UT has a well-built, centralized management system with its head office located in Jakarta and

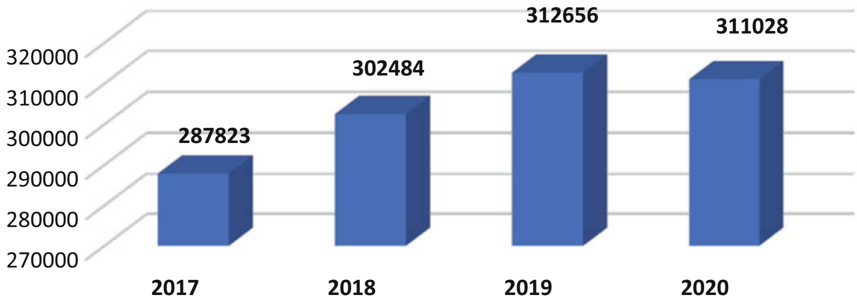


Fig. 1 UT student body 2017–2020. (Source: UT's Bureau for Academic Administration and Planning)

equipped with 39 regional offices spread throughout Indonesia's 34 provinces. Figure 1 shows the trend of UT's student body over the last 4 years.

The increasing number of student body since 2017 is the result of the new policies on student enrolment that allow new students to enroll at any time and marketing programs that are designed to attract the digital native generation. As shown by the figure, however, the number of students slightly decreased in 2020 due to COVID-19 outbreak.

The Nature and Importance of QA at UT

Why is Universitas Terbuka and perhaps all distance higher education (DHE) institutions considering the development and implementation of a formal QA system? For decades, there are many institutions that have prospered, flourished, and established good reputations without intentionally commencing formal QA programs. Although there are considerable advantages to be gained from having a formal QA system, there people who believe that QA is a good practice to be implemented in education. For example, Bradley (2005) contends that the adoption of QA programs from industry to education tends to simplify the conclusion of success or failure. University is different from industrial manufacturing institution that can create a QA system in an obvious approach. University provides education, which is a service process that involves the whole university system comprehensively; and, it is very difficult to translate the complexity of that process into a linier QA system. There are natural and significant differences between a university and an industrial manufacturer. Manufacturers are concerned with the production of physical products, whereas universities are concerned with educating students so they can have meaningful and productive lives in the various roles they will play in society.

It is argued that QA should be internally driven and accepted as an integral part of the institutional strategies in supporting student success. Based on the writer observation in three open universities in Southeast Asia, QA programs have been employed by these open universities to equip the management with quality guidelines for all departments and people involved in their respective quality areas. According to

UT's *Manual Book for Quality Assurance* (2012), for example, there are at least four reasons to why a QA system is important to UT, that is, to improve "...readiness for accreditation, accountability, competitiveness, and effectiveness" (p. 3).

(a) Improve readiness for accreditation.

Accreditation deals with policy interest of the government. As mandated by the National Education Law, the National Accreditation Board for Higher Education or BAN-PT (stands for *Badan Akreditasi Nasional – Perguruan Tinggi)* regularly conducts quality review for accreditation purposes at study program level. Obtaining accreditation from BAN-PT is compulsory for all higher education institutions in Indonesia. UT's quality criteria should correspond well with quality standards being applied by BAN-PT for external inspection.

(b) Increase public accountability.

UT is a public university with a complex system and large geographical coverage. Therefore, it needs a quality framework and guidelines to assure standardized quality of services and products for public accountability.

(c) Rivalry among higher institutions (competitiveness).

Educational global markets are now moving to experience greater competition from local and global higher education institutions, both in distance higher education and conventional campus-based education. There are almost no time and geographical boundaries in the global market. In such situations, quality that relates to teaching and learning provision as well as support services becomes a strategic issue and a competitive advantage. The QA system provides an opportunity to develop a systematic and sustainable improvement toward that quality.

(d) Increase effectiveness (economies of scale).

While existing standard operational practices might have embedded quality, these might not always be the most efficient or effective method. A comprehensive approach to university performance is considerably important in restructuring its educational approaches to reduce costs while maintaining and improving quality of the products. A QA system can present tools by which quality can be achieved and cost of producing additional products, such as learning materials, will decrease as the volume of outputs increases.

The adoption of QA program, however, "is not a way to set goals nor a procedure to reach the goals but is an effort for systematic and sustainable improvement" (UT QA Manual book, 2012). The program is necessary and a strategic tool for the university which applies "open policy for [serving] a large number of students within a large country" (Hardini, Sunarsih, Meilani, & Belawati, 2012).

The implementation practices of QA programs in open and distance universities vary significantly. There are QA approaches/methodologies that involve accreditation, quality audits, and student surveys (Chalmers & Johnston, 2012), and there is also another approach that is more industry-based quality review such as ISO standards and the Baldrige National Quality Award (Bogue, 1998; Sallis, 2002). UT currently practices both approaches through its internal quality system and external quality assessments. The external quality assessment is conducted by BAN-PT to seek accreditation, by ISO QA agencies to seek ISO certification, and by the International Council for Open and Distance Education (ICDE) for quality review.

UT's Internal Quality Assurance System

Universitas Terbuka has developed a comprehensive internal QA system (known as SIMINTAS or Sistem Jaminan Kualitas) and has been implementing it for almost 20 years. The current internal QA program complies with the government quality standards as laid out in the Education Law for Higher Education No. 12, 2012, and further elaborated by the Ministerial Regulation No. 50, 2018, about "National Standards for Higher Education" and Ministerial Regulation No. 109, 2013, about the Provision of Distance Education for Higher Education. The UT's SIMISTAS was developed based on the AAOU's quality assurance framework covering several key components of the open and distance education system. The SIMINTAS was developed in 2001 by a QA committee (Belawati & Zuhairi, 2007), which was formed as a strategic action for enhancing UT's quality through several steps starting from analyzing and adapting the AAOU framework to resonate UT internal requirements, as well as to comply to the Indonesian educational setting. The QA committee also identified the structure and components of quality areas, as well as selected priorities needed for developing quality guidelines of each value chain activities within the whole UT's business processes.

Over the years, UT's QA system and standards have gone through several reviews and revisions to meet stakeholder's demand and changes in both internal and external situations. Based on the current UT's QA manual (2012, p. 4), UT internal QA system consists of 10 quality areas, which are elaborated into 120 quality policies/standards in forms of statement of best practices (SOBP) as follows (Table 1):

The statements of best practices were developed and defined involving key staff (including academic, administrative, and technical staff) across departments to

Table 1 UT's quality areas and policies/statement of best practices

No.	Area of quality	Statement of best practices (SOBP)
1.	Policy and planning	7 SOBP
2.	Human resource recruitment and development	9 SOBP
3.	Management and administration	21 SOBP
4.	Learners	10 SOBP
5.	Program design and development	6 SOBP
6.	Course design and development	14 SOBP
7.	Learning supports	18 SOBP
8.	Assessment of student learning	15 SOBP
9.	Media for learning	7 SOBP
10.	Research and community services	13 SOBP

Source: Adapted from UT's quality assurance system (2012), p. 2

ensure the comprehensiveness of the coverage. For implementation purposes, job manuals in the form of work instructions and standard operating procedures (SOPs) for each and every particular business process were developed. According to Belawati, Zuhairi, and Wardani (2012), the quality job manuals "helped to generate a quality-oriented work culture in line with systems and procedures" (p. 116).

The SOPs and work instructions have been regarded as major references for quality guidelines. It was important to note that one of the main changes at UT during the initial adoption of QA programs was the introduction and the development of various SOPs for different quality programs (Darojat, 2013). Every SOP shows the workflow and the interrelationships among all operational activities within the system. The SOPs reflect the value chain activities for different business processes and the "how" of putting quality into practices. Meanwhile, work instructions describe the time frame, the human capital needed, the financial estimation, and other resources needed to support quality programs.

Within the execution, internalization of the whole QA system and procedures that involve rigorous discussions among staff across departments was conducted continuously. This is to achieve shared perception about standards and procedures. Having the same perception is very important in respect to sharing feelings and beliefs around the QA programs. Rigorous discussion followed by orientation sessions both face-to-face and virtual briefings across departments also includes UT's staff at the regional offices throughout the country. The discussions during the orientation step focused not only on how to implement the job quality manuals but also on how to measure achievement in all quality areas. The orientation session was very important for two reasons. Firstly, it provides people with more understanding of QA job manuals. Secondly, the orientation offers a room for staff engagement leading to higher confidence in the use of tools and implementing the program (Belawati & Darojat, 2014). The success of QA implementation is believed to be affected by the shared understanding about what quality and QA really mean and about their roles and involvement in the QA programs. All staff should be well informed on how to be involved and improve quality in their daily works. It is important to note that shifting an organization's behavior is one of the major tasks when undertaking "transformation." In this step, such a change requires encouragement and commitment from all staff as well as from managers at all levels.

A further organizational change has also been taken through formally establishing the Quality Assurance Centre in 2004 (Belawati & Zuhairi, 2007). The strategic role of this center was to manage and coordinate the development all quality guidelines and to monitor the employment of the quality programs. To ensure that the implementation of UT's quality programs corresponds well with procedures, work instructions, and quality criteria that have been agreed upon, the QA Center invited and trained a number of faculty members and other relevant staff to become internal auditors. In additions, the QA Center is also responsible for coordinating external quality assessments carried out by ISO QA agencies and by the ICDE.

Regularly internal quality audits are conducted to disclose nonconformity (major and minor findings) dealing with quality process and criteria achievement in various areas such as in registration, learning materials, tutorial services, and examination.

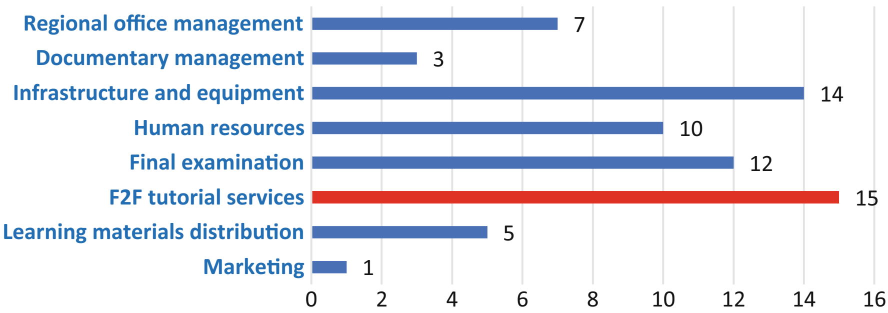


Fig. 2 Internal quality audit findings by quality areas in 2019 in 39 regional offices. (Source: UT Quality Assurance Center (2019))

The results of the internal quality audits provide feedback to the management for improvements. Figure 2 shows an illustration of the internal quality audit's results in UT's 39 regional offices for 2019.

The above figure shows the different nonconformances to different quality criteria, namely, office management, documentary management, infrastructure and equipment, human resources, final examination, face-to-face tutorial services, learning materials distribution, and marketing. The findings varied in terms of number, types, and weight (major and minor nonconformity). Based on quality audit in 2019, it was identified that most nonconformances were found in the area of face-to-face tutorials and infrastructure and equipment (15 minor nonconformances and 14 nonconformances, respectively). All nonconformances were analyzed and discussed in the management review meeting called as *Rapat Tinjauan Management (RTM)* involving all units in UT's head office and all regional offices. Analysis and exposure of findings of quality audits in the RTM was intended to give a general description about the problems faced by UT, especially in implementing the policies, procedures, and guidelines of the university quality programs in the regional offices. To support productive discussion during the meeting, the QA Center generated a quality implementation report with two purposes: on one hand, to provide the map and general summary of weaknesses and nonconformity faced in the implementation of quality programs and, on the other hand, to deliver recommendations to the management in respect to the university's future quality programs. The management review meeting has also been regarded as an important forum for recognizing and identifying strategic solutions and different actions that should be undertaken for future continual improvement.

Lessons Learned

The adoption of QA program at UT reveals a number of emergent lessons learned in different aspects of organization and management. It was clear that the QA system has helped the university in providing guidelines on how to put quality programs into practices. As the means to achieve quality, the QA programs were equipped with standards and procedures that enable faculties and administrative staff to fully understand and contribute to the quality programs in their respective daily activities. Based on the writer involvement in the implementation of the program, specifically when the writer was assigned as the head of UT's Quality Center, there are several lessons learned that have been regarded as the favorable characteristics for implementing the quality programs at UT.

(a) Involve all people within the system.

The adoption of QA called for participation of leaders/managers and the entire staff in all management levels. All people in the university should have two roles, as part of the QA system and as contributors to continuous improvement. The involvement of all people and functions within university has led to the benefit of "getting things right first time" for every single aspect of the quality activities. It is important to note that top and middle managers played a significant role in the initial stage when adopting the QA programs. The managers are not only primarily responsible for initiating and introducing the system to their subordinates, but the managers were also the first people who were trained for the QA programs. Various actions have been taken by the managers in developing, maintaining, and changing appropriate cultures to support the implementation of the QA program. They were responsible for creating new rules and policies that reinforced the desired performance of new organizational culture and simultaneously eliminating rules and policies that hindered the desired ways of operating. The top and middle management levels are also responsible for establishing a physical environment that reinforced the cultural changes, reviewing an organizational structure that strengthened operational changes, and providing training to all staff that focuses on the new skill level needed to support quality programs.

(b) Design SOPs and improve the quality process within the system.

The prerequisite to having better and organized workflows for each quality areas requires standardized operating procedures and work instructions, which would increase the awareness of faculties and administrative staff to perform more effective ways of completing their tasks as well as to enhance their feeling of ownership toward the system. The implementation of the quality programs should also be supported by necessary training activities for both top and middle managers as well as all staff to allow them develop and upgrade their new required skills. Thus, all employees would have the opportunity to perform well within the system.

(c) Integrate continuous improvement activities with the university's annual strategic plan (ASP) derived from the university's strategic business planning (SBP).

The implementation of QA programs called for integration of the continuous improvement programs within the framework of ASP as well as the mid- and long-term SBP of the university. All units should formulate their own set of quality achievements, agendas, budgets, and all necessary resources within the existing quality programs. All individual units must have clear objectives and directions regarding quality. However, those objectives and all the working plan to achieve the objectives should be flexible enough to deal with uncertainty. The

> continuous changes in competitive global markets, government policies in education, and other unpredicted external factors including those coming from students would have certain impacts on how the university should be operated and moved forward from one approach and tactic to other scenarios.

Furthermore, it is also important to note that QA has an unexpected impact on quality culture. It reveals itself in several obvious ways. Since implementing QA programs, the university culture is reflected in the pride of excellence and achievement. The merit system that is part of the QA paradigm provides opportunities to all staff to perform well and receive encouraging rewards including financial rewards. The reward system is embedded in the monthly staff performance appraisal. In addition, the QA programs also generate specific values and norms, which have influenced staff's positive attitudes and behavior. It appears that all staff appreciates the university's commitment to fostering an organizational culture that is characterized by trust, integrity, and fairness; upholding the value of faculty and administrative staff; emphasizing cooperation and collegiality; ensuring flexibility, responsiveness, open communication, and transparency; as well as ensuring accountability for decisions and outcomes.

Besides gaining many benefits, nevertheless, practicing QA programs is not without challenges to encounter. The implementation of QA that requires consistency and discipline has been also felt as being too demanding and time-consuming, especially in terms of documentation activities (Darojat, 2013) and changing prevailing mindset (Belawati & Zuhairi, 2007) that leads to staff misunderstanding about QA. There were some staff who feel intimidated as the quality programs significantly impact their daily activities, performance, and remuneration. Therefore, intensive communication, well-defined quality criteria, and clear directions to all stakeholders being involved are part of important exercises to develop shared understanding and to achieve a shared purpose, which is a continuous quality improvement.

Finally, at UT, the ultimate reason of adopting QA program is derived from the shared spirit of all staff and management to produce well-educated students and graduates through quality educational programs that will equip them with knowledge, skills, and experiences to allow them to have successful and meaningful lives.

Quality Assurance at Mega University: Open University of China

General Overview of the Open University of China (OUC)

China's higher education has developed rapidly since the twenty-first century. Statistics from the Ministry of Education (2020b) show that from 2000 to 2019, the number of higher education institutions in China has increased from 1,813 to 2,956 and the students enrolled in higher education has increased from 12.3 million to 40.02 million. In 2020, the gross enrollment rate of higher education reaches 54.4%, and it has transferred from massification toward popularization. In the next 5 years which corresponds to the China 14th Five-Year Plan period, the government proposes that the higher education should be transformed from a quantity-based strategy to a quality-based strategy. High-quality education is put forward at the core. Therefore, quality becomes the key point and focus of the Open University of China's development.

The Open University of China (OUC) has played an important role in the expansion of higher education for the last decades. The number of students at OUC has increased from 1.15 million in 2000 to 4.6 million in 2020 (Ju, 2020). OUC is the largest university in China and serves as the main open distance learning (ODL) provider in China. Quality assurance (QA) has always been the strategic focus of OUC. And, as a national public university directly managed under the Ministry of Education, OUC accepts quality supervision from the Ministry of Education in various ways and means.

OUC is established based on the China Central Radio and TV University (CCRTVU), which was officially established on February 6, 1979, with approval of Mr. Deng Xiaoping in person. On July 31, 2012, the CCRTVU was renamed as OUC with the purpose of providing a flexible and open lifelong learning system and developing a learning society (Li, 2014). OUC is designed to be open to all members of society in China, not only working adults but also school-aged students, the elderly, farmers, the unemployed, and other disadvantaged groups, and offers degree and nondegree education services to all members of society. It aims to promote equal access to education, sharing of quality education resources, and continuous improvement of the human resources quality.

OUC promotes lifelong learning for all. It has shaped a broad educational system made up of 1 headquarter, 45 provincial branches, 14 industrial and corporate colleges, and over 4,000 study centers, covering all urban and rural areas in China. Over the last 40 years, OUC has approximately 20.5 million enrollments and 15.12 million graduates, and it occupies 10% of the higher education enrollments and graduates in China (Jing, 2020). Of the 4.31 million active students of degree education, 70% are from grassroots communities and 55% are in branches located in the central and western regions of China (Ju, 2020).

The Overview of QA at OUC

In 2012, OUC upholds five core educational ideas, including Openness, Responsibility, Quality, Diversity, and Internationalization. It is committed to integrating quality into the university's teaching and learning, scientific research, and social services. Today OUC has established a specialized organization for QA, a QA framework and standards system, with a holistic view of QA system including internal and external systems. At the same time, OUC has also strengthened research on quality assurance. Using the *Open University* and *quality* as keywords, 2186 academic papers can be found in the China National Knowledge Infrastructure (CNKI) which is an important academic journals database in China. The number, distribution, and trends of the papers are shown in Fig. 3. These research papers provide strong support for QA understanding of ODL on the concepts, methods, practices, effects, and so on.

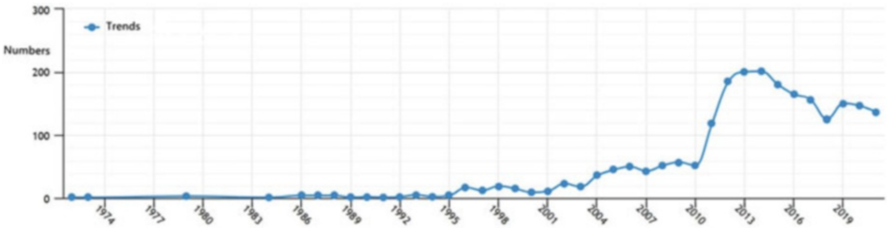


Fig. 3 The academic research trends on quality of Open University by CNKI. (Source: CNKI Database (2021))

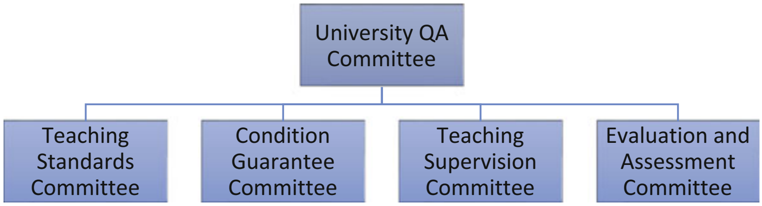


Fig. 4 Governance structure of quality assurance at OUC

OUC's QA Organizational Structure

In terms of QA governance, OUC established the University QA Committee in 2013. The Committee is the QA governance body and is a specialized organization that conducts research, planning, guidance, and supervision of university QA system. OUC President chairs this important committee which formulates the *Statutes of the Quality Assurance Committee of OUC*. The Committee has four subcommittees that are the Teaching Standards Committee, the Condition Guarantee Committee, the Teaching Supervision Committee, and the Evaluation and Assessment Committee (see Fig. 4).

In terms of QA management, OUC headquarters set up a specialized department called the Quality Monitoring and Evaluation Center responsible for evaluating, monitoring, and researching the quality ODL provision of each level of the university system and making suggestions for improvement. The Center currently has a full-time work team and it has set up three offices including a general office, a quality monitoring office, and a quality evaluation office (see Fig. 5). The Center is responsible for development and maintenance of the quality standards, implementation of dynamic quality monitoring, carrying out periodic evaluation of quality status, as well as doing quality research.

At each level of the university system including branches, colleges, and study centers, there are also QA departments and QA personnel. OUC carries out regular education and research training for all QA staff of the whole system.

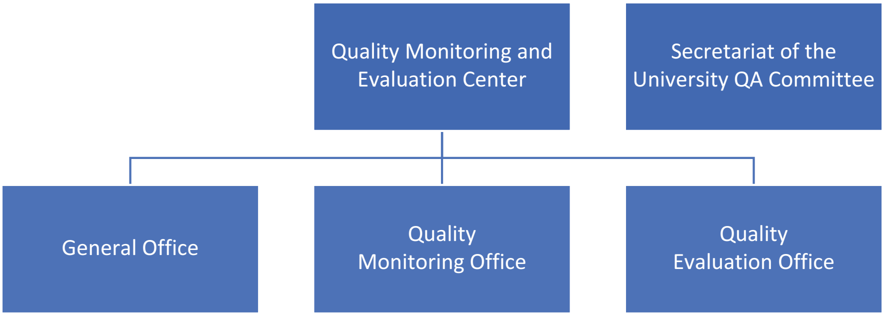


Fig. 5 Management structure of quality assurance at OUC headquarter

The Quality Standards

In 2016, OUC set up quality standards framework and indicators. The quality standards framework includes 12 indicators and 40 sub-indicators (Open University of China, 2016). The 12 indicators cover general rules, university conditions, professional courses and resources, enrollment management, teaching process implementation, practical teaching, educational administration management, student affairs management, teaching process monitoring, evaluation and feedback, scientific research, and social services. The 40 sub-indicators represent specific requirement of the 12 indicators. For example, the sub-indicators of “educational administration management” are “student status management” and “examination management.” The sub-indicators of “student affairs management” are “selection of the outstanding graduates” and “scholarship.” The sub-indicators of “the scientific research” are “scientific research system,” “scientific research process,” and “scientific research results.”

OUC quality standards focus on teaching and learning process. It standardizes the quality requirements of all links and aspects of the entire process of teaching and learning, in order to clarify the basic requirements for the university to implement lifelong learning for all. The indicators of the quality standards include not only the quality requirements for graduation but also the quality requirements for educational process including the policies, mechanisms, conditions, training process, etc.

The QA Procedure and Mechanism

OUC QA system can be divided into internal system and external system as shown in Fig. 6. The two systems have different focuses. The procedure and mechanisms are shown in the figure.

The Internal QA System

The focus of the internal QA system is on teaching and learning. It has adopted a variety of methods to pay attention to the organization, operation, maintenance,

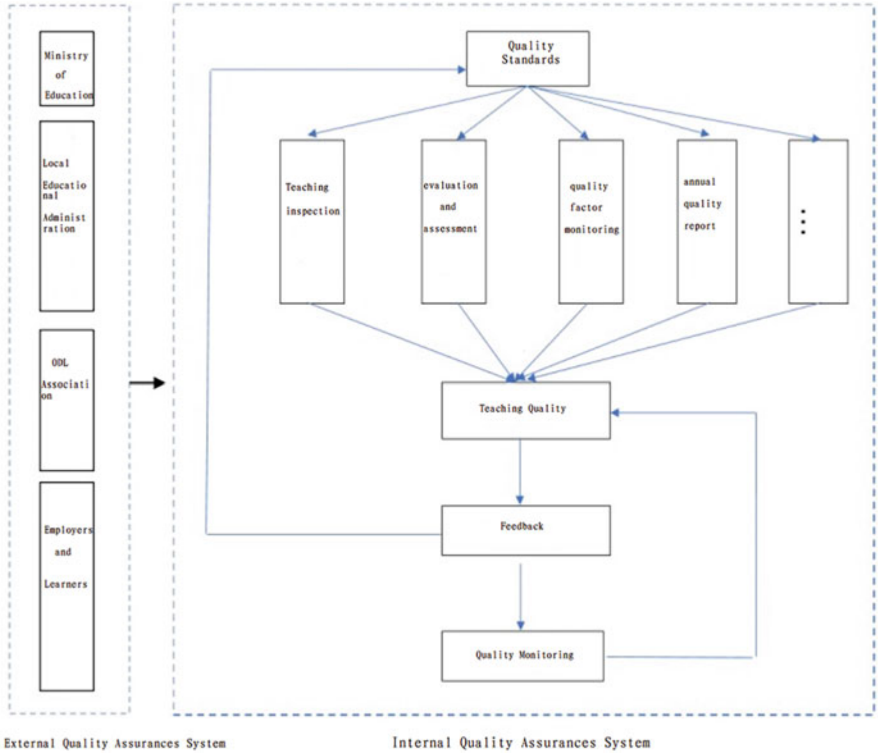


Fig. 6 Quality assurance system of OUC

monitoring, and management of the teaching process by various institutions in the university system. For example, in order to support student learning, OUC provides various multimedia materials, course syllabi, formative assessment brochures, exam instructions, and other learning resources based on a comprehensive consideration of student needs, especially different learning conditions in the economically developed and less developed areas, and offers quality printed, audio, and video materials and provides the online resources (Li, Yang, & Niu, 2013).

In order to carry out all-round quality assurance, OUC adopts varieties of the QA methods, including teaching inspection, evaluation and assessment, specialized supervision, quality factor monitoring and analysis, annual quality report, etc.

The External QA System

The external QA system of OUC includes evaluation and supervision from educational administration, various third-party agencies, employers, and learners.

Quality Monitoring from the Educational Administration

There are mainly three means of monitoring. The first is making policy requirements. The development of ODL in China is closely related to the government regulation (Gaba & Li, 2015). Since 2012, the Ministry of Education has successively issued several policies related to the quality development of open universities. For example, in 2016, the *Recommendations on Improvement of the Open University* demands that the Open University should adhere to the principle of quality first (Ministry of Education, 2016). In 2020, the *OUC Comprehensive Reform Plan* issued by the Ministry of Education emphasizes the need to improve quality assurance system (Ministry of Education, 2020a). The second means is related to quality review on degree-awarding programs. The Ministry of Education reviews the academic degree-awarding programs offered by OUC every year, and only those programs that passed the review can enroll students. This regulation requires OUC to consider its quality conditions for teaching and learning. The third is related to specialized evaluation and inspection. The Ministry of Education requires OUC to submit its annual development report. In addition, it often carries out special evaluations, such as special inspection of study centers and so on.

Quality Management from the ODL Association

There are not many third-party organizations related to ODL in China. The Ministry of Education has set up a National Collaboration Group for Modern Distance Education in Universities. The Group carried out many activities, for example, to select best practice of ODL in China. OUC maintains a good relationship with the organization.

Quality Evaluation from the Employers and Learners

Since 2018, OUC has carried out an annual survey on employer satisfaction and has invited a third-party education consulting company (Maxus) to jointly conduct the survey (Open University of China, 2020). According to the quality annual report released by OUC Quality Monitoring and Evaluation Center (2019), the satisfaction of employers is at generally good level, with a very satisfied ratio reaching 60%.

Achievements and Challenges

Achievements

Since 2012, with the implementation of a series of reform practices such as the implementation of the strategy of "creating quality and improving quality," the recognition of OUC has been greatly improved. It has been rewarded several important international awards including the ICDE Prize of Excellence (2017) and UNESCO King Hamad Bin Isa Al-Khalifa Prize (2020). These rewards generally admit OUC's continuous commitment to high-quality development in recent years.

Challenges

The first challenge is to cope with the digital transformation which has significance on OUC QA governance mechanisms and tools. In recent years, OUC has vigorously developed online education, especially during the COVID-19 epidemic period, and a large amount of teaching and learning data has been generated and restored online. This puts forward new need for the QA governance mechanisms and tools. At present, OUC has not yet been able to fully apply artificial intelligence and big data technology to optimize quality assurance governance effects.

The second challenge is to meet high-quality education development and its influence on the professional requirement of the teaching staff. Successful ODL depends largely on the quality of teaching staff (Li et al., 2013). Until the end of 2019, OUC has more than 60,000 academic teachers, 34,000 tutors, and 16,000 management staff (Ju, 2020). And many of them lack professional development opportunities (Zhang & Li, 2019). To achieve high-quality educational development, there is a huge need of upgrading teachers' professional abilities.

The third challenge is related to its social reputation and its challenge to building a quality culture for ODL providers. In China, the ODL providers and mega universities have a different quality reputation and social recognition from the on-campus education. The society must establish an appropriate quality culture and solve the problem of inconsistent understanding.

Conclusion

This chapter presents some important development of and new challenges to QA system of UT and OUC today. Along with the advancement and increased use of information technology, and the demand for high-quality education, the QA of UT and OUC are also facing new pressures and challenges. Despite the uniqueness of the system adopted, UT and OUC have demonstrated that as mega universities in Asia and the world, they could develop an effective, robust, and comprehensive internal QA system. Both UT and OUC's experiences show that assuring quality is not isolated nor simple programs. The QA system has to be developed systematically and embedded in the whole university's structure and management. In addition, the ultimate goal of such QA programs is not to have a robust system but to have a continuous improvement culture that is understood, believed, and internalized by all parties involved.

References

Belawati, T., & Bandalaria, M. (2019). Distance education in Asia: Indonesia and Philippines. In M. G. Moore & W. C. Diehl (Eds.), *Handbook of distance education* (pp. 557–573). New York, NY/London, England: Routledge.

Belawati, T. & Darojat, O. (2014). *Managing quality assurance in a mega university.* In Center for Learning Innovations & Costomized knowledge solutions (CLICKS). http://www.cli-cks.com/wp-content/uploads/2018/08/CLICKS_Insider_May.pdf. Accessed 21 Jan 2021

Belawati, T., & Zuhairi, A. (2007). The practice of a quality assurance system in open and distance learning: A case study at Universitas Terbuka Indonesia (The Indonesia Open University). *International Review of Research in Open and Distance Learning, 8*(1), 1–15.

Belawati, T., Zuhairi, A., & Wardani, I. G. A. K. (2012). Quality assurance in a mega-university: Universitas Terbuka. In I. Jung & C. Latchem (Eds.), *Quality assurance and accreditation in distance education and E-learning: Models, policies, and research*. New York, NY: Routledge.

Bogue, E. G. (1998). Quality assurance in higher education: The evolution of systems and design ideals. In G. H. Gaither (Ed.), *Quality assurance in higher education: An international perspective*. San Francisco, CA: Jossey-Bass.

Bradley, D. (2005). *Quality assurance and diversity.* In the INQAAHE biennial conference, Wellington, New Zealand. 29 March 2005. https://www.inqaahe.org/sites/default/files/pictures/Quality%20Assurance%20and%20Diversity_Denise_Bradley.pdf. Accessed 18 Jan 2021.

Chalmers, D., & Johnston, S. (2012). Quality assurance and accreditation in higher education. In I. Jung & C. Latchem (Eds.), *Quality assurance and accreditation in distance education and E-learning: Models, policies, and research*. New York, NY: Routledge.

Daniel, J. (1999). *Mega-universities and knowledge media: Technology strategies for higher education* (rev ed.). London, England: Kogan Page.

Darojat, O. (2013). *Quality assurance in distance teaching universities: A comparative study in Thailand, Malaysia, and Indonesia.* Dissertation. SimonFraser University. file:///C:/Users/UNIVER~1/AppData/Local/Temp/etd8024_ODarojat-1.pdf. Accessed 22 Jan 2021

Gaba, A., & Li, W. (2015). Growth and development of distance education in India and China: A study on policy perspectives. *Open Praxis, 7*(4), 311–323. https://doi.org/10.5944/openpraxis.7.4.248.

Hardini S.Y.P.K., Sunarsih, D., Meilani, A., & Belawati, T. (2012). Indonesia's Universitas Terbuka. In: I. Jung, T. M. Wong, T. Belawati (eds). Quality assurance in distance education and E-Learning: Challenges and solutions from Asia, 1 (pp. 155–168). New Delhi, India: Sage.

Jing, D. G. (2020). Open universities: Mission, development and challenges. *Open Education Research, 26*(4), 4–11.

Ju, C. J. (2020). *Education statistics yearbook of Open University of China*. Beijing, China: Open University of China Press.

Jung, I. and Latchem, C. (eds). (2012). Quality assurance and accreditation in distance education and e-learning: Models, policies and research. Higher Education*,* 64(5).

Li, W. (2014). A new engine for building a learning society: A case study of the Open University of China. *International Journal of Continuing Education and Lifelong Learning, 7*(1), 311–323.

Li, Y. W., Yang, T. T., & Niu, B. (2013). Open University of China. In I. Jung, T. M. Wong, & T. Belawati (Eds.), *Quality assurance in distance education and E-learning: Challenges and solutions from Asia* (1st ed., pp. 155–168). New Delhi, India: Sage.

Ministry of Education. (2016). *Recommendations on Improvement of the Open University (JZC Publication No. 2)*. Beijing, China: MOE Printing Office. Available via DIALOG. http://www.moe.gov.cn/srcsite/A07/zcs_cxsh/201602/t20160202_229322.html. Accessed 2 June 2021.

Ministry of Education. (2020a). *OUC comprehensive reform plan (JZC Publication No. 6)*. Beijing, China: MOE Printing Office. Available via DIALOG. http://www.moe.gov.cn/srcsite/A07/zcs_zhgg/202009/t20200907_486014.html. Accessed 2 June 2021.

Ministry of Education. (2020b). *Overview of educational achievements in China in 2019*. Beijing, China: MOE Printing Office. Available via DIALOG. http://en.moe.gov.cn/documents/reports/202102/t20210209_513095.html. Accessed 2 June 2021.

Open University of China. (2016). *Quality standards of the Open University of China*. Beijing, China: Open University of China Press.

Open University of China. (2020). *Satisfaction survey report on graduates and employers of Open University of China*. Beijing, China: Open University of China Press.

OUC Quality Monitoring and Evaluation Center. (2019). *Quality report of the Open University of China*. Beijing, China: Open University of China Press.

Sallis, E. (2002). *Total quality management in education*. London, England: Kogan Page.

Zhang, W. Y., & Li, W. (2019). Transformation from RTVUs to Open Universities in China Current State and Challenges. *International Review of Research in Open and Distributed Learning, 20*(4), 1–20. https://doi.org/10.19173/irrodl.v20i4.4076.

Quality Assurance Systems for Digital Higher Education in Europe

44

George Ubachs and Piet Henderikx

Contents

Abstract

Since the corona crisis, digital higher education practices permeate higher education in Europe. In degree education, various digital pedagogies are used in courses and programs, such as synchronous hybrid, blended, and online

G. Ubachs (✉) · P. Henderikx
EADTU, Maastricht, The Netherlands
e-mail: george.ubachs@eadtu.eu; piet.henderikx@eadtu.eu

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_41

education and distance learning. In addition to degree education, higher education institutions offer online continuing education and open education through MOOCs. Microcredentials are high on the agenda of the European Commission, national governments, and institutions.

The international dimension has also become important in all these areas. Universities organize joint curricula and virtual mobility schemes. This development has even been reinforced by the European Universities Initiatives of the European Commission (EUI), which already created 41 university alliances across Europe.

Digital education plays a vital role in creating a new pedagogical landscape shaping the Commission's Transformation of the European University 2030. This has implications for the internal and external quality assurance of education, which should lead to better quality and more robust maturity.

This chapter illustrates how quality assurance models and practices in Europe have evolved towards a multilevel and multi-stakeholder approach. It describes the development of quality assurance systems and guidelines for digital higher education in Europe in recent decades. In addition, it focuses on new quality assurance challenges to respond to the next stages of development in higher education, keeping pace with future innovations. Finally, it provides an overview of the current position of quality assurance with the most important conclusions.

Keywords

Quality digital higher education · Maturity in digital education · Multi-stakeholder and multilevel approach to quality · Quality microcredentials · Quality European University alliances · European Standards and Guidelines for Quality Assurance · E-xcellence

Introduction

Quality in Digital Higher Education

The European Network of Quality Assurance Agencies (ENQA) has taken the lead in developing the common Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG, 2015), adopted by the EHEA Ministerial Conference. These are applied by internal quality assurance bodies in the universities and by national external quality assurance agencies. In addition to quality assurance, most agencies also play a role in the accreditation of universities.

The ESG sees quality as "primarily a result of the interaction between teachers, students, and the institutional learning environment." Quality assurance ensures that "programme content, learning opportunities and facilities are fit for purpose" and focuses on "all activities within the continuous improvement cycle of higher education institutions" (ESG, p. 7).

Digital education does strengthen the interaction between teachers and students, learning processes, and the learning environment. This happens in the field of degree education, continuing education, and MOOCs but also in the field of international education and virtual mobility. This has consequences for quality assurance.

Quality Assurance: Multi-Stakeholder Perspectives

From the point of view of quality assurance and quality improvement, it is important to take into account the perspectives of the different stakeholders. Stakeholders include all internal actors within an institution such as institutional leaders, students, and staff, as well as external stakeholders such as enterprises, professional organizations, regions, and governments. Examples of such perspectives are as follows:

- The learner's perspective, related to dimensions such as the learner's readiness for online learning, the digital learning environment and learning resources, flexibility, and student support
- The perspective of the teaching staff and program board, related to organizational conditions for digital course and curriculum design, the suitability of the learning environment for various digital pedagogies, the availability of media and tools, frameworks for international course collaboration and virtual mobility, and tools for e-assessment
- The perspective of teaching and learning support services, related to digital course and curriculum design, team support, ICT support, and mobility support
- The leadership perspective, related to institutional strategies and frameworks for the digitization of education, international education and virtual mobility (e.g., in European Universities Initiatives alliances or EUIs), quality assurance frameworks, institutional budgeting, the continuous professional development of staff, and continuous institutional evaluation
- The external stakeholder perspective, related to the response to needs for flexible online education in enterprises, professions, and society, possibly the co-creation of content, flexible workplace learning, and the recognition of qualifications for digital learning
- The government perspective related to the legal framework for digital education, institutional funding, quality assurance and accreditation, the ICT infrastructure for universities, and international cooperation and mobility

Stakeholders' perspectives may differ in mainstream education, continuing education and professional development, and open education through MOOCs. It is therefore important to create specific internal quality frameworks and support services for these areas, although in practice they may interact with each other.

Multilevel Approach

At the same time, a multilevel approach is important because change processes affect stakeholders at their own level. To make change processes effective, these levels need to be in continuous dialog (Williams, Ubachs, & Bacsich, 2015):

- The microlevel constitutes the course and curriculum with students and academic staff as key players.
- The meso-level refers to the institutional organization, with institutional leaders, support staff, and representatives of external stakeholders as key actors.
- The macro-level includes national and regional decision-makers related to the organization of higher education, including national support services such as quality assurance agencies and ICT infrastructure providers, councils, and stakeholder groups.

Although processes at these levels are different, an integrated approach to quality and innovation must involve stakeholders at all levels with their own perspectives and responsibilities.

Learning Outcomes and Processes

Ultimately, external quality assurance agencies assess quality by measuring the learning outcomes achieved. Many ways of teaching and learning can lead to quality learning outcomes, which is recognized by the ESG.

The quality assessment of digital education is typically process-oriented, e.g., related to course and curriculum design, including learning materials and learning activities; facilities in the learning environment for developing and delivering digital education; the support of teaching and learning and ICT services to course and teams; and institutional strategies for digital education and innovation.

Quality Criteria and Benchmarking

Quality criteria are based on agreed principles or frames of reference for course and curriculum design, institutional drivers and enablers related to digital education, and national policies for digital education and innovation. These criteria are used for benchmarking, identifying internal improvement opportunities. Current practices in digital education can therefore be compared with “best in class” practices.

By benchmarking, universities learn from each other. For use in quality assurance assessment, benchmarking should be performed in a systematic manner to make strategic choices for improvement.

Quality and Maturity

The concept of maturity refers to the degree of deliberate and evidence-based decision-making on digital learning courses and programs, leading to the continuous optimization of the design, development, and implementation or specific institutional conditions and strategies concerning digital practices (Van Valkenburg, Dijkstra, & De Los Arcos, 2020).

Maturity is reached when the university (or a faculty) reaches the level of a "learning organization," which bases informed decisions on evidence. Leadership is shared, and all processes and workflows are integrated and continuously evaluated to better serve stakeholders. Technology is fully exploited to create better education.

The difference with quality is that maturity refers to a deliberate and sustained process of decision-making for the improvement of digital education. This includes the use of the results of quality assurance. Maturity can vary from initiated to piloted, deployed, institutionalized, and optimized steps in the implementation of digital education.

Quality Assurance Systems in Distance Teaching Universities in Europe

Quality assurance in online and distance learning is gaining interest as the growth of online and distance learning offerings fuels the need for appropriate quality assurance systems. Two major investigations have already taken place in the past decade: first, a publication by the International Council for Distance Education (ICDE) on quality models in online and open education around the world (Ossiannilsson, Williams, Camilleri, & Brown, 2015) and, second, a study by the Working Group on Quality Assurance and e-Learning of the European Network of Quality Assurance Agencies (ENQA) on quality assurance of e-learning provisions (Huertas et al., 2018).

The European Association of Distance Teaching Universities (EADTU) as a representative body for online, open, and flexible education in Europe has been active on this topic since 2005 by launching the E-xcellence manual and tool for quality assurance in online and blended education.

E-xcellence: Quality Benchmarking for Blended and Online Education

A Manual

The first of three editions of the E-xcellence manual on benchmarking quality assurance in online education was published in 2006. The later versions also contain blended models and emerging developments such as open education and MOOCs (Williams, Kear, & Rosewell, 2016).

The primary purpose of the manual is to provide a reference framework of benchmarks, quality criteria, and guidance notes against which e-learning programs and their support systems can be assessed. However, the manual has also proved useful for designing, developing, and implementing e-learning courses and programs.

Course developers and teachers see the manual as a useful development and/or improvement tool to integrate into institutional systems of quality assurance and enhancement. To date, more than 50 universities across Europe have used the E-xcellence tool to benchmark their e-learning performance with peer review. The instrument is available in open license and translated in several languages worldwide.

A Benchmarking Instrument

E-xcellence would initially become a tool to set standards across Europe for the delivery of quality online education. It would not only offer guidelines for universities but also prove the quality that leading universities in online education in Europe represent. However, already in the initiation phase, experts within E-xcellence from open universities, conventional universities, QA agencies, EUA, and UNESCO decided to work with benchmarks. This was necessary because the context of universities and digital learning practices across Europe differs too much to set standards. The system of benchmarking has several advantages:

- It respects the institution's own responsibility for QA and the level of ambition and pace of implementation and lays the foundation for an improvement roadmap.
- It includes self-assessment benchmarking as a basis for self-improvement, comparing university performance with best practices in e-learning in Europe.
- It uses peer reviewers as reference and input for improvement, installing collaborative processes of internal dialog.

In the many exercises with E-xcellence benchmarking at European universities, the most important feature mentioned is the guided discussion by using the tool. Not only does it ensure that all necessary aspects of delivering high-quality online education are covered, but it encourages university staff to reflect and discuss processes they take for granted or have not thought about before.

Addressing all aspects of delivering high-quality online education, the E-xcellence tool clearly represents a multilevel approach, targeting both staff and management levels under the manual's six chapters on strategic management, curriculum design, course design, course delivery, staff support, and student support.

- Strategic management: the institution should have defined policies and management processes that are used to establish strategic institutional objectives for the development of e-learning.
- Curriculum design: program boards should integrate knowledge and skills development and address challenges of active and personalized learning to meet different learning needs and aspirations.

- Course design: course teams should outline the relationship between learning objectives/outcomes, teaching and learning activities, and assessment methods elements (constructive alignment). A course can contain a mix of e-learning and face-to-face learning.
- Course delivery: includes the virtual learning environment, personal learning environments, and/or other channels, such as social media, through which students receive their course materials or communicate with fellow students and staff.
- Staff support: various staff support services enable all members of the academic, administrative, and technical staff to contribute fully to the development and service of digital learning, including specific professional development activities.
- Student support: student support services are an essential component of e-learning provision. Students' retention, success, and satisfaction are their main objectives. Institutions should develop policies and strategies for the design and provision of student support services.

Internal Quality Assurance Leading to the E-xcellence Associate in Quality Label

The E-xcellence instrument consists of three steps toward the E-xcellence label, which recognizes a continuous cycle of e-learning improvement by the university.

The assessment allows the university to determine the performance of its current digital programs and to identify the requirements for further improvement. After having first performed the quick-scan as a quick self-assessment, the university can opt for a more extensive review assessment by experts. This can be done through either an online or a full on-site assessment, with locally focused recommendations for improvement by the review team.

The reviewers of E-xcellence base their review on the complete reference material from the university and the evaluation of its self-assessment on 35 quick-scan benchmarks. Building on the self-assessment, the university will develop an adequate roadmap with further improvements to digital learning for the next 3 years. This roadmap is also assessed by the reviewers in consultation with university staff.

In order to guarantee a continuous cycle of self-evaluation of its e-learning performance as a university, the procedure includes the integration of the E-xcellence benchmarks into the internal quality assurance system. This is a requirement for obtaining the E-xcellence Associate in Quality Label from EADTU (Fig. 1).

The E-xcellence label was extended with the OpenupEd label as a response to the need for a quality label for MOOCs (Rosewell & Jansen, 2014).

The SEQUENT Handbook for Quality in E-Learning Procedures

Building on E-xcellence, EADTU, in collaboration with ENQA, has expanded its partnership with leading QA agencies, connecting universities and QA agencies on their shared challenge to address quality assurance issues in online education. QA

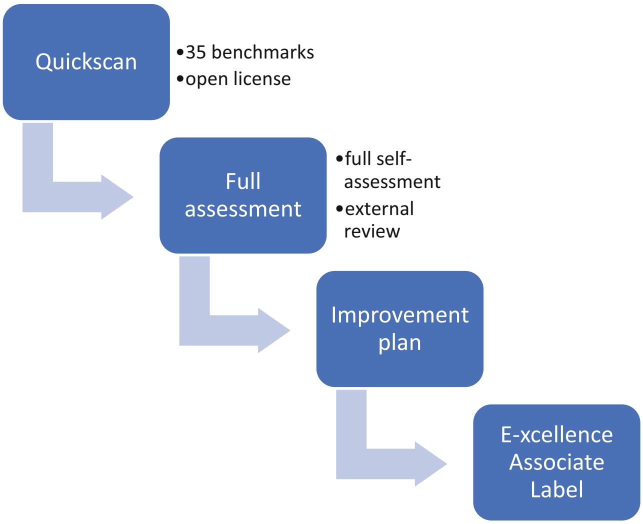


Fig. 1 E-xcellence, toward an E-xcellence associate label

agencies were aware of the need to anticipate developments in online learning and were willing to develop appropriate quality measures.

The SEQUENT project (2013–2015) funded by the European Commission aimed to promote excellence and innovation in higher education through the use of ICT and to prepare universities to take advantage of new teaching methods. In a concerted effort to convince governments, universities, and QA agencies of the need for a QA approach to online education, EADTU has joined forces with ENQA for introducing a variety of quality models.

The SEQUENT handbook was the main outcome of this project (Williams et al., 2015). The core of the handbook used the ENQA European Standards and Guidelines (ESG) for internal quality assurance, determining the broad context for institutional approaches to quality assurance for e-learning. The handbook was based on the project partners' experiences with the tools E-xcellence, UniQue, and ECB Check. It illustrates how quality assurance dimensions of online education can operationalize the ESG standards and how the quality of European higher education can be made more future-proof through the use of technology enhanced learning.

The handbook was further illustrated by numerous showcases of universities using QA in online education instruments of E-xcellence and UniQue (Bacsich, 2015). Interesting about these showcases was the integration of the QA tools into the QA systems. All cases explain, among other things:

- How they implemented the self-assessments as part of the QA in e-learning approach
- How their institution's QA system addressed blended or online distance learning

- What impact the QA system had for the use of e-learning and how it improved the overall educational offer of the institution

ENQA Considerations for QA of E-Learning Provision

Next to EADTU, ENQA has started early in addressing the challenges for universities when adopting new teaching methods. In October 2009, ENQA held a workshop on quality assurance in e-learning, which showed that the European Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG) – if correctly interpreted – can be used as a backbone for quality assurance processes, including those for e-learning (Grifoll et al., 2010). The ESG has since been revised (ESG, 2015), not specifically aimed at e-learning but certainly equally applicable to all forms of teaching and learning. However, the need for an appropriate interpretation for its use remained.

EUA's 2014 e-learning survey already indicated that 91% of 249 surveyed institutions have integrated e-learning into their education (Gaebel, Kupriyaova, Morais, & Colucci, 2014). Eighty-two percent reported to offer online learning courses. In contrast, much less attention has been paid to the quality assurance of such provisions. The authors suggested there was a clear shortcoming, citing the fact that only 23% of national QA agencies paid special attention to e- learning.

To further investigate whether QA agencies needed more support and expertise to keep up with new developments and innovations in education, ENQA launched the ENQA Working Group on Quality Assurance and E-learning in 2016. The main aim was to address the challenges associated with the alternative learning and teaching methods that ICT has created.

Recognizing that recommendations for quality assurance and e-learning had already been written, the Working Group decided to create a new focus, systematically examining both the applicability and relevance of the standards as defined in the ESG 2015 and using existing papers and publications. While each standard appeared to be fully applicable to e-learning, some seemed to require special guidelines on how to apply them. As a result of an intensive discussion process both in the Working Group and with relevant e-learning stakeholders in Europe, the Working Group came up with guidelines to use the ESG for e-learning offers, published in the "Considerations for Quality Assurance of E-learning Provisions" report (Huertas et al., 2018).

Peer Learning Activity on Quality Assurance in Online Education

EADTU further conducted a survey on quality assurance and accreditation of online education. The study compared national frameworks and regulations, institutional developments at universities, and current practices of external quality assurance for online and distance learning in 15 countries. The results of this research were presented in a collaborative peer learning activity between EADTU and ENQA with the aim of identifying the next steps in the development of a quality blended degree and online continuing education in a dialog with universities, governments, QA agencies, and students (Grifoll et al., 2010). This resulted in stakeholder-specific recommendations for QA agencies, national governments, the European Commission, and universities.

In summary, the recommendations proposed a dialog on innovation and quality assurance between higher education institutions, quality assurance agencies, and governments to support innovations in higher education and promote appropriate quality assurance policies:

- Institutions that develop and implement policies and strategies for digital education, taking into account an internal quality framework and a maturity model for blended and online degree, continuing, and open education.
- Quality assurance agencies that adapt and refine criteria/indicators and guidelines for digital modes of teaching and learning and share good practices of internal and external quality assurance.
- Governments developing drivers and reviewing regulatory frameworks for quality assurance and accreditation in higher education, encouraging and accelerating innovation. A vision of change must be expressed through national strategies.

This dialog should lead to concerted actions to support innovation in higher education and to apply appropriate quality assurance measures.

The European Maturity Model for Blended Education (EMBED)

Very closely linked to quality in open, distance, and digital education is the European Maturity Model for Blended Education or the EMBED approach (2017–2020) with the aim of empowering European higher education to achieve high-quality blended education programs and courses (Goeman & Dijkstra, 2019a).

The degree to which these decision-making processes are embedded in a course or program or in institutional conditions and strategies determines the maturity level of blended education. This allows teaching staff and course designers to continuously improve blended practices in an iterative manner. Maturity therefore does not equate to quality, but on the other hand it can contribute to quality improvement and a continuous delivery of quality.

The EMBED maturity dimensions are based on most recent literature research (Goeman, Poelmans, & Van Rompaey, 2018), on the evaluation of best blended course development practices and institutional strategies, and on a Delphi research on the results of these investigations (Goeman, Dijkstra, Poelmans, Vemuri, & Van Valkenburg, 2021). Criteria and instruments are developed to assess and map the degree of maturity of blended education for each of these maturity dimensions. For each dimension, a high, medium, or low maturity level can be represented in a spider diagram.

The EMBED model uses a multilevel and multi-stakeholder approach:

- At the course level, the maturity is assessed for course and curriculum design according to six dimensions: the selection and sequencing of learning activities,

the selection of blended learning tools, course flexibility, course interaction, the student learning experience, and study load and inclusiveness.
- At the program level, the maturity level is assessed according to six dimensions: program coherence, alignment and coherence of blended learning tools, program flexibility, the student learning experience, study load, and inclusiveness.
- At the institutional level, the maturity level is assessed according to eight dimensions: institutional strategy, institutional support, sharing and openness, institutional development, quality assurance, governance, finance, and facilities.
- At the policy level, recommendations are developed for policy makers.

For each dimension, guidelines are developed to optimize processes leading to systemic decision-making (Goeman & Dijkstra, 2019b).

ICDE Quality Models in Online and Open Education Around the Globe: State of the Art and Recommendations (2015)

Main player at the global level is the International Council for Distance Education (ICDE). In 2015, under coordination of EADTU, ICDE delivered a report on "Quality Models in Online and Open Education Around the Globe" (Ossiannilsson et al., 2015).

This report provides the first global overview of quality models in online and open education. It illustrates that quality in online learning is a complex matter and addresses new needs such as quality in MOOCs and Open Educational Resources. The diversity of instruments used globally at that time was developed independently.

The report delivers insight into the quality concept and the quality dimensions and describes a selected number of models in relation to certification, benchmarking, accreditation, and advisory frameworks. An important message from this global report is that while its findings on the one hand show there is no need for new quality schemes as such, it reveals a huge gap and need for knowledge sharing and capacity building and for coordination among stakeholders.

ICDE has given follow-up on this message by establishing QA focal points under the ICDE Quality Network. In November 2016, regional Focal Points on Quality were established by the ICDE Executive Board, in which EADTU represents Europe. The quality network gives advice and collects knowledge on the latest developments on quality related to open, flexible, and distance education within the institutions and regions (Mathes, 2018).

Challenges and Directions for the Future

The corona crisis seems to give rise to a new phase of developing a digital education. Universities are now consolidating digital pedagogies for mainstream degree education while rethinking and expanding continuing education and professional development and open education provisions.

These developments are substantially supported by the EU and national governments.

University-Level Developments

Post-corona Pedagogies in Degree Education

With the corona crisis, universities had to move quickly to digital education and completely reorganize their campus. Emergency decisions were taken at all levels. European Commission surveys of May 2020 found that 95.1% of universities organized online distance learning during the lockdown period and even 82.7% organized online examinations. All had to create massive institutional support for organizing digital education.

Three main approaches were observed and appear to be continuing (Pieters, Oudehand, & Sangra, 2021):

- Synchronous hybrid learning: based on course design that has in common that both on-site or "here" students and remote or "there" students are included simultaneously (synchronous hybrid learning (Raes et al., 2020a, b)
- Blended learning: based on a course design with a conscious combination of online and offline learning activities (Garrison & Kanuka, 2004; Garrison & Vaughan, 2013; Goeman et al., 2018; Laurillard, 2012, 2015)
- Online distance learning: based on a course design with a continuous physical separation between teacher and student, synchronous and asynchronous (Martin, Ting & Westin, 2019)

These emergency practices have led to a better understanding of digital education opportunities by university leaders, teaching staff, and learners. Higher education institutions in all countries are becoming aware that this unprecedented situation will lead to a paradigm shift in the coming years.

New paradigms will change teaching and learning processes and require continuous professional development of staff, team teaching, and educational and ICT support of staff. In all three approaches, specific benchmarks are to be developed, for example, related to course design, teacher and student interaction, the learning experience, and e-assessment (TESLA, 2019). Also, universities will be challenged by new educational technologies with applications of artificial intelligence.

This will need change management at all levels of an institution and at the governmental level.

Rethinking and Upscaling Continuing Education and Professional Development

Due to the needs in the economy and society, universities will rethink continuing education and professional development (CEPD) offerings and develop appropriate organizational models for this area. The permanent interaction with economy and society adds a dimension to the design, delivery, and organization of CEPD (the quadruple helix).

To make CEPD scalable, accessible, and inclusive, universities have to use the full potential of digital education. To adapt offerings to the needs of learners, shorter types of programs and qualifications will be developed such as microcredentials and microdegrees. Extension schools or similar structures will coordinate and support the CEPD activities of an institution and function as an educational interface with public and private enterprises.

However, at most European universities, continuing education and professional development is still in an exploratory phase. Institutional developments are not yet adapted to the scale of the needs in the labor market and in society.

Quality benchmarks of digital continuing education are related to dimensions such as the level of flexibility for adult learners, the integration of academic and professional competency development, the learning experience of mature learners in a professional context, and the design of courses in co-creation with enterprises and sectors.

MOOCs and MOOC-Based Microcredentials

Since 2013, MOOC platforms have been offering massive open online courses in collaboration with universities. Recently, MOOC platforms and universities have started developing MOOC pathways for CEPD, consisting of a coherent set of MOOCs. These pathways are often developed in co-creation with sectors and companies.

To valorize these trajectories, the European MOOC Consortium, consisting of main European platforms (Futurelearn, FUN MOOC, EduOpen, Miriadax, iMooX, EduOpen), has developed the Common Microcredential Framework (CMF) (EMC, 2018), which rewards MOOC trajectories with a microcredential qualification after assessment. The microcredential awarded by CMF is an academic qualification with a professional orientation. Microcredentials possibly can be stacked into a broader certified program or academic degree (bachelor, master).

To better serve the labor market, MOOC platforms have established partnerships with professional organizations and companies in both the private and public sectors, for example, in food, IT, teacher education, healthcare, and the environment.

Herewith, MOOC platforms increasingly function as an interface between universities and labor market organizations (Henderikx, Ubachs, Ferguson, Hodges, & Antonaci, 2020; Habib & Sanzgiri, 2020). Collaborations have different organizational forms: specific business spaces, corporate platforms where universities show courses for the labor market, and white label platforms for sectors and public or private enterprises. They work together to investigate needs, organize workplace learning, or even co-create content. In other cases, university courses are endorsed by industry or professional partners who have previously assessed and recognized the course for professional development or professional accreditation.

Internal quality assurance by institutions looks into the educational design of the MOOCs and MOOC pathways, the qualifications awarded, the interaction with enterprises and sectors for combining an academic and professional orientation, and the stackability of courses.

Policy Developments

The European Commission and national governments develop actions to support the development of digital higher education in a lifelong learning perspective.

The Digital Education Action Plan (DEAP)

Already in 2018, the revised European Commission's Digital Education Action Plan (2021–2027) (European Commission, 2018b) sets out measures for high-quality and inclusive digital education and training in Europe at all levels. Digital technology should "facilitate the provision of flexible, accessible learning opportunities, including for adult learners and professionals, helping them to re-skill, upskill, or change careers," which can be supported "through microcredentials which capture the learning outcomes of short-term learning."

The European Education Area

In 2020, the Commission launched its communication "Towards the European Education Area by 2025" (European Commission, 2020a), in which the development of a European approach to microcredentials in higher education is a key priority. It announced a proposal to the Ministers of Education Recommendation by 2021 and a plan at having all the necessary steps in place by 2025 for the wider use, portability, and recognition of microcredentials. With these steps, the European Commission frames national microcredential offers to make them comparable and responding to the same standards.

To prepare this, the European Commission established the "Microcredentials in Higher Education Consultation Group" (European Commission, 2021). This defined a microcredential as "a proof of the learning outcomes that a learner has acquired following a short learning experience." They are "underpinned by quality assurance following agreed standards." In terms of volume for a microcredential, the group left flexibility for innovation and experimentation: from one ECTS to less than a full degree (European Commission, 2020b).

Almost simultaneously, a European project with national ministries of education and European networks launched a complementary definition of microcredentials (Cirlan & Loukkola, 2020): "a microcredential is a certified short learning experience designed to provide the learner with specific knowledge/skills/competences that respond to societal, personal, cultural, or employability needs. Microcredentials are subjected to a quality assurance assessment in line with the ESG."

In order to develop a microcredential policy, higher education institutions will work as central actors among external stakeholders to realize the "knowledge square": education, research, innovation, and service to society. This is a new concept for higher education institutions, and quality assurance guidelines should take into account new organizational models and types of course design for CEPD, involving external stakeholders at all levels.

The European Universities Initiatives (EUIs)

Since 2021, 279 universities have been involved in 41 European Universities Initiatives or EUIs (European Commission, 2018a). The European Commission considers these alliances as a priority and a spearhead for innovation to be supported by digital education. They organize an integrated European campus, e.g., through joint courses and programs and embedded mobility for students and staff. In line with the delivery mode of programs, mobility can be physical, virtual, or blended (Henderikx & Ubachs, 2019). The target is 50% short-term or long-term mobility, depending on the curriculum goals and personal preferences of the students.

The corona crisis was an emergency test for the alliances for organizing this as planned. Digital teaching and learning methods enabled them to realize the goals they are committed to. To this end, they brought together the best expertise in the field of digital education at their partner institutions. Now, they see the need for changing emergency approaches in sustainable pedagogies for international education.

This is an important challenge for quality assurance. To some extent, the alliances can fall back on the already existing European approach to quality assurance of joint programs (EQAR, 2015). However, EUIs have a broader mission as their activities span multiple campuses and therefore many national quality assurance bodies would need to be addressed. The ongoing EUniQ project focuses on the special features of multicampus quality assurance and expanded missions of the new alliances, “allowing to replace multiple national QA procedures that are not appropriate to assess the quality of these European alliances” (EUniQ, 2021).

Conclusions

More Complexity in Digital Higher Education

After the corona crisis, digital higher education practices are growing in quantity and permeating mainstream degree education. They have also become more complex as various pedagogies are used in courses and programs, such as synchronous hybrid, blended, and online education and distance learning.

Universities also organize a broader range of education. In addition to degree education, they offer online programs for continuing education, microcredential courses, and open education through MOOCs, all based on their mission.

The international dimension has also become important in all these areas. Universities organize joint curricula and mobility schemes. This development has even been bolstered by the European Commission’s European Universities Initiatives (EUIs), creating alliances across Europe.

Digital education plays an essential role in creating a new pedagogical landscape.

Quality Assurance in Digital Education

The quality assessment of digital education is typically process-oriented, e.g., related to course and curriculum design, including digital resources; interactive facilities in the learning environment for developing and delivering digital education; the support of course teams by teaching and learning and ICT services; and wider institutional strategies for digital education and innovation. At the macro-level, governments are pushing digitalization to succeed in the Commission's Transformation Agenda of the European University for 2030.

Universities and quality assurance agencies are aware that quality assurance should take into account the perspectives of the various internal and external stakeholders at different levels in the university ecosystem. Change processes affect stakeholders at micro-, meso-, and macro-levels who all need to engage in dialog with each other.

Quality Instruments

Quality criteria for digital higher education are based on agreed principles or frames of reference. These criteria are used for benchmarking, identifying internal improvement opportunities. The widely used E-xcellence instrument refers to benchmarks related to curriculum and course design, course delivery, student support, staff support, and strategic management for digital education. The E-xcellence label recognizes a continuous cycle of e-learning improvement by the university.

For internal and external quality assurance, it is estimated that the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG, 2015) apply to digital education as it is to traditional forms of education. However, when applying the ESG guidelines, specific extensions have been developed for digital education.

Recently, a maturity model has been developed to assess institutional decision-making about digital education at all levels, based on dimensions in the most recent research (van Valkenburg et al., 2020 ipv EMBED).

A global report on quality assurance in digital higher education shows that there is no need for new quality schemes as such but that there was a huge gap and need for global knowledge sharing, capacity building, and coordination.

Challenges

Specific challenges for the future relate to the areas of degree, continuing education, and professional development (CEPD) and international education and virtual mobility.

Degree Education

After of the corona crisis, universities are now consolidating digital pedagogies for on campus degree education, in particular synchronous hybrid, blended, and online distance education. While upscaling these approaches, specific benchmarks are to be developed. Also, universities will be challenged by new educational technologies with applications of artificial intelligence.

Continuing Education

Due to the needs in the economy and society, universities will rethink CEPD offerings and develop appropriate organizational models for this area. The European Commission is promoting microcredentials for continuing education. Governments and universities have already started with this new development. The permanent interaction with economy and society adds a dimension to the design, delivery, and organization of CEPD.

Quality benchmarks in this area are related to dimensions such as the level of flexibility for adult learners, the integration of academic and professional competency development, the design of courses in interaction with enterprises and sectors, the recognition of qualifications for microcredentials, and the stackability of courses.

Collaborations and Mobility that Transcend the Individual University

International collaboration and digital mobility within EUI alliances are an important issue for quality assurance. EUIs span multiple campuses, and therefore many national quality assurance bodies would need to be addressed. Ways forward have to be developed for multicampus quality assurance and expanded missions of the new alliances, replacing multiple national quality assurance procedures that are not appropriate to assess the quality of these European alliances.

National Governments and Universities: Bottom-Up and Top-Down Processes

The European policy agenda is shared by national governments through the Council of Ministers, where bottom-up and top-down processes meet. In the coming years, these will include the full range of quality assurance issues such as the digitization of higher education practices in university alliances, microcredentials, joint programs, and various forms of virtual mobility. National governments and institutions are already anticipating these developments. It will impact on internal and external quality assurance processes (Raes, 2020a, Raes 2020b, Detienne, Windey, & Depaepe, 2020)

References

Bacsich, P. (2015). University "showcases" for "quality in e-learning" procedures. *SEQUENT Deliverables*. Retrieved from http://www.sequent-network.eu/images/Guidelines/Sequent_Showcases.pdf

Castro, M. D. B., & Tumibay, G. M. (2019). A literature review: Efficacy of online learning courses for higher education institution using meta-analysis. *Education and Information Technologies, 26*, 1367–1385. https://doi.org/10.1007/s10639-019-10027-z.

Cirland, E., & Loukkola, T. (2020). *Microcredentials linked to the Bologna key commitments, EUA*. Retrieved from https://eua.eu/resources/publications/940:microcredentials-linked-to-the-bologna-key-commitments.html

EQAR. (2015). *European approach for quality assurance of joint programmes*. Retrieved from https://www.eqar.eu/kb/joint-programmes

ESG. (2015). *Standards and guidelines for quality assurance in the European higher education area.* Retrieved from https://www.enqa.eu/wp-content/uploads/2015/11/ESG_2015.pdf

EUniQ, (2021). *Developing a European approach for comprehensive quality assurance of (European) university networks*. Retrieved from https://www.nvao.net/nl/euniq

European Commission. (2018a). *European Universities Initiative*. Retrieved from https://ec.europa.eu/education/education-in-the-eu/european-education-area/european-universities-initiative_en

European Commission. (2018b). *Digital education action plan*. Retrieved from https://ec.europa.eu/education/education-in-the-eu/digital-education-action-plan_en

European Commission. (2020a). European Education Area. https://ec.europa.eu/education/sites/default/files/document-library-docs/eea-swd-212-final_en.pdf

European Commission. (2020b). *A European approach to micro-credentials. Final report.* https://doi.org/10.2766/50302

European Commission, DG EAC. (2021). A *European approach to microcredentials. Output of the microcredentials higher education consultation group. Final report*. Retrieved from EU publications: https://op.europa.eu/en/publication-detail/-/publication/7a939850-6c18-11eb-aeb5-01aa75ed71a1

European MOOC Consortium (EMC). (2018). *The common microcredential framework*. Retrieved from: https://emc.eadtu.eu/cmf-awarded-programmes

Gaebel, M., Kupriyaova, V., Morais, R., & Colucci, E. (2014). *E-Learning in European higher education institutions: Results of a mapping survey conducted in October-December 2013.* European University Association. Retrieved from https://eua.eu/resources/publications/368:e-learning-in-european-higher-education-institutions.html

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *Internet and Higher Education, 7*(2), 95–105.

Garrison, D. R., & Vaughan, N. D. (2013). Institutional change and leadership associated with blended learning innovation: Two case studies. *The Internet and Higher Education, 18*, 24–28.

Goeman, K., Dijkstra, W., Poelmans, S., Vemuri, P., & Van Valkenburg, W. (2021). Development of a maturity model for blended education: A Delphi study. *International Journal on E-Learning, 20(*3), 229–258. Waynesville, NCUSA: Association for the Advancement of Computing in Education (AACE). Retrieved August 9, 2021 from https://www.learntechlib.org/primary/p/217682/

Goeman, K, & Dijkstra, W. P. (2019a). *European maturity model for blended education. 20*. Retrieved from https://embed.eadtu.eu/download2433

Goeman, K, & Dijkstra, W. P. (2019b). *European maturity model for blended education. Implementation guidelines*. Retrieved from https://embed.eadtu.eu/download/2517/EMBED%20implementation%20guidelines.pdf?inline=1

Goeman, K., Poelmans, S., & Van Rompaey, V. (2018). *Research report on state of the art in blended learning and innovation. European maturity model for blended education*. Retrieved from https://embed.eadtu.eu/results

Grifoll, J., Huertas, E., Prades, A., Rodríguez, S., Rubin, Y., Mulder, F., Ossiannilsson, E., Soinila, M., & Stalter, M. (2010). *Quality assurance of e-learning. ENQA: Workshop report 14*. Retrieved from http://www.enqa.eu/files/ENQA_wr_14.pdf

Habib, M., & Sanzgiri, J. (2020). *Compendium on good practices in assessment and recognition of MOOCs for the EU labour market*. European MOOC Consortium – MOOCs for the labour market project. Retrieved from https://emc.eadtu.eu/images/publications_and_outputs/EMC-LM_Compendium_on_good_practices_final.pdf

Henderikx, P. & Ubachs, G., (2019.), *Innovative models for collaboration and student mobility.* Retrieved from https://eadtu.eu/documents/Innovative_Models_for_Collaboration_and_Student_Mobility_in_Europe.pdf

Henderikx, P., Ubachs, P., Ferguson, R., Hodges, M., Antonaci, A., Report of the peer learning activity: MOOCs and online learning opportunities for the labour market, https://emc.eadtu.eu/images/publications_and_outputs/EMC-LM_PLA__report_final.pdf

Huertas, E., Biscan, I., Ejsing, C., Kerber, L., Kozlowska, L., Marcos Ortega, S., Lauri, L., Risse, M., Schörg, K., Seppmann, G., Report from the ENQA Working Group on Quality Assurance and E-learning, Occasional Papers 26, ENQA, 2018 https://www.enqa.eu/publications/considerations-for-qa-of-e-learningprovision/

Laurillard, D. (2012). *Teaching as a design science. Building pedagogical patterns for learning and technology*. New York, NY: Routledge, Taylor and Francis Group.

Laurillard, D. (2015). *Higher Education and the digital era. A thinking exercise. Flanders KVAB thinkers in residence program 2015.* The Royal Flemish Academy of Belgium for Sciences and Arts. Retrieved from: Home|Koninklijke Vlaamse Academie van België voor Wetenschappen en Kunsten (kvab.be); 33 stpt Higher education Laurillart-Dillenbourg-HR (kvab.be)

Martin, F., Ting, S., & Westine, C.D. (2019). A systematic review of research on online teaching and learning from 2009 to 2018. *Computers & Education*, December 2020. https://doi.org/10.1016/j.compedu.2020.104009.

Mathes, J. (2018). *Global quality and online open flexible and technology enhanced education. An analysis of strengths, weaknesses, opportunities and threats*, *ICDE*. Retrieved from https://static1.squarespace.com/static/5b99664675f9eea7a3ecee82/t/5d2476fbe6f76d00010499a3/1562670846037/ICDE+Global+Quality+in+Online+Open+Flexible+and+Technology+Enhanced+Final+REPORT+2018-min.pdf

Ossiannilsson, E., Williams, K., Camilleri, A. F., & Brown, M. (2015). *ICDE Quality models in online and open education around the globe: State of the art and recommendations*. Retrieved from https://files.eric.ed.gov/fulltext/ED557055.pdf

Pieters, M., Oudehand, M., & Sangra, A. (2021). Professional development in digital teaching and learning. Digitel Pro. EADTU-EU Summit 2021. Retrieved from: Ubachs, Pieters, Ouwehand, Dijkstra & Sangrà – Digitel Pro (slideshare.net).

Raes, A., Vanneste, P., Pieters, M., Windey, I., Van Den Noortgate, W., Depaepe, F. (2020a), Learning and instruction in the hybrid virtual classroom: An investigation of students' engagement and the effect of quizzes. Computers & Education, volume 143, January 2020 Retrieved from: https://www.sciencedirect.com/science/article/abs/pii/S0360131519302350

Raes, A., Detienne, L., Windey, I., & Depaepe, F. (2020b). A systematic literature review on synchronous hybrid learning: Gaps identified. *Learnning Environments Research, 23*, 269–290. https://doi.org/10.1007/s10984-019-.

Rosewell, J. & Jansen, D, (2014). The OpenupEd quality label: benchmarks for MOOCs. The instrenational Journal for Innovation and Quality in Learning (INNOQUAL), 2(3)………… https://www.researchgate.net/publication/286925442_The_OpenupEd_quality_label_Benchmarks_for_MOOCs

TESLA project. (2019). Retrieved from: http://tesla-project-eu.azurewebsites.net/papers/

Ubachs, G., Williams, K., Kear, K., & Rosewell, J. (2015). *Quality assessment for e-learning. A benchmarking approach*. Retrieved from https://e-xcellencelabel.eadtu.eu/about

Van Valkenburg, W. F., Dijkstra, W. P., & De Los Arcos, B. (2020). *European maturity model for blended education. 20.* Retrieved from https://embed.eadtu.eu/download2433

Williams, K, Kear, K., & Rosewell, J. (2016). *Quality assessment for E-learning: A benchmarking approach.* Retrieved from http://oro.open.ac.uk/id/eprint/34632%0Ahttps://e-xcellencelabel.eadtu.eu/tools/manual

Williams, K., Ubachs, G., & Bacsich, P. (2015). *Handbook for quality in e-learning procedures.* Retrieved from https://sequent.eadtu.eu/images/Guidelines/Sequent_Handbook_for_Quality_in_e-learning_procedures.pdf. Retrieved from Guidelines for online education & showcases – SEQUENT (eadtu.eu).

Program and Course Evaluation in Open, Distance, and Digital Education 45

Melinda dela Peña Bandalaria

Contents

Abstract

Open, Distance, and Digital Education (ODDE) has potential to help educational institutions address the various challenges which usually result in the disruptions of the learning process. This system of education is flexible, agile, and resilient enough to adjust to the different contexts and also enables the academic institution to respond to some expectations like making available lifelong learning opportunities to all types of learners. There is, however, a lingering perception that ODDE is of lower quality compared to the conventional mode of education despite results of research showing otherwise which can prevent the realization of the full potential of this system of instruction.

Through an intensive review of literature, this chapter looked at how quality in ODDE was and is being articulated with respect to curricular programs and

M. dela Peña Bandalaria (✉)
University of the Philippines Open University, Los Baños, Philippines
e-mail: mdbandalaria@up.edu.ph; mbandalaria@upou.edu.ph

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_42

courses and how they are evaluated for quality with the goal of determining if there are gaps which need to be addressed to help dispel that perception of lower quality. Eleven Quality Assurance (QA) Frameworks developed by various organizations from different parts of the world during the last 20 years (2000–2019) were evaluated for a more focused review process. Results showed that there is a general agreement as to what constitutes quality in this system of education. For the methodologies for program and course evaluation, some improvements and innovations can be done as informed by the QA Frameworks and tapping on what information can the technology provide as in the case of learning analytics which served as basis for the recommendations made.

Keywords

Program evaluation · Course evaluation · QA Frameworks · Open, Distance, and Digital Education · Quality education · Sustainable education

Introduction

Open, Distance, and Digital Education (ODDE) is a mechanism to address the various challenges being faced by the education sector. The need for a flexible, agile, and resilient education system became more evident when the COVID-19 pandemic affected the whole world and forced all educational institutions to immediately shift to remote instruction just to ensure that learning would continue for their students.

The disruptions in education, however, are not a new challenge for the education sector. Discontinuance of learning also happens when students and teachers are prevented from going to school because of natural calamities like typhoons and floods, disasters like earthquake and volcanic eruptions, and even man-caused circumstances like the disruption in the peace and order situation in the area.

ODDE is also a viable strategy which can position higher education institutions to respond effectively to the projected demand for higher education estimated to reach over 414 million in 2030 (ICDE, 2015) as well as contribute to the goal of making available inclusive lifelong learning opportunities as demanded by the fast-changing world of work. The full adoption of ODDE as a system or a component of the system of learning, however, can be hindered by the still lingering perception that this form of education is of lower quality compared with the residential or conventional education despite research results showing otherwise. Asare (2014), for instance, argued that the focus should not be the mode of delivery but rather how learners are equipped with relevant knowledge and skills to become functional citizens which can be achieved even in the distance mode of education. Also, a publication released by the US Department of Education (2010) presenting the results of a systematic review of literature from 1996–2008 showed that "*students who took all or part of their course online performed better, on average, than those taking the same course through traditional face-to-face instruction*" (p. x1v). Shachar and Neumann (2010) also validated this finding in their research which also showed that "*that DL* [distance learning] *students outperformed their traditional counterparts*" (p. 322).

This perception of lower quality can be traced to as far back as the pioneering days of distance education or the correspondence system of learning which can be due to the lack of social education usually associated with what students can get when studying on campus (Tait, 2008). Citing de Salvo (2002), Tait (2008) further explained that a student's university career is "more than the acquisition of knowledge" (p. 86) but being a "man among men" (p. 86) which can result from joining university extracurricular activities like debating society, football, and the likes.

Over the years, the implementation of distance education has evolved as influenced by the rapid advancement in the information and communications technologies (ICT). Most universities engaged in this mode of delivering instruction resorting to online learning or technology-enabled teaching and learning which was also seen to address the concern about the social education of the learners. The potential of ODDE was also implied by the Council on Higher Education (CHE), Pretoria (2014), that "there seems to be a widespread assumption that education mediated by means of ICT-supported methods can improve the quality of educational provision in developing countries, not least in institutions of higher learning" (p. 1).

The stigma of being of lower quality attached to online learning (Hodges, Moore, Lockee, Trust, & Bond, 2020) could be attributed to that observation that "students in online environments tend to feel more confused, isolated, and frustrated, and as a result their learning effectiveness and satisfaction can be reduced" (Markova, Glazkova, & Zaborova, 2017). Despite many research that aimed to address this issue of quality in ODDE and while results of these studies showed that the physical separation between the teacher and the students is not a major factor that determines quality education, the perception remains.

Two questions are forthcoming: Where are the possible gaps? And what are they?

Sloan Consortium (2002) observed that "despite research from respectable educators that points toward the positive effects of online learning, many still say that more sound studies still need to be conducted to measure and document the most effective kinds of online teaching" (p. 4) which points to the type of research that were conducted to address the concern. Markova et al. (2017), on the other hand, pushed for certain quality indicators to "be established to ensure high quality standards in distance tertiary education" (p. 686). Chao, Saj, and Tessier (2006) pointed to the methodology being used and forwarded the following observation:

> *Despite efforts in defining and examining quality issues concerning online courses, a systematic, formative methodology to measure and ensure quality is lacking. The most common tools for gauging quality are surveys and course evaluations in which instructors, learners, or sometimes administrators provide their perceptions, opinions, or experiences. Data collected from surveys or course evaluations only touch on some aspects of a course's quality—mostly issues related to teaching and learning, such as how an instructor performs in class or how the learning experience affected learners. Often, aspects not obvious to faculty or learners are ignored...* (p. 33)

The need to reframe how the quality of open distance and digital education is evaluated was also implied by Chao et al. (2006, p. 33) in terms of requiring “a comprehensive framework and appropriate guidelines as well as devise an instrument and method for measuring the hidden aspects of quality.” Council on Higher Education (CHE) (2014) is also of the perspective that “the question of the quality of educational delivery and support using ICTs requires much deeper analysis” (p. 2).

This chapter aims to address these implied quality determination and evaluation gaps in ODDE with the hope of contributing toward strengthening its position as the foundation of a resilient and sustainable education system.

The QA Frameworks for ODDE: The Domains That Matter

Just like in the conventional mode of instruction, there are already many frameworks for QA in ODDE. Many of these QA Frameworks were developed by different organizations during the last 20 years which can be attributed to the rise of open and digital education as a result of continuous and increasing level of integration of modern ICTs, specifically the Internet, into the teaching and learning process during this time span. An evaluation of ten QA Frameworks developed by various organizations from different parts of the world from 2000 to 2019 shows the different domains or benchmarks of quality for ODDE (Table 1). Information presented in Table 1 is from multiple sources. The selection of the QA Frameworks evaluated in this chapter was based on the following criteria: (1) It was developed by an organization/agency involved with ODDE and is not a result of a study by a researcher or developed by a specific university for its use (adopted from Pedro & Kumar, 2020); (2) it was developed during the last 20 years to determine the trend; and (3) it can represent areas/geographical locations from different parts of the world.

In general, there are some agreements as to what constitutes quality in ODDE as evidenced by the similarity of the domains identified across the frameworks. Most of the frameworks studied were supposed to guide the development of ODDE programs and courses as well as the evaluation for quality which could be the reason why the domains identified were more of the inputs by the academic institutions offering ODDE which include among others institutional mission, vision, policies, planning, infrastructure, the faculty and staff credentials and continuous development, and the learner support system. Further, the QA Frameworks for ODDE during the last 20 years showed consistency in the inclusion of domains pertaining to programs and courses as these represent the products and services offered by ODDE institutions, as appropriately described by the Canadian Association for Community Education (CACE, 2002) in the way they framed their QA Framework. Some QA Frameworks are specific in identifying programs (or academic programs, for that matter), and the specific aspect that is being looked into in the framework like program design (CHE, 2014), curriculum design (Asia-Pacific Economic Cooperation (APEC), 2019; EADTU, 2016), program design and curriculum development

Table 1 Different QA frameworks in ODDE (2000–2019)

Year	The QA Framework	Organization who developed	Country/ region	Domains/benchmarks of quality
2000	Quality on the Line	Institution for Higher Education Policy (IHEP)	USA	7 quality benchmarks: Institutional support Course development Teaching and learning Course structure Student support Faculty support Evaluation and assessment
Barker, 2002	Canadian Recommended E-learning Guidelines	FuturEd and Canadian Association for Community Education (CACE)	Canada	3 major e-learning quality guidelines: Quality outcomes from e-Learning products and services Quality processes and practices and practices in e-Learning products and services Quality inputs and resources for e-Learning products and services
Inside Higher Education, 2005	Sloan Consortium Quality Framework	Sloan Consortium (which was renamed into Online Learning Consortium)	USA	5 quality principles: Learning effectiveness Cost effectiveness and institutional commitment Access Faculty (employee) satisfaction Student (customer satisfaction)
ACODE, 2014	Distance Higher Education Programs in a Digital Era: Good Practice Guide	Council on Higher Education (CHE) by South African Institute for Distance Education (SAIDE)	South Africa	19 criteria for evaluation for accreditation: Program design Student recruitment, admission, and selection Staffing Teaching and learning strategy Student assessment Library services Program administrative services Postgraduate policies, procedures, and regulations Program coordination Academic development Teaching and learning interactions Student assessment practices Assessment system Coordination of work-based learning (where applicable) Delivery of postgraduate programs Student retention and throughput Employability and recognitionprogram evaluation

(continued)

Table 1 (continued)

Year	The QA Framework	Organization who developed	Country/region	Domains/benchmarks of quality
	ACODE Benchmarks for Technology Enhanced Learning (TEL)	ACODE (Australian Council on Open, Distance and e-learning)	Australia	8 benchmarks: Institution-wide policy and governance for technology-enhanced learning Planning for institution-wide quality improvement of technology-enhanced learning Information technology systems, services, and support for technology-enhanced learning. The application of technology-enhanced learning services Staff professional development for the effective use of technology-enhanced learning Staff support for the use of technology-enhanced learning Student training for the effective use of technology-enhanced learning Student support for the use of technology-enhanced learning
2016	Quality Assessment for E-learning; a Benchmarking Approach (E-xcellence) Manual (3rd Edition)	European Association of Distance Teaching Universities (EADTU)	EU	6 benchmarks: Strategic management Curriculum design Course design Course delivery Staff support Student support
2017	A Benchmarking Approach – Excellence (3rd Ed.)	Online Learning Consortium (OLC) (formerly Sloan Consortium)	US	9 key areas for the quality scorecard Institutional support Technology support Course Development/instructional design Course structure Teaching and learning Social and student engagement Faculty support Student support Evaluation and assessment
2019	Quality Assurance of Online Learning Toolkit	Asia-Pacific Economic Cooperation (APEC)	Asia Pacific	9 domains of quality Leadership and management Staffing and professional Development Review and improvement Resources Student information and support Student experience Learning outcomes

(continued)

Table 1 (continued)

Year	The QA Framework	Organization who developed	Country/ region	Domains/benchmarks of quality
				Assessment and integrity Curriculum design
	Quality Assurance Framework	Asian Association of Open Universities (AAOU)	Asia	10 domains: Policy and planning Internal management Learners and learners' profile Infrastructure, media, and learning resources Learner assessment and evaluation Research and community services Human resources Learner support Program design and curriculum development Course design and development
	The Regional Community of Practice (CoP) QA Guidelines in Open and Distance Learning	Commonwealth of Learning (COL)	Southern Africa	7 standards: Program standard Learner support systems Materials development Student assessment Infrastructure and facilities Staffing Open and distance education systems and structures

(AAOU, 2019), and program standards (Commonwealth of Learning, 2019). CHE (2014) also included administrative services, coordination, delivery, and evaluation as additional aspects for evaluating programs for quality. Other QA Frameworks subsumed the program/curriculum component in the other domains as in the cases of IHEP (International Higher Education Policy, 2000), CHE (2014), and EADTU (2016). In the IHEP Framework, evaluation and assessment benchmarks include program effectiveness assessment through the following: enrollment data; costs and successful/innovative uses of technology; and regular review of the intended learning outcomes to ensure clarity, utility, and appropriateness of the ICT use. CHE, on the other hand, has a recommended framework for curriculum development and evaluation which can serve as a standard for evaluating for quality while EADTU focused on curriculum design which was articulated in terms of flexibility, academic community involvement, knowledge and skills, and assessment procedures.

For the course quality domain, some observations which can be drawn from the ten QA Frameworks studied are the following.

Course Development

There is a consistent inclusion of the course component in all the frameworks studied which implies the common perspective that this aspect is important in determining the quality of ODDE. Course is a main quality domain in IHEP (2000), EADTU (2016), Online Learning Consortium (2017), and AAOU (2019) frameworks and is subsumed or implied in other domains based on the domain descriptions and in the indicators or evidence of quality.

Different terms or nomenclature and descriptions were used to refer to the course domain for quality like course design (EADTU), course delivery (EADTU), course development (IHEP, 2000), teaching and instructional practices (OLC), learning effectiveness (SLOAN), and student satisfaction (SLOAN). The CACE Framework included the course component in the evaluation of process (approaches to learning; instructional strategies; and assessment of learning) and inputs and resources (intended learning outcomes; curriculum content; teaching and learning materials; learning technologies; and technical design of the LMS).

A more comprehensive description was forwarded by EADTU (2016) for course evaluation which starts at looking at the rational progression from one course to the next; the relationship of the course with the curriculum and the overall program learning outcomes, the course content design and the student interaction with the course material, the detailed development of the course materials, and assessment; and course evaluation and the process of course approval. For OLC (2017), course design covers course overview and information, course technology and tools, design and layout, content and activities, interaction, assessment, and feedback (https://onlinelearningconsortium.org/consult/oscqr-course-design-review/). IHEP (2000) has a domain for course structure which focuses on the different stages of the course delivery, e.g., orientation about the course and technology requirements before starting the online program, learning outcomes, library resources, assignments, and faculty response. IHEP also has course development benchmark to cover design and delivery, as well as determining the technology to be used based on the learning outcomes.

COL (2019) has a specific domain for course materials development which looks at the desired characteristics of the learning materials to include the following: presentation in appropriate formats that allow easy access by learners; and coherence between learning materials and learning outcomes and course content and assessment. Learning materials should teach in a coherent way, engage learners, and promote development of problem-solving and critical thinking skills. Learning materials should also be evaluated and updated on a regular basis. The CACE QA Framework (2002) also included teaching and learning materials as one aspect under inputs and resources.

Course delivery was also articulated in the different QA Frameworks focusing on different aspects of this quality domain. OLC (2017) includes teaching and instructional practices domain which covers the digital classroom experience, course fundamentals (course design, accessibility, and continuous improvement), learning foundations (course learning outcomes, course content, and assignments), faculty engagement (the instructor role like providing effective feedback, use of tools within the LMS to facilitate the learning experience in an effective manner), and student engagement (how the course was designed to facilitate class discussion engagement, building community, and communication). IHEP (2000) covers teaching and learning quality domain which pertains to student-teacher and student-student interactions as facilitated by various technologies, and providing constructive and timely feedback to students' submissions. CACE (2002) has approaches to learning, instructional strategies, and assessment of learning as components of the process domain. For EADTU (2016), the specific domain for course delivery includes the Virtual Learning Environment, the personal learning environments, and the other channels, such as social media, through which students receive their course materials or communicate with fellow learners and staff. The selected systems should be driven by both educational and technical requirements. The educational requirements include delivery of learning resources, facilities for online communication, and tools for assessment while the technical requirements refer to the reliability and security standards. EADTU also emphasized that the delivery system should be reviewed and monitored to ensure that it continues to meet the educational and technical requirements.

The COL QA Framework (2019), on the other hand, puts emphasis on student assessment, which can also be considered as part of course delivery. According to COL, assessment strategies should be effective, valid, and reliable, and with appropriate security and QA measures to ensure the integrity of the assessment process. COL also included the presence of a policy for student appeals on assessment results and that the turn-around times for such appeals should be clearly defined in the policy.

In some QA Frameworks, the course domain is also implied in the student experience or journey while taking the course which can also be a result of the convergence of other quality domains like learner support services, infrastructure, credentials and qualifications of faculty and staff, and institutional policies.

In general, the different QA frameworks studied presented the course domain to cover the life cycle of the course which starts from its identification as a component of the curricular program, the development and design of the course/course materials, how the course is delivered to the learners, and the evaluation for subsequent revision and further improvement.

Educational Technology

There is emphasis on the selection and use of appropriate teaching and learning technologies vis-a-vis the intended learning outcomes when evaluating courses in the ODDE system. EADTU, for instance, described the whole course delivery process to include the different technologies used like the virtual learning environment where the learners receive the instructional materials, communicate, or facilitate the different interactions that are critical to the learning process and the tools for assessment and other learning activities.

Program and Course Evaluation

Program and course evaluation is a domain of quality itself. There are QA Frameworks which specifically include program and course evaluation as domains of quality such as EADTU, CACE, and COL. SLOAN Consortium (2005) also included learning effectiveness with the following indicators: new knowledge generated; theories applied to the workplace, continuous feedback from different stakeholders; and student satisfaction and loyalty. CACE has a specific domain for quality outcomes which can be determined by the relevance to employment of the content skills and knowledge acquired from the course/program, and the recognition of the course credits and program credentials by other education institutions and employers locally and internationally. For student satisfaction, CACE proposed that this be derived from the following: course effectiveness or the achievement of personal learning goals; course efficiency or the best use of student finances, time and energy; student satisfaction with processes and practices; and adequacy of inputs/resources provided to the students.

Program and Course Evaluation in ODDE: Perspectives and Practices

The perspectives expressed by various authors imply a comprehensive view which can be adopted when it comes to program and course evaluation. While there was a general agreement that program and course evaluation principles in conventional instruction and distance education are generally similar, many authors were also quick to point the major differences which can be attributed to the basic attributes of ODDE: the openness to provide access to education opportunities to the nontraditional learners; the separation in time and space of the learners from the teachers and fellow learners; and the higher integration of ICT into the teaching and learning process to bridge the physical separation. These attributes also make program and course evaluation in ODDE more complex compared to conventional instruction.

The Kirkpatrick (1975) model of ODDE program and course evaluation looks at four levels: (1) reaction and planned action which gauge the participants' satisfaction and studying how they intend to apply what has been learned during the course; (2) learning which shows what the participant has learned from the course; (3) workplace application which pertains to whether and how the participants apply what they have learned to their respective jobs; and (4) business results which look at the benefits gained by the organization in offering ODDE programs and courses and can be in economic terms and/or customer satisfaction.

Different authors are in agreement that evaluation of ODDE programs and courses is more complicated because of the basic characteristics and attributes of this system of instruction, which include the usually big number of enrollment in the programs and courses, the geographically and widely dispersed student body (CHE-South Africa, 2014), and the diversity in the students' profile which may have implications in quality outcomes and students' satisfaction.

Further, given the major role that modern ICTs play in the ODDE system, there may be that tendency to just focus on the technology per se instead of its impact on the teaching and learning (CHE, 2014).

CHE (2014) further emphasized that in evaluating ODDE programs and courses, the focus should not be the technology per se but the effect on teaching and learning as explained below:

> *The question of the quality of educational delivery and support using ICTs requires much deeper analysis. Simply throwing computers at higher education institutions is in no way a responsible manner in which to begin to address quality improvement. While the provision of ICT hardware and related supporting network infrastructure, improvement in the provision and reliability of Internet access and connectivity, and implementation of relevant software applications are clearly important, it is only when the improvement of teaching and learning is addressed that claims made for the educational potential of supporting ICTs can be confirmed or refuted.* (p. 2)

The Openness Attribute

Being open in widening access and participation while providing reasonable care to ensure success (Zawacki-Richter et al., 2020), ODDE programs and courses would affect the structure, the aspects to be evaluated, success definition, indicators, and criteria, as well as the evaluators who will participate in the evaluation for quality process. The openness attribute implies the wide variation in the profile of the learners and the geographical distribution which impact on the learning design and authentic learning. Questions like what examples to use, what resources to refer to, the language to use (CHE, 2014), and developing collaborative learning activities and the subsequent grouping of learners to maximize the learner-learner interaction need to be carefully considered.

Alturkistani et al. (2020) also emphasized the need for a separate evaluation system for open education as in the case of MOOCs, which are ideal representations of ODDE because teaching and learning in MOOCs is very different from the conventional mode of instruction and even in an online course which is not open. The current practices in evaluating MOOCs for quality center on three aspects: learner; teaching; and the MOOC itself. For the learner, aspects of engagement, completion rate, satisfaction, peer interaction, learning outcomes and experience, and knowledge retention were the parameters being looked into. For the teaching aspect, the pedagogical practice of teaching in massive enrollment was given importance. And for the MOOC itself, comparison with other learning platforms, content and structure, implementation, and sustainability are considered as indicators of quality (Alturkistani et al., 2020). It should also be noted that the current evaluation methods for MOOCs consist of surveys, interviews (email and online focused group discussion), pretest/posttest, and the data gathered from the Learning Management System which can include attendance rate; completion of the different MOOCs components; quiz or assignment scores; learner activity; and discussion posts.

The Mode of Instructional Delivery

Because of the nature of ODDE, the programs and courses can accommodate various types of learners and learning contexts. ODDE programs should be structured in such a way that it can accommodate and be responsive to the needs of various learners and as such implies the involvement of a multidisciplinary team to design the learning experience appropriate to these learners. The mode of instructional delivery highlighting separation between the teacher and the learners also assumes the exacerbation of the transactional distance (Hodges et al., 2020). This implies that course evaluation for quality should look at teaching strategies or instructional practices which are considered to be critical to learning like the instructional dialogue. Instructional dialogue is the interaction between the teacher and the students facilitated by the ICTs. The consideration for evaluation is whether opportunities for such dialogue are built into the design of the courses.

The ICT Integration

ICT integration into the ODDE programs and courses is not simply "transferring face-to-face education materials on the virtual setting" (Tonbuloğlu & Gürol, 2016). Enabling or enhancing the teaching and learning process through technology integration can result in different learning design strategies and possible increase in the variables and indicators which should be considered when evaluating for quality (Benigno & Trentin, 2000). As articulated by various authors, technology contributes to the enrichment of the learning environment as it facilitates interactivity and asynchronicity (Benigno & Trentin, 2000), encourages cognitive and psychosocial development (Kerr & Hiltz, 1982, as cited by Benigno & Trentin, 2000), and helps develop metacognitive skills and organized thinking process (Henri, 1992 as cited by Benigno & Trentin, 2000).

Designing learning for ODDE often considers the integration of the various types of interactions: learner-learner; learner-teacher; learner-content; and learner-community of practice which has been recognized to promote authentic learning. The asynchronous component of most online courses provides space as well as opportunity for the learner to digest course content and engage in self-reflections which can be building blocks of the learning process. The asynchronous online discussions also allow learners to consider and appreciate the diverse perspectives about the lesson, and organize the information gathered to build their own learnings.

Recommendations for ODDE Program and Course Evaluation

Various authors forwarded some recommendations for effective program and course evaluation in ODDE.

Alturkistani et al. (2020) recommended the use of the design thinking approach for better quality and precision of data that will be gathered and at the same time provide general guidance especially in terms of performance indicators which should be considered in the evaluation process. Burns (2018), on the other hand, suggested the adoption of the instructional design process which "begins with the end in mind" (p. 150) or a "backward mapping evaluation" (p. 254) and which consists of three steps or answering three questions: Who is the audience of the evaluation and for what purpose would the evaluation results be used? What do they want to know? How the information will be gathered or collected? (https://elearningindustry.com/evaluating-your-online-learning-program-part-1). The same design for evaluation was also suggested by the US Department of Education (2008), who aside from recommending both formative and summative program and course evaluations also recommended that the process should begin "with a clear vision for the evaluation" (p. 49) which determines the following: "what you want the evaluation to accomplish and what questions you hope to answer, the most appropriate evaluation methods for meeting your goals and the budget to meet evaluation needs."

The recommendations on the process of evaluation include the shift from formal evaluation of learning to gauging the students' participation in group and learning activities (Benigno & Trentin, 2000), peer evaluation (Stewart & Kogan, 2015), and for the process to be continuing instead of being "episodic" (University of Toronto Center for Teaching Support and Innovation, https://teaching.utoronto.ca/teaching-support/curriculum-renewal/program-assessment/).

In terms of evaluation data, the University of Toronto's Center for Teaching Support and Innovation (https://teaching.utoronto.ca/teaching-support/curriculum-renewal/program-assessment/) recommended the inclusion of direct, indirect, and supportive evidence. Direct evidence, which can be the student artifacts from course work like exams, capstone projects, and portfolios, can provide information on what the students know and can do and as such implies the achievement of the learning outcomes. Perceptions of students, alumni, employers, and other stakeholders comprised the indirect evidence for inclusion in the program and course evaluation. One example cited in the University of Toronto material is asking alumni the extent to which the program that they had completed at the university prepared them for their current position. Note that answers to this question can provide information as to the continuing relevance of the program in addition to the perception of the alumni. The supportive evidence are aspects connected to student learning like graduation rates, job placements data, faculty-to-student ratio, and program promotional materials, among others.

The nine principles of good practice in ODDE by Stewart and Kogan (2015) can also provide some insights on what should be looked into in program and course evaluation. The nine principles are student-faculty contact, cooperation among students, active learning, prompt feedback, time on task, the communication of high expectations, respect for diverse talents and ways of learning, the establishment of (clear) course procedures, and the effective use of technology. Likewise, the evaluation questions forwarded by Burns (2018) can help in determining the data-gathering mechanisms which can ensure the technical soundness and rigor of the evaluation process. For instance, the "what" questions usually require quantitative designs while the "how" and "why" questions which usually look at the process imply qualitative designs. Mixed method designs can also be considered depending on the type of data or question being asked as part of the evaluation process.

While the foregoing recommendations may present a comprehensive perspective for course and program evaluation, one can also look at the traditional role of education in terms of its contribution to national and global concerns like sustainable development and inclusion in education as other relevant components. Specifically on inclusive education, the higher level of modern ICT integration in ODDE may put this system of education to a better position to provide inclusive learning opportunities targeting the inclusion of nontraditional learners who cannot be part of the conventional education system. It should also be noted that the essence of our basic guiding principle in the ODDE system is inclusion, hence, the extent by which this purpose is achieved should be a major component of the evaluation framework.

Innovating on the Program and Course Evaluation: The Role of Technology

The emerging trends in education which provide the scenario into the future of learning imply the need for an innovative approach to program and course evaluation especially in the ODDE system where such innovations may happen sooner compared to the conventional mode of instruction. These trends which include the digitization of textbooks, deployment of immersive technologies like the Virtual Reality into the teaching environment, more mobile learning practices (Gajura, 2020), and the move toward more digital learner-learner, learner-teacher, and learner-content interactions imply the need to consider the data that can be extracted from the virtual learning environment. Benigno and Trentin (2000) suggested the analysis of course messages in terms of number and content and the activity logs or records of the activities of the students which are automatically recorded in the virtual learning environment or Learning Management System. Other emerging trends, like microcredentialing which can be concretized through the offering of MOOCs, stackable credits or unbundling of the traditional degree programs, and AI-driven teaching and learning processes like e-tutoring and automated assessments, also require innovative perspectives on program and course evaluation vis-a-vis the needs and gaps that they are trying to address in the overall scheme of manpower and economic developments. Given that these trends are anchored on digital tools and platforms, a data analytics-driven process is a logical direction for program and course evaluation. It should be noted that the use of data analytics is already a common practice in business but is still at its infancy when it comes to higher education (Dziuban, Moskal, Cavanagh, & Watts, 2012). This potential, however, had already been recognized by software developers who are now offering digital solutions for a fully automated course evaluation process, analysis of data, and distribution of results (https://explorance.com/solutions/course-evaluations/).

Conclusion

The existing QA Frameworks for ODDE can provide a perspective on what should be considered when evaluating ODDE programs and courses. However, there are no standardized terms, parameters, and indicators as the different frameworks use different terms to refer to the same thing (e.g., program and curriculum) or use the same term (e.g., course) to refer to different aspects which can cover course design, course materials development, and course delivery. This may have resulted in the lack of a generally accepted understanding of quality when it comes to ODDE but, at the same time, points to the complexity of the evaluation process in this system of education. This further emphasizes the need for a standard program and course evaluation framework for ODDE as recognized and recommended by the various authors. The aspect of program openness and inclusion, which resulted in the diverse profile of the learners and which, in turn, impact on course design and delivery, was not given enough emphasis in the articulations of quality in the QA Frameworks studied.

While the existing QA Frameworks can serve as a very good starting point toward the development of the standardized program and course evaluation since they already provided an extensive articulation as to what should be the indicators of quality in this system of instruction, the emerging and projected trends in the higher education system like microcredentialing, stackable credits, the use of blockchain technology, and the likes will have an impact on the process, the data, and the indicators or parameters for program and course evaluation. Data which reflect the different teaching and learning processes and which are automatically captured in the virtual environments or digital platforms where such processes take place will definitely change the framework, and possibly the focus, of program and course evaluation in ODDE. This also implies the need to employ advanced research methodologies for ODDE institutions to be better prepared for new challenges emerged from the future learning environment.

Cross-References

► Evolving Learner Support Systems
► Learning Analytics in Open, Distance, and Digital Education (ODDE)
► Quality Assurance at Mega Universities
► Quality Assurance of Open Educational Resources
► Quality Assurance Systems for Digital Higher Education in Europe

References

AAOU. (2019). *Quality assurance framework*. https://www.aaou.org/quality-assurance-framework/

ACODE (Australian Council on Open, Distance and e-learning). (2014). *Benchmarks for technology enhanced learning*. https://www.acode.edu.au/mod/resource/view.php?id=193

Alturkistani, A., Lam, C., Foley, K., Stenfors, T., Blum, E. R., Van Velthoven, M. H., & Meinert, E. (2020). Massive open online course evaluation methods: Systematic review. *Journal of Medical Internet Research, 22*(4). https://doi.org/10.2196/13851.

Asare, K. B. (2014). Looking beyond the residential education and distance education debate. What matters in education is…*Turkish Online Journal of Distance Education, 15*(3), 143–154. https://files.eric.ed.gov/fulltext/EJ1043672.pdf

Asia-Pacific Economic Cooperation (APEC). (2019). *Quality assurance of online learning toolkit*. https://www.apec.org/Publications/2019/12/APEC-Quality-Assurance-of-Online-Learning-Toolkit

Barker, K. (2002). Canadian recommended e-learning guidelines. https://www.futured.com/pdf/CanREGs%20Eng.pdf

Benigno, V., & Trentin, G. (2000). The evaluation of online courses. *Journal of Computer Assisted Learning, 16*(3), 259–270. https://doi.org/10.1046/j.1365-2729.2000.00137.x.

Burns, M. (2018). *Evaluating your online learning program* (Part 1). https://elearningindustry.com/evaluating-your-online-learning-program-part-1

Chao, T., Saj, T., & Tessier, F. (2006). Establishing a quality review for online courses. *Educause Quarterly Review, 29*(3), 32–39.

Council on Higher Education (CHE). (2014). Distance higher education programmes in a digital era: Good practice guide. Pretoria, South Africa: CHE. https://www.saide.org.za/documents/CHE_-_Distance_Higher_Education.pdf

Commonwealth of Learning. (2019). *The regional community of practice (COP) quality assurance guidelines in open and distance learning* (ODL). http://oasis.col.org/handle/11599/3126

Dziuban, C., Moskal, P., Cavanagh, T., & Watts, A. (2012). Analytics that inform the university: Using data you already have. *Online Learning, 16*(3). https://doi.org/10.24059/olj.v16i3.276.

EADTU. (2016). *E-xcellence manual*. https://e-xcellencelabel.eadtu.eu/images/E-xcellence_manual_2016_third_edition.pdf

Gajura, C. (2020). Emerging trends in education and technology. https://elearningindustry.com/emerging-trends-in-education-and-technology

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). The difference between emergency remote teaching and online learning. EDUCAUSE Review, March 27, 2020. https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning

Inside Higher Education. (2014, July 7). Sloan goes online. https://www.insidehighered.com/news/2014/07/07/sloan-consortium-renames-itself-online-learning-consortium

International Council for Open and Distance Education (ICDE). (2015). The Paris message 2015. https://www.icde.org/events-listings/unesco-icde-global-high-level-policy-forum-9-11-june-2015-paris-france-

International Higher Education Policy. (2000). http://www.ihep.org/press/news-releases/quality-line

Kerr, E., & Hiltz, S. (1982). *Computer-mediated-communication systems*. New York, NY: Academic Press.

Kirkpatrick, D. L. (1975). Techniques for evaluating training programs. In D. L. Kirkpatrick (Ed.), *Evaluating training programs* (pp. XX–ZZ). Alexandria, VA: ASTD.

Lorenzo, G., & Moore, J. (2002). The Sloan Consortium Report to the Nation FIVE PILLARS OF QUALITY ONLINE EDUCATION. Accessed at https://www.immagic.com/eLibrary/ARCHIVES/GENERAL/SLOANCUS/S021106L.pdf

Markova, T., Glazkova, I., & Zaborova, E. (2017). Quality issues of online distance learning. *Procedia – Social and Behavioral Sciences, 237*, 685–691. https://doi.org/10.1016/j.sbspro.2017.02.043.

Moore, J. C. (2005). The sloan consortium quality framework and the five pillars. http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.115.4238&rep=rep1&type=pdf.

Online Learning Consortium. (2017). https://onlinelearningconsortium.org/consult/qs-navigator/

Pedro, N. S., & Kumar, S. (2020). Institutional support for online teaching in quality assurance frameworks. *Online Learning, 24*(3), 50–66. https://doi.org/10.24059/olj.v24i3.2309

Tonbuloğlu, B., & Gürol, A. (2016). Evaluation of distant education programs with regards to various shareholder opinions. *Journal of Education and Practice, 7*, 9–22. XX.

Shachar, M. & Neumann, Y. (2010). Twenty years of research on the academic performance differences between traditional and distance learning: Summative meta-analysis and trend examination. *MERLOT Journal of Online Learning and Teaching, 6*(2): 318–334. https://jolt.merlot.org/vol6no2/shachar_0610.pdf

Stewart, S., & Kogan, L. (2015). Evaluation of online courses/teaching in the department of clinical sciences. http://csu-cvmbs.colostate.edu/documents/clinsci-eval-online-courses.pdf

Tait, T. (2008). What are universities for? *Open Learning: The Journal of Open, Distance and e-Learning, 23*(2), 85–93. https://doi.org/10.1080/02680510802051871.

University of Toronto Program Assessment. Center for Teaching Support and Innovation. (n.d.). https://teaching.utoronto.ca/teaching-support/curriculum-renewal/program-assessment/

US Department of Education Office of Planning, Evaluation, and Policy Development Policy and Program Studies Service. (2010). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies*. https://www2.ed.gov/rschstat/eval/tech/evidence-based-practices/finalreport.pdf

US Department of Education Office of Innovation and Improvement. (2008). Evaluating online learning. *Challenges and strategies for success*. https://www2.ed.gov/admins/lead/academic/evalonline/evalonline.pdf

Zawacki-Richter, O., Conrad, D., Bozkurt, A., Aydin, C. H., Jung, I., Kondakci, Y., . . . Xiao, J. (2020). Elements of open education: An invitation to future research. *The International Review of Research in Open and Distance Learning, 21*(3), 319–334. https://doi.org/10.19173/irrodl.v21i3.4659.

Quality Assurance of Open Educational Resources

46

Olaf Zawacki-Richter, Wolfgang Müskens, and Victoria I. Marín

Contents

O. Zawacki-Richter (✉)
Center of Open Education Research, Carl von Ossietzky University of Oldenburg, Oldenburg, Niedersachsen, Germany
e-mail: olaf.zawacki.richter@uni-oldenburg.de

W. Müskens
University of Oldenburg, Oldenburg, Germany
e-mail: wolfgang.mueskens@uni-oldenburg.de

V. I. Marín
University of Lleida, Lleida, Spain
e-mail: victoria.marin@udl.cat

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_43

Abstract

The lack of transparency of the quality of Open Educational Resources (OER) is often seen as a barrier to the wider adoption, use, sharing, and further development of OER in the practice of teaching and learning in ODDE. Following the UNESCO Recommendation on OER, this chapter starts providing an overview of quality assurance systems from an international perspective, and the perceptions of faculty members on OER quality. Then, based on an empirical study, a quality framework and validated instrument for the evaluation and quality assessment of OER is presented – the Instrument for Quality Assurance of OER (IQOER). The second part of the chapter looks at how such an instrument can be integrated into a quality assurance process that takes into account the different goals, roles, and functions of the stakeholders involved. It becomes clear that a cultural change toward Open Educational Practice (OEP) is also needed to reach a wider acceptance of OER.

Keywords

Open Educational Resources · OER · Quality assurance · Evaluation · Open Educational Practice · OEP

Introduction

"Open" is *en vogue*. In the course of the general digital transformation and the digitalization of learning and teaching, the open education movement has developed dynamically in recent years (Kerres, 2019) – not only because of the recent Covid-19 pandemic and ad hoc shift toward online learning. However, the idea of "open education" goes back further and is linked in particular to the appearance of open education ("open learning") in the 1960s to reach so-called nontraditional target groups. This has also been the *raison d'être* of Open Universities, which have always used media because distance learning and teaching are made possible by them in the first place (Tait, 2008; Xiao, 2018).

Open Educational Resources (OER) are a central element of open education practices (Zawacki-Richter et al., 2020). The term OER was mentioned for the first time in the UNESCO Declaration (2002), referring to "the open provision of educational resources, enabled by information and communication technologies, for consultation, use and adaptation by a community of users for non-commercial purposes" (p. 24). Around 2006/2007, a definition of OER was still being negotiated. In their report on the OER movement to the William and Flora Hewlett Foundation Atkins, Brown and Hammond (2007) provided a widely received definition:

> OER are teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use or re-purposing by others. Open educational resources include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge. (p. 4)

In the UNESCO (2019) Recommendation, OER is defined as “learning, teaching and research materials in any format and medium that reside in the public domain or are under the copyright that have been released under an open license, that permit no-cost access, re-use, re-purpose, adaptation and redistribution by others” (see Section I, No. 1). These definitions show the wide scope of OER. Jung, Sasaki, and Latchem (2016) speak in this context of the “granularity” of learning materials: “OER range from entire courses and massive open online courses to small-scale learning materials, games, simulations, quizzes and other digital resources” (p. 10). Essentially, OER are about making teaching and learning materials available for unrestricted use. Digital materials are particularly suitable for this because they can be copied, shared, and changed as often as desired, without loss and with virtually no spatial restrictions. In his blog, Wiley (2013) describes this openness of use with five Rs: the right to retain, reuse, revise, remix, and redistribute open content. Therefore, OER might have the potential to facilitate the development of collaborative and participatory learning arrangements (Otto, 2020).

The development and distribution of OER are seen as an important element in the UNESCO (2019) Recommendation toward open and inclusive knowledge societies and the achievement of the UN 2030 Agenda. The implementation of OER contributes especially to the achievement of the Sustainable Development Goal (SDG) 4, quality education. However, despite the many initiatives to develop and sustain OER materials and repositories, Jung et al. (2016) conclude that “the take-up of OER has fallen short of expectations” (p. 1). The reason for the low adoption rate is due to the potential users’ uncertainty over the quality and appropriateness of the content. The report of the Open Educational Quality Initiative (OPAL, 2011) already identified the “lack of quality or fitness of OER” (p. 8) as an important barrier to the use of OER. Since then, after a review of international approaches to the evaluation of learning materials, Zawacki-Richter and Mayrberger (2017) conclude that no quality assurance procedure or instrument has become widely accepted and used.

The UNESCO (2019) Recommendation on OER also refers to the importance of quality assurance. Member states are encouraged “to develop and integrate a quality assurance mechanism for OER into the existing quality assurance strategies for teaching and learning materials” (Areas of Action, ii Developing supportive policy) and consider “developing and adapting existing evidence-based standards, benchmarks and related criteria for the quality assurance of OER” (Areas of Action, iii Encouraging effective, inclusive and equitable access to quality OER). The great importance of quality assurance of OER is largely undisputed. For example, Camilleri, Ehlers, and Pawlowski (2014) state that “The need for quality assurance mechanisms to support the development and sustainable use of Open Educational Resources (OER) is being raised in the literature and in European and national policy documents as a major challenge and opportunity” (p. 6).

Therefore, the aim of this chapter is to explore potential quality dimensions of digital learning materials and to propose a model and an instrument for the evaluation and quality assessment of OER. We will begin with an overview of international approaches to quality assurance systems for OER in which such an instrument could be applied.

An International Perspective on Quality Assurance Systems for OER

An international comparison between OER digital infrastructures in higher education was conducted within the German research project "Digital educational architectures – Open learning (educational) resources in disseminated learning infrastructures" (EduArc; https://uol.de/coer/research-projects/projects/eduarc). This international comparison covered the macro (national and regional context), meso (institutional context), and micro levels (teaching and learning) across ten countries (Australia, Canada, China, Germany, Japan, South Africa, South Korea, Spain, Turkey, and the United States). One of the main issues addressed in this comparative case study was the quality of OER, especially referring to national standards for the creation, dissemination, and quality assurance of OER at the macro level (Marín et al., 2020). In the meso level, the aim was to observe the development of institutional measures for the creation, dissemination, and quality assurance of OER across countries (Marín et al., under review). Finally, the micro level addressed the level of awareness of faculty members with regard to institutional procedures related to OER quality assurance and to the responsible people of these procedures across countries (Marín et al., 2022). In this section, a synthesis of the three levels studied in the context of the EduArc project (higher education) is presented, along with some insights into other educational stages.

National and Regional Guidelines and Actors

Marín et al. (2020) addressed the influence of country-specific contexts on the development of national standards for the creation, dissemination, and quality assurance of OER in higher education and provided an overview of the different countries involved in the case study. The authors showed through their description that the level of political structure centralization had some effects on the quality issue for OER and their repositories across countries, but not in a uniform way across all of them.

For instance, the case of China, with a highly centralized political structure, shows this influence on OER quality. The Ministry of Education issued Technical Specifications for Modern Distance Education Resources Construction in May 2000. As the authors highlight, "this non-mandatory standard focuses on the guidelines for resource developers, production requirements, and functions of the management system" (Marín et al., 2020, p. 250). In addition, the Chinese e-Learning Technology Standardization Committee has already developed several national and association standards related to educational digitalization, including the consideration of OER.

On the other hand, most of the countries investigated in the EduArc project did not experience a relevant impact connected to the political structure centralization. These other countries did not have any official national quality frameworks or standards linked concretely to OER. Overall, quality assurance of OER has been more connected to the meso level, to the higher education institutions (e.g., South Africa) or, even more often, to individual faculty members (e.g., Japan). What can be highlighted at the national and regional levels is the existence of checklists or evaluation guides related to OER in some of the countries studied. This is the case in Spain, where a working group on institutional repositories (including OER repositories) within the Network of Spanish University Libraries (REBIUN) actively develops different documentation to evaluate the status of Spanish OER repositories and guide their evaluation. Also, the South Korean governmental organizations connected to the development of Korean Open Course Ware (KOCW) and K-MOOCs have developed different documents to, on one side, ensure a good quality of OER and provide best practices and, on the other side, to help guide KOCW and K-MOOC development. A third example is Australia, where different OER guidelines have been developed to assist higher education institutions in making informed decisions for OER adoption, for instance, the Feasibility Protocol (Bossu, Brown, & Bull, 2014a).

The actors involved in OER quality at this macro level depend on the country but usually include governments, agencies, librarians, and other working groups (Marín et al., 2020). Actors related to governments and agencies usually also cover other educational stages beyond higher education. For example, in China and South Korea, the main actors deeply involved in OER quality are public agencies. In contrast, in Spain, apart from the working group mentioned above for higher education, an association for standardization endorsed by the Spanish government has developed some standards for digital educational resources across educational stages through the Learning Object Metadata-LOM-ES and quality dimensions: technological effectiveness, effectiveness regarding accessibility, and pedagogical effectiveness (INTEF, red.es, & Spanish Autonomous Communities, 2010; Fernández-Pampillón Cesteros, 2017). On the other hand, the United States is a unique case, "since many digital education organisations are involved in defining quality for (O)ER, such as Quality Matters or the Online Learning Consortium, Educause, the Association for the Advancement of Computing in Education and the Association for Educational Communications and Technology" (Marín et al., 2020, p. 250).

Institutional Guidelines and Actors

As regards quality assurance of OER at the institutional level, three different models could be distinguished (Marín et al., under review, pp. 5–6):

a) Institutional cases in countries with (binding) top-down institutional quality assurance mechanisms for OER, derived from national regulations (China, South Korea, and Turkey). For instance, all inter-institutional platforms in China have their quality assurance mechanisms that derive from rules and regulations of the Ministry of Education, which supervises the quality assurance of the "top-quality courses" projects. Similarly, South Korea follows a top-down approach, where the Center for Teaching and Learning of each university is responsible for ensuring OER quality at the institutional level and for following national guidelines. Turkey also adopted a top-down approach: the top management of the higher education institutions is responsible for institutional OER quality assurance, according to national policies.

b) Institutional cases with their own independent institutional guidelines for OER quality assurance mechanisms (Canada, Japan, Spain). For instance, University H's (anonymized large public university in Japan) Center for Open Education uses a set of key performance indicators related to well-established instructional design strategies for online courses for creating and implementing OCW and other OER. In Spain, higher education institutions supporting the development of OER have institutional quality assurance mechanisms and guides to support faculty in this endeavor (e.g., the Universidad Carlos III of Madrid).

c) Institutional cases with basically no institutional OER quality assurance processes, which are left up to the individuals (Australia, Germany, South Africa; bottom-up approach). For example, in Australia, there are no quality assurance processes or frameworks related to OER in higher education institutions (Stagg et al., 2018); quality assurance of OER is mostly up to individual members of faculty (academic self-assurance). Similarly, South Africa has no institutional quality assurance processes for OER, and the responsibility also lies with the academic author, following the "pride-of-authorship" model (Hodgkinson-Williams et al., 2013). In Germany, quality assurance of OER in higher education most often does not rely on institutional guidelines; however, an exception is the province-based platform Hamburg Open Online University, which has quality assurance in place for offerings under its auspices (top-down approach).

Faculty Perceptions About OER Quality Assurance for Teaching and Learning

Marín et al. (2022, pp. 11–12) explored academics' awareness and perceptions of quality of OER, and of the institutional quality assurance agents involved in OER, as well as the academics' involvement as quality assurance agents in OER at the teaching and learning level in seven countries (Australia, Canada, Germany, South Africa, South Korea, Spain, and Turkey). In many of the countries, the perceptions of quality of OER referred to a common prejudice against OER as being of low quality. This is especially the case in Turkey, where openness and OER-related concepts were linked to free sources with low quality. In South Africa, lecturers were concerned about using OER by authors whose reputations are in doubt or not yet established (Madiba, 2018). The poor quality of OER available and the concerns regarding the quality of content stored in OER repositories are common challenges related to faculty perceptions in the literature (Bates, Loddington, Manuel, & Oppenheim, 2007; Bossu, Brown, & Bull, 2014b; Mtebe & Raisamo, 2014).

A low awareness along with a lack of frameworks regarding the quality of OER and their infrastructures was highlighted in most of the countries of the study, in line with previous literature (e.g., Baas, Admiraal, & van den Berg, 2019). For instance, in South Korea, the lack of mechanisms to ensure the quality of OCW is a challenge for the active adoption of OCW (Lee & Kim, 2015).

In terms of academics' awareness regarding agents responsible for OER quality assurance, the outlook is also rather bleak but provides some insights into common actors. For instance, in Spain and Germany, faculty awareness about this issue was low, but the influence of IT services for the institutional learning management system (LMS) was perceived by faculty members as relevant in Germany. In the universities of both countries, academic staff who used OER were the key actors in defining the quality of OER, of OER metadata, and of OER repositories. This faculty involvement and responsibility of OER quality was present in other countries too (e.g., Japan, Turkey). In other countries' institutions (e.g., at the Australian Queensland University of Technology), the library played a key role in OER development through an optional stage of Quality Assurance (QA; Stevens, Bradbury, & Hutley, 2017).

Toward a Quality Model and an Assessment Instrument for OER

The results of the international comparison study described above imply that the perceived low or unclear quality might be a major barrier to the uptake and wide adoption of OER by teachers and faculty members. An abundance of learning materials is freely available on various platforms and repositories, but the selection of high-quality materials remains a challenge.

Against this background, during the development of the Hamburg Open Online University (HOOU, https://www.hoou.de) portal, a study was commissioned to collect an international inventory of instruments and quality criteria for learning materials and OER and to develop a model and an instrument for quality assurance of OER. The model was informed by Almendro and Silveira (2018) who noted that the quality of OER has pedagogical, content, and technical dimensions.

OER Quality Model

The first step in the research project for the HOOU was a search for evaluation instruments for the assessment of OER (Zawacki-Richter & Mayrberger, 2017). Eight different instruments or rubrics with 161 quality criteria were identified. Based on a qualitative analysis of the quality dimensions and criteria, a framework of OER quality was proposed by Mayrberger, Zawacki-Richter, and Müskens (2018) with two broad quality dimensions – the pedagogical and technical dimension, and four subdimensions, i.e., content, instructional design, accessibility, and usability, covering a set of 15 quality criteria (see Fig. 1). In contrast to Almendro and Silveira (2018), the content dimension was integrated into the pedagogical dimension on the same level with instructional design as both subdimensions depend on each other.

Table 1 provides an overview of the 15 quality criteria in the OER quality model.

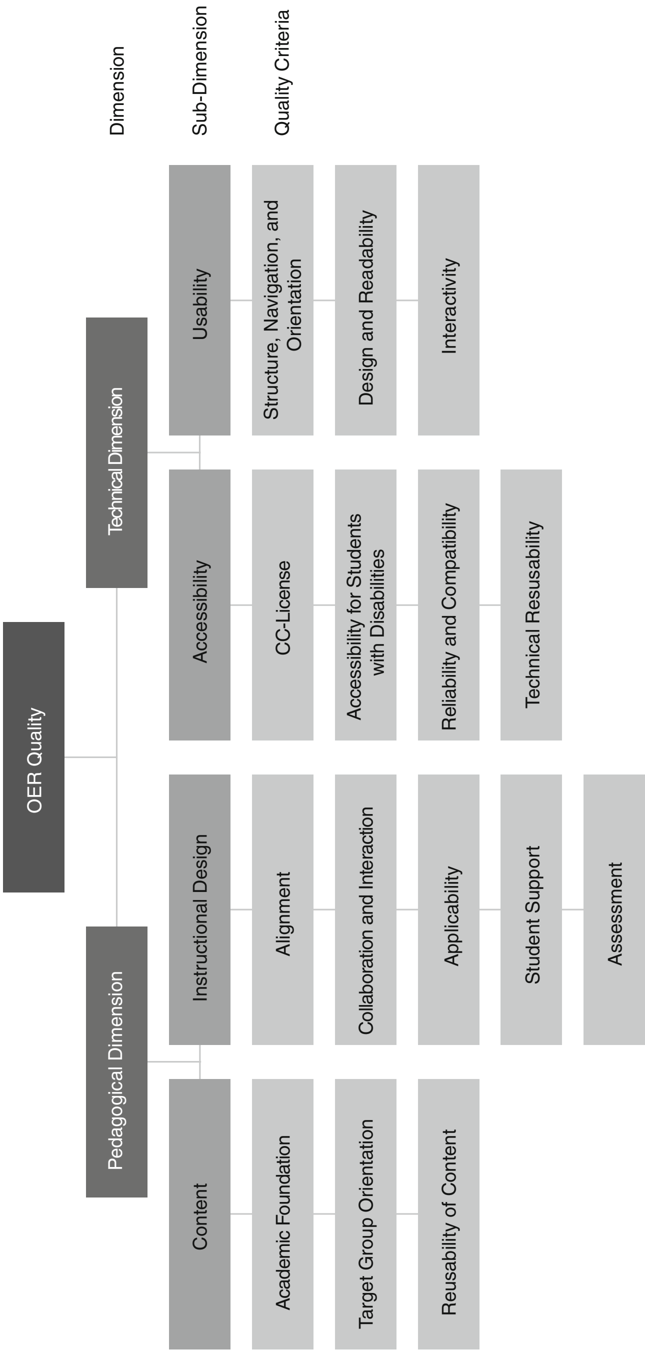


Fig. 1 OER quality model proposed by Mayrberger et al. (2018, p. 29)

Table 1 Quality criteria in the OER quality model (Mayrberger et al., 2018)

Quality criteria	Description
Content/academic foundation	The contents are scientifically correct. The origin of models, methods, and approaches is referenced
Content/target group orientation	The target group for the material is clearly stated. All necessary prior knowledge or skills are made explicit. The material fully corresponds to the level indicated
Content/reusability of content	The contents are presented in such a generic way that they can be used in other contexts (e.g., in a similar module in another program) without much effort
Instructional design/alignment	The intended learning outcomes are made clear to the learners. The content, learning activities, tasks, and assessment presented are consistent with these learning outcomes. The assessment is suitable to measure the desired level of learning outcomes
Instructional design/collaboration and interaction	The material contains activities or assignments that systematically stimulate interaction and collaboration among learners. The learners work together as a team in a goal-oriented way
Instructional design/applicability	Learning activities or tasks prompt learners to transfer the learning content to new types of problem situations or their (professional) practice and to cope with authentic tasks and situations
Instructional design/student support	The material offers help and support, both for navigation through the learning content and for the learning content itself. Contact options are given for technical and content-related questions
Instructional design/assessment	Assessment consists of a variety of tasks or exercises that correspond to the intended learning outcomes. It records the level of competence at the beginning and at the end of the learning process and provides feedback to learners within the learning process on the level of knowledge they have achieved
Accessibility/CC-license	The learning material has been published under a license that allows anyone to access the learning material and to use, modify, and share it with others. The resource has been published under CC 0 ("Public Domain") or a comparable license
Accessibility/accessibility for students with disabilities	A variety of measures have been taken to ensure that people with disabilities can also use the material as far as possible. The recommendations of the Web Content Accessibility Guidelines (WCAG) are consistently implemented
Accessibility/reliability and compatibility	The learning object runs technically robust and error-free on all specified devices and operating systems. The use does not require any additional software
Accessibility/technical reusability	The learning object can be used in different contexts and be integrated into other applications. This is supported by the use of international metadata standards and documentation
Usability/structure, navigation, and orientation	The structure is simple and clear. Learners can stop the learning sequence at any time. All learning content (previously presented) can be accessed at any time

(continued)

Table 1 (continued)

Quality criteria	Description
Usability/design and readability	The learning material has a consistent design appropriate to the content. All texts and graphics are easy to read. The interface always responds quickly to learner input
Usability/interactivity	The material contains interactive elements that can be used by the learners to independently perform constructive or manipulative actions. The design possibilities of the learners go beyond pure data input

The Instrument for Quality Assurance of OER (IQOER)

The study by Zawacki-Richter and Mayrberger (2017) showed that existing OER quality assessment instruments differ in complexity and depth of detail. Little is known about the reliability and validity of the instruments. Some instruments are based on a quality model with several quality dimensions to which a number of quality criteria are assigned; others consist only of lists of criteria. Some instruments involve a detailed scoring guide for the operationalization of the rating scales (e.g., the LORI instrument by Nesbit, Belfer, & Leacock, 2007), while others consist of simple checklists (see also Yuan & Recker, 2015). It is also worth mentioning the Learning Evaluation Object Platform (LOEP), developed as an integrated platform for learning object evaluation, which facilitates the collaborative evaluation of educational resources (Gordillo, Barra, & Quemada, 2015).

Responding to this need of a validated and reliable quality assessment instrument for OER, such an instrument was developed in the EducArc project (see above) based on the OER quality model by Mayrberger et al. (2018), namely, the Instrument for Quality Assurance of OER (IQOER). The IQOER has two versions: a shorter one using classification scales and a longer version using mean scales based on individual items.

For the short version, a five-level classification scale was operationalized for each of the 15 quality criteria. Table 2 shows the rating scale for “academic foundation” of OER content. The classification scale allows the ranking on one of five levels, which are marked with colors from red (lowest level) to dark green (highest level). The red, light green, and dark green levels of the rating scales are all described by several statements (descriptors). The intermediate second and fourth levels are not described, so it is up to the raters to interpolate the content of these levels from the other levels.

The assessment of quality criteria using this kind of classification scale is associated with two problems from the point of view of measurement theory. First, if a characteristic is only determined using a single rating, split-half reliability or internal consistency cannot be determined because there is no other measure to correlate with. Secondly, and more importantly, a classification scale forces a joint evaluation of possibly incompatible statements. Each classification scale (Table 2) consists of several statements that do not necessarily have to be equally true for a

Table 2 Classification scale "academic foundation" of OER content

(dark green)	The contents are presented in a scientifically correct and balanced manner. Bibliographic literature sources that meet the standards of the discipline are cited throughout. The reasoning is coherent (5)
(green)	(4)
(light green)	The contents are scientifically correct and relevant. The origins of models, methods, and approaches are mostly named (3)
(yellow)	(2)
(red)	The contents contradict the current state of research in the respective discipline or focus unilaterally on certain providers, products, or models. The underlying methods or approaches are either not presented at all or presented without reference (1)

particular learning material. For example, a material may well have cited bibliographic sources, but the reasoning within the resource may not be coherent. In such a case, the rater in the example from Table 2 is faced with the difficulty of deciding whether the dark green alternative is true. Ultimately, the rater is forced to weigh the different statements arbitrarily and make a rating accordingly.

An alternative to classification scales is to average across scores from different individual items. Such items consist of a single statement for which the rater expresses agreement or disagreement on a multipoint Likert scale. Such ratings using Likert scales require raters to make only simple judgments of clear statements about an OER. The long version of the IQOER consists of mean scales, each aggregating five to six individual items. Table 3 shows the scale "academic foundation" of the long version of the IQOERs. In this case, the scale is formed by the mean of the item ratings. The alternative "does not apply at all" is coded as 1 and "fully applies" as 5, and the alternatives in between are coded as 2–4. Items with opposing content (e.g., item 2 in Table 3) are recoded.

However, the best and most robust quality assessment instrument will not lead to higher acceptance and wider dissemination of OER if it is not integrated into a systematic quality assurance process. These aspects are addressed in the following section.

Implementing a Process of Quality Assurance for OER

A functioning quality assurance requires not only quality models and instruments for quality assessment but also the development of a quality assurance process. For example the UNESCO and Commonwealth of Learning (2011) demand: "Recognize the important role of educational resources within internal quality assurance

Table 3 "Academic foundation" scale using individual items based on Mayrberger et al. (2018, p. 35)

#	Item	1	2	3	4	5
1	The OER contains references to subject-specific literature or research findings					
2	The content of the material focuses unilaterally on specific providers, products, or models					
3	The content is up-to-date, accurate, and relevant					
4	The reasoning in the material is coherent and comprehensible					
5	The presentation of the content is precise					

1 = does not apply at all, 2 = rather does not apply, 3 = applies somewhat, 4 = largely applies, 5 = fully applies

processes. This should include establishing and maintaining a rigorous internal process for validating the quality of educational materials prior to their publication as OER" (p. 7).

However, authors and providers of OER platforms face the challenge in how quality assurance can be designed within the process of developing OER. Even if a comprehensive quality assurance model including corresponding scales is available, the following questions arise regarding the workflow of quality assurance:

- At what point in the process of creating or using an OER should the quality assessment take place? (Time)
- What is the purpose of the quality assessment? (Objective)
- Who assesses the resources by means of the criteria or scales? (Rater)
- In what way do the quality assurance institution and the authors/developers of the OER work together? (Degree of interaction)

Approaches to quality assurance of conventional, non-free learning materials (e.g., textbooks) cannot always be easily transferred to OER. In this context, Camilleri et al. (2014) explain the differences between the quality assurance of OER and that of non-OER due to the life cycle of OERs, which also includes the possibilities of reuse and adaptation:

> …the traditional lifecycle of a resource, particularly with respect to the processes of creation, editing, evaluation and use, is significantly disrupted. Whereas before these steps were traditionally distinct, consecutive and managed by various actors, the freedom granted by OER leads to a blurring of these boundaries. The involvement of many more actors in each step, therefore, means a federation of responsibility for each step, which in turn can lead to cross-over in the functions and timing of processes, as well as sub-cycles (such as several rounds of editing and evaluation). (p. 4)

Aim of Quality Assessment

While anglophone OER platforms such as MERLOT (www.merlot.org) already contain thousands of resources, the stock of OER in other languages that are suitable for higher education usage is currently still very limited. From the perspective of many providers of recently established OER platforms, the aim of quality assessment is therefore to support authors and developers in the creation of OER rather than to make selections of submitted resources.

A quality assessment by users after publication of the resource often helps to inform potential users. In such a crowd rating, the published OER can be continuously rated by users by means of scales. The averaged results of the ratings are constantly updated and presented. In summary, three essential goals of quality assessment can be outlined by means of standards, criteria, and scales: to support the creation and development of the resource, to select the resources or to check minimum standards, and to inform the users.

Time of Quality Assessment

The quality assessment can occur at various moments within the following 11-step process of the OER "life-cycle" described by Camilleri et al. (2014).

1. Creation of the resource by an author/creator
2. Description of the resource by means of metadata
3. Approval by the commissioning body of the resource
4. Publication of the resource, making it available to the wider public
5. Discovery, the process by which a user finds the published resource
6. Evaluation or checking of the fitness for purpose of the discovered resource
7. Resolution, where a handle is used as a precursor to obtaining it
8. Obtaining the resource usually by downloading it or streaming
9. Re-purpose and re-use: the resource may be edited and/or changed by the tutor using the resource
10. Integration, which describes the process of including it into a larger learning experience (such as a course), or as part of a technical tool such as a virtual learning environment
11. Use, which describes the actual utilization of the resource to enable a learning experience by the end user/student (p. 15)

Quality assessment by means of criteria, standards, or scales can take place at various points within this process:

- Content-related criteria can be applied even before the resource is created, for example, when concepts are evaluated by experts within the scope of project funding.
- During the development process, the standards and criteria can support the authors and developers in aligning their work with the development goals. Formative evaluation can be used to check the level of progress achieved and to define work steps that still need to be done.
- Immediately before publication, a peer review process can ensure the quality of the content of the resource. Instructional designers and technical experts can check compliance with minimum standards.

- After publication in repositories, the resources can be assessed by users toward the standards, criteria, or scales. A distinction should be made between evaluation by lecturers as indirect users and by learners as end users.

Raters

Depending on the aim and time of the quality assessment, different groups of people can be considered as raters (i.e., for carrying out the assessment):

- The authors or creators themselves can use standards, criteria, or scales during the development of the OER to identify remaining work steps (self-evaluation).
- In a summative evaluation, subject matter experts can assess the content quality of the resources in a peer review (cf. UNESCO and Commonwealth of Learning, 2011). The assessment can be done either before publication on a platform or with regard to a concept outline before the development starts.
- Specialists from the fields of instructional design or technology can check compliance with minimum technical or pedagogical standards before publishing an OER. However, the development can also be monitored and supported by a formative evaluation regarding these standards.
- An evaluation by users usually takes place after publication of the resource. The use of more subjective rating scales (e.g., how motivating or interesting the resource is perceived) can provide other users with usage information that goes beyond objective assessment standards. Camilleri et al. (2014) call this form of evaluation by users "social ranking" (p. 24).

Level of Interaction

There are usually two parties involved in an OER quality assessment: the institution that initiates the quality assessment (QA agency, often the provider of an OER portal) and those who create or develop the resource. The level of interaction between these two parties can vary greatly.

- Level 0: No interaction: The QA agency assesses OER without knowledge of the authors or creators or does not provide information on the standards, criteria, or scales used.
- Level 1: Information: The QA agency provides information about the criteria, standards, or scales without concrete advice on how to achieve these criteria.
- Level 2: Instruction: The QA facility gives concrete instructions on how to achieve the criteria/standards or how to optimize the quality of the resources. The instructions are of a general nature, so they can be applied to a wide range of resources.

- Level 3: Counselling: The QA organization provides individual counselling to the authors or creators before and/or during the creation of the resource on appropriate ways and activities to optimize the quality of the resource.
- Level 4: Cooperation: The QA agency provides templates, tools, etc. that facilitate the creation of quality-assured resources or is actively involved in the technical development of the resource itself.

Standards, criteria, or scales are used for all different levels of interaction. While these are only used as an assessment tool in the "no interaction" and "information" scenarios, they form the basis for the "instruction" and "counselling" scenarios. In the "cooperation" scenario, the quality assurance agency develops templates and tools itself based on the standards, criteria, and scales, which are used in the creation of the resources.

OER and OEP

For educational institutions, the use of OER is often only one element on their way to adopting Open Educational Practices (OEP), and an open learning architecture (cf. Camilleri et al., 2014). Ehlers (2011) describes OEP as the following process: "[Using OEP] builds on OER and moves on to the development of concepts of how OER can be used, reused, shared, and adapted [, and] goes beyond access into open learning architectures, and seeks ways to use OER to transform learning" (p. 3). Tillinghast (2020), who speaks of "OER-enabled pedagogy" (p. 168), describes the example of a teacher who creates a chapter of an OER textbook for a course that she thinks is missing. Another example would be the creation of OERs by the learners themselves.

In OEP, in addition to the quality of OER, the quality of the courses in which OER are used, or the quality of the open learning architecture as a whole, moves into focus. Here, quality assurance focuses more on the OEPs and less on the OERs used. Thus, Brückner (2018, p. 60) calls for an "alternative perspective on quality of OER." She advocates for an enhanced understanding of quality that also takes special features of OERs such as their free accessibility and changeability into account. An essential aspect here is to involve the stakeholders involved in quality assurance at every stage of the development process and use of OERs.

Quality Standards and Quality Culture

In summary, the use of standards, criteria, and scales to capture the quality of OERs is by no means a one-time measurement of quality. Rather, standards, criteria, and scales represent the starting points for a complex development and revision process involving different actors and stakeholders. In this process, the quality-assuring agency is often not an independent observer but rather an active co-creator of quality. Also, the selection of resources fulfilling minimum standards is often not in the foreground of this process but rather the active accompaniment and support of the development of OER and the achievement of the highest possible quality under the given conditions.

Eventually, the aim of such a quality assurance process is to establish a "quality culture" (UNESCO and Commonwealth of Learning, 2011) for teaching and learning with OER.

Conclusion

OER can promote wider access to and collaboration on educational materials and thus contribute to the UN Agenda for Quality Education (SDG 4). However, it should be noted that worldwide dissemination and application in the practice of teaching and learning is still limited, even though there are many countrywide initiatives to support the creation of OER and build corresponding infrastructures. These depend strongly on the nature of the respective education system.

The low usage rate of OER is often linked to the question of quality. There is an unmanageable variety of OER materials and repositories, so that teachers are confused when choosing materials. Interestingly, there has been no widely used instrument for evaluating OER that has been systematically developed and meets scientific quality criteria. This was the starting point for the IQOER instrument described here.

However, the mere existence of such an instrument is not enough. It must be integrated into a quality assurance process agreed with all stakeholders. When implementing a quality assessment instrument in a quality assurance system, the process must be designed and communicated in such a way that it meets with the greatest possible acceptance on the part of the teachers and faculty members.

Finally, the culture of teaching and learning must change toward an Open Educational Practice in which it becomes a matter of course that high-quality learning materials are created, shared, and further developed together. Only then can we expect OER to be widely disseminated, even beyond the Anglo-American sphere. This would be very desirable, because the need for free learning materials is great in many countries. Especially during the Covid-19 pandemic, many teachers created digital learning materials with great effort in so-called emergency remote teaching and in the period thereafter. It would be a pity if these materials would not be shared and developed further in the future.

Cross-References

► Online Infrastructures for Open Educational Resources

Acknowledgments The work described in this publication is partly derived from the project "Digital educational architectures: Open learning resources in distributed learning infrastructures – EduArc" funded by the German Federal Ministry of Education and Research (grant #16DHB2129).

References

Almendro, D., & Silveira, I. F. (2018). Quality Assurance for Open Educational Resources: The OERTrust Framework. International Journal of Learning, Teaching and Educational Research, *17*(3), 1–14. https://doi.org/10.26803/ijlter.17.3.1

Atkins, D. E., Brown, J., & Hammond, A. L. (2007). *A review of the open educational resources (OER) movement: Achievements, challenges, and new opportunities*. William and Flora Hewlett Foundation. http://www.hewlett.org/wp-content/uploads/2016/08/ReviewoftheOERMovement.pdf

Baas, M., Admiraal, W., & van den Berg, E. (2019). Teachers' adoption of open educational resources in higher education. *Journal of Interactive Media in Education, 1*(9), 1–11. https://doi.org/10.5334/jime.510.

Bates, M., Loddington, S., Manuel, S., & Oppenheim, C. (2007). Attitudes to the rights and rewards for author contributions to repositories for teaching and learning. *ALT-J: Association for Learning Technology Journal, 15*(1), 67–82. https://doi.org/10.1080/09687760600837066.

Bossu, C., Brown, M., & Bull, D. (2014a). *Feasibility protocol for OER and OEP: A decision making tool for higher education*. Sydney: Australian Government Office for Learning and Teaching. Retrieved from https://ltr.edu.au/resources/CG10_1687_Bossu_Feasibility%20Protocol_2014.pdf

Bossu, C., Brown, M., & Bull, D. (2014b). *Adoption, use and management of open educational resources to enhance teaching and learning in Australia*. Sydney: Australian Government Office for Learning and Teaching. https://bit.ly/36xqK3d

Brückner, J. (2018). Eine Frage der Qualität – Qualitätsforderungen an Open Educational Resources in Schule und Hochschule. *MedienPädagogik*, *32*, 51–62.

Camilleri, A. F., Ehlers, U.-D., & Pawlowski, J. (2014). State of the art review of quality issues related to open educational resources (OER). In *JRC scientific and policy reports*. Publications Office of the European Union. https://nbn-resolving.org/urn:nbn:de:0111-opus-91019

Ehlers, U.-D. (2011). Extending the territory: From open educational resources to open educational practices. *Journal of Open, Flexible, and Distance Learning, 15*(2), 1–10.

Fernández-Pampillón Cesteros, A. M. (2017). UNE 71362, a standard to guide, improve, and assess the quality of digital educational materials. *Revista AENOR*, *329*. Retrieved from https://eprints.ucm.es/45088/

Gordillo, A., Barra, E., & Quemada, J. (2015). A flexible open source web platform to facilitate learning object evaluation. In *2014 IEEE Frontiers in Education Conference (FIE) proceedings*. https://doi.org/10.1109/FIE.2014.7044498.

Hodgkinson-Williams, C., Paskevicius, M., Cox, G., Donnelly, S., Czerniewicz, L., & Lee-Pan, S. (2013). 365 Days of openness: The emergence of OER at the University of Cape Town. In R. McGreal, W. Kinuthia, S. Marshall, & T. McNamara (Eds.), *Perspectives on open and distance learning: Open educational resources: Innovation, research and practice* (pp. 33–45). Vancouver: Commonwealth of Learning and Athabasca University. Retrieved from https://oerknowledgecloud.org/sites/oerknowledgecloud.org/files/pub_PS_OER-IRP_CH3.pdf

INTEF, red.es, & Spanish Autonomous Communities. (2010). Perfil de aplicación LOM-ES para etiquetado normalizado de Objetos Digitales Educativos (ODE). Retrieved from http://educalab.es/documents/10180/40863/1LOMES.pdf/67a11fe2-edc0-487f-b6d5-6a87dc258668

Jung, I., Sasaki, T., & Latchem, C. (2016). A framework for assessing fitness for purpose in open educational resources. *International Journal of Educational Technology in Higher Education, 13*(1), 3. https://doi.org/10.1186/s41239-016-0002-5.

Kerres, M. (2019). Offene Bildungsressourcen und Open Education: Openness als Bewegung oder als Gefüge von Initiativen? *MedienPädagogik: Zeitschrift Für Theorie Und Praxis Der Medienbildung*, *34*(Research and OER), 1–18. https://doi.org/10.21240/mpaed/34/2019.02.17.X.

Lee, E., & Kim, K. (2015). A study of Korean professors' experiences in the adoption and use of open courseware. *Journal of Curriculum Studies*, *33*(1), 65–91. https://bit.ly/3g2UNUH

Madiba, A. M. (2018). *Lecturers' perceptions and experiences of open educational resources in teaching and learning* (Doctoral dissertation). University of the Free State.

Marín, V. I., Bond, M., Zawacki-Richter, O., Aydin, C. H., Bedenlier, S., Bozkurt, A., . . . Xiao, J. (2020). A comparative study of national infrastructures for digital (open) educational resources in higher education. *Open Praxis*, *12*(2), 241–256. https://doi.org/10.5944/openpraxis.12.2.1071.
Marín, V. I., Zawacki-Richter, O., Aydin, C. H., Bedenlier, S., Bond, M., Bozkurt, A., . . . Zhang, J. (under review). Institutional measures for supporting OER in higher education: An international case-based study.
Marín, V. I., Zawacki-Richter, O., Aydin, C. H., Bedenlier, S., Bond, M., Bozkurt, A., . . . Zhang, J. (2022). Faculty perceptions, awareness and use of open educational resources for teaching and learning in higher education: A cross-comparative analysis. *Research and Practice in Technology Enhanced Learning*. https://doi.org/10.1186/s41039-022-00185-z
Mayrberger, K., Zawacki-Richter, O., & Müskens, W. (2018). *Qualitätsentwicklung von OER – Vorschlag zur Erstellung eines Qualitätssicherungsinstrumentes für OER am Beispiel der Hamburg Open Online University: Sonderband zum Fachmagazin Synergie*. Hamburg: Universität Hamburg. https://doi.org/10.25592/978.3.924330.67.5.
Mtebe, J., & Raisamo, R. (2014). Challenges and instructors' intention to adopt and use open educational resources in higher education in Tanzania. *International Review of Research in Open and Distance Learning, 15*(1), 249–271. https://doi.org/10.19173/irrodl.v15i1.1687.
Nesbit, J., Belfer, K., & Leacock, T. (2007). Learning object review instrument (LORI)—User manual. http://www.transplantedgoose.net/gradstudies/educ892/LORI1.5.pdf
OPAL. (2011). Beyond OER: Shifting Focus from Resources to Practices. Open Educational Quality Initiative (OPAL). https://duepublico2.uni-due.de/servlets/MCRFileNodeServlet/duepublico_derivate_00025907/OPALReport2011_Beyond_OER.pdf
Otto, D. (2020). Grosse Erwartungen: Die Rolle von Einstellungen bei der Nutzung und Verbreitung von Open Educational Resources. *MedienPädagogik: Zeitschrift Für Theorie Und Praxis Der Medienbildung*, *2020*(Occasional papers), 21–43. https://doi.org/10.21240/mpaed/00/2020.02.26.X.
Stagg, A., Nguyen, L., Bossu, C., Partridge, H., Funk, J., & Judith, K. (2018). Open educational practices in Australia: A first-phase National Audit of higher education. *International Review of Research in Open and Distributed Learning, 19*(3), 172–201. https://doi.org/10.19173/irrodl.v19i3.3441.
Stevens, J., Bradbury, S., & Hutley, S. (2017). Open education in practice – How policy can Lead to positive change. *Journal of the Australian Library and Information Association, 66*, 249–258. https://doi.org/10.1080/24750158.2017.1357914.
Tait, A. (2008). What are open universities for? Open Learning: The Journal of Open, Distance and e-Learning, *23*(2), 85–93. https://doi.org/10.1080/02680510802051871
Tillinghast, B. (2020). Developing an open educational resource and exploring OER-enabled pedagogy in higher education. *IAFOR Journal of Education, 8*(2), 159–174. https://doi.org/10.22492/ije.8.2.09
UNESCO. (2002). *Forum on the impact of open courseware for higher education in developing countries – Final report*. Paris: UNESO. http://unesdoc.unesco.org/images/0012/001285/128515e.pdf
UNESCO. (2019). Recommendation on Open Educational Resources (OER). https://unesdoc.unesco.org/ark:/48223/pf0000373755/PDF/373755eng.pdf.multi.page=3
UNESCO and Commonwealth of Learning. (2011). Guidelines for open educational resources (OER) in higher education. http://www.unesco.org/new/en/communication-and-information/resources/publications-and-communication-materials/publications/full-list/guidelines-for-open-educational-resources-oer-in-higher-education/
Wiley, D. (2013). The access compromise and the 5th R. https://opencontent.org/blog/archives/3221

Xiao, J. (2018). On the margins or at the center? Distance education in higher education. Distance Education, *39*(2), 259–274. https://doi.org/10.1080/01587919.2018.1429213

Yuan, M., & Recker, M. (2015). Not all rubrics are equal: A review of rubrics for evaluating the quality of open educational resources. *International Review of Research in Open and Distance Learning, 16*(5), 16–38. https://doi.org/10.19173/irrodl.v16i5.2389

Zawacki-Richter, O., & Mayrberger, K. (2017). *Qualität von OER: Internationale Bestandsaufnahme von Instrumenten zur Qualitätssicherung von Open Educational Resources (OER) – Schritte zu einem deutschen Modell am Beispiel der Hamburg Open Online University.* Hamburg: Hamburg Open Online University. https://www.synergie.uni-hamburg.de/media/sonderbaende/qualitaet-von-oer-2017.pdf

Zawacki-Richter, O., Conrad, D., Bozkurt, A., Aydin, C. H., Jung, I., Kondakci, Y., . . . Xiao, J. (2020). Elements of open education: An invitation to future research. *International Review of Research in Open and Distance Learning*, *21*(3), 319–334. https://doi.org/10.19173/irrodl.v21i3.4659

Accreditation and Recognition of Prior Learning in Higher Education

47

Dianne Conrad

Contents

Abstract

The recognition of prior learning (RPL) can, and does, play an important role in the accreditation of higher institutional learning, thereby benefitting students, employers, and society. Using rigorous tools that permit learners to bring forward for assessment their experiential learning from various life experiences, RPL can contribute to a fuller and equally valid expression of learners' knowledge than does traditional assessment. Additionally, RPL contributes to mitigating issues of equity, diversity, and inclusion in education by acknowledging and valuing a variety of learning opportunities. RPL also raises difficult epistemological issues

D. Conrad (✉)
Athabasca University, Athabasca, AB, Canada
e-mail: diannec@athabascau.ca

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_44

and the question of knowledge ownership, thus making it a contentious and challenging academic concern This chapter reviews the process and pedagogy of RPL practice within the evolving context of accreditation, both at present and in the future, a future which includes innovations such as open educational practice, MOOCs, and micro-credentialling, all of which create opportunities for traditional modes of accreditation and assessment to re-examine their purpose and process.

Keywords

Prior learning recognition · Assessment · Accreditation · Micro-credentialling · Inclusion · Access

Introduction

The hallmark of formal higher education is accreditation. Learners seek, via accreditation, acknowledgment of the learning that they have acquired from their institutions, be it the acquisition of degrees – post-graduate, graduate, or undergraduate – or perhaps a diploma requiring 2 or 3 years of study. Accreditation is an important – the most important? – goal for most higher education learners.

Accreditation of an institution, however, is equally important, involving many stakeholders. Students seek a viable institution with proven quality and a proven history; the labor market seeks assurance that graduates are appropriately knowledgeable, skilled, or certified. National and international agencies manage institutional accreditation processes in order to ensure and assess institutional quality in all its aspects: research, teaching, programs, assessment protocols, accountability.

Nevertheless, all accreditation is fraught with difficulties. Carey, from New America Foundation, says that "No one really likes accreditation but no one knows what else to do" (uPlanner, 2016). In determining "what to do," in matters of accreditation, institutions face many challenges, both internal and external. This chapter examines the relationship between the accreditation of students' learning and the process of recognizing prior learning (RPL) – a process internal to the institution. In so doing, this chapter discusses the underlying foundational principles of RPL, thereby establishing its educational philosophical ballast, and further topics of related concern: society, hegemony, epistemology, pedagogy, and the future. It will describe its process; it will outline RPL's current role in higher education; and it will offer strategies to further engage institutions and learners in a valuable process that can expedite their studies, allow them to move more quickly and efficiently into the workplace, or to advance appropriately in their current positions. As the president of Capella University recently stated: "Improving the effectiveness of practices such as [RPL] is one way that institutions can reduce barriers to access and affordability and offer educational experiences that are tightly coupled with the needs of the students we serve" (Kelly, 2021). An academically rigorous RPL assessment process contributes to a sound accreditation process.

The Recognition of Prior Learning

The Recognition of Prior Learning (RPL), also called Prior Learning Assessment and Recognition (PLAR), among other labels, is a practice in higher education whereby learners' previous and existing knowledge and skills are assessed by an institution's content experts. Credit is then granted (or not) toward the learner's program of study. This chapter uses the acronym RPL to appeal to the largest global readership.

RPL is not a new process; it rests philosophically not only on the work of John Dewey (1938) who proclaimed that the "beginning of instruction shall be made with the experience learners already have . . . this experience and the capacities that have been developed during its course provide the starting point for all further learning" (p. 74) but harks back to Aristotle and, more recently, to noted educators Knowles (1970), Vygotsky (1978), Kolb (1984), and Brookfield (1986).

Given its objective to facilitate faster and more accessible credentialization for deserving learners, what process could be more relevant today in the "age of open," an era now, in the twenty-first century, that promises and celebrates the lowering and abolishment of many of the barriers that have traditionally stood in the way of learners for decades? Even more dramatically and specifically, what could be more helpful now at the time of a global pandemic – and those that are projected to follow – than a path to higher education with fewer barriers and constraints?

RPL: What It Is, What It Is Not

Speaking broadly, the recognition of prior learning offers a "process-oriented approach for recognising and valuing what people have learned in their lives and linking that – through personalised lifelong learning – to further development steps" (Duvekot, 2014, p. 65). *Personalized lifelong learning* refers to, or includes, the recognition of prior learning, which permits learners to bring forth for assessment their *own* learning journeys and the results of that learning, whether it be formal or informal and experiential (whereas RPL generally attends to informal learning that learners have acquired experientially, formal learning is also often considered in the RPL process if that formal learning has not already been credited to the learner's transcript in the credit transfer process).

Defining what RPL is *not* offering a narrower path to defining what it is. The RPL process is not credit transfer nor credit equivalency. However, some institutions' categorization of RPL lump it into the classification of transfer, along with advanced standing and block transfer, thus further confusing the issue (see, for example, Sheridan College in Canada).

Credit transfer (CT). On many occasions and in many institutions, RPL is often confused with credit transfer (CT). Credit transfer offers learners another portal to advanced standing via the transfer process where credits earned formally at a previously attended formal institution are assessed for value by the host/receiving institution and subsequently awarded to learners following their successful application for transfer. "It is important for reasons of social equity and educational effectiveness for all institutions to develop reasonable and definitive policies and procedures for acceptance of such learning experiences" (Distance Education Accrediting Commission [DEAC], 2021). As such, most institutions have developed, in cooperation with other similar institutions, such agreements.

The evaluation of already-recognized credits – or a completed credential – from a recognized institution to another institution is quite different from RPL, where it is the learner's experiential, nonformal, or informal learning that is assessed. In considering the effects of the Covid-19 pandemic on higher education, a recent article by Commonwealth of Learning personnel presented transfer credit as part of a "new model for a new normal" (Kanwar & Carr, 2020), a model that focuses on accessibility and mobility, thus permitting learners additional flexibility as they work toward a credential. While it is true that increased credit transfer processes will indeed serve learners, so too would the increased use of RPL. Transfer credit recognizes formalized learning; RPL recognizes nonformalized learning.

Credit equivalency (EQ). Some institutions (see, for example, Recognition of Prior Learning Service at NBCC in Canada) equate life experience and life's experiential learning (volunteerism, military service, workshops, seminars, training, self-directed study, faith study) to the outcomes or competencies required in a formal course, unit, or module. In these cases, documents are submitted to indicate the scope of learning and the "match" of the applicant's experiential learning with the institution's offering. The defining difference between EQ and RPL is the dependence on the externally evidenced fit of one to the other. EQ requires little of the applicant but to fill in the logistical details of his or her experience. "Samples of work . . . which demonstrate specified learning, such as portfolios, product, models, written reports, visual presentations, published articles, or project plans" (NBCC, 2021) are accepted as evidence of learning; whereas in a rigorous RPL process, these items only serve as documentation.

In sum, credit transfer and credit equivalency can be fairly straightforward, following a close vetting of course curriculum and the acceptance of stated curricular levels, intended outcomes or objectives, and assessment protocols; RPL is usually, and *should be,* a more detailed and personalized demonstration and examination of an individual's learning in a clear fashion as demanded by the receiving institution. The components of such a process are outlined below.

While RPL-offering institutions will each have their own process, there are several important foundational concepts that form the basis of those processes. Following are those concepts as presented by the Open University of the Netherlands (EUCEN, n.d.): the process must be learner-centered; clear guidance and instruction must be provided to learners; learners must provide evidence of their learning; evidence of learning must be supported by documentation; and RPL credit awarded must be of equal value to the similar credit earned through program study.

The Philosophy and Practice of RPL

Issues around knowledge are key to the understanding and implementation of RPL practice. Although scholars approach the understanding of knowledge from various perspectives, a key question problematizes the central issue: how do experiential and academic learning articulate with each other (Osman, Shalem, Castle, & Attwood (2000, p. 12)? Discussion around this issue raises the question of knowledge boundaries: What are they? Are different forms of knowledge separated by *soft boundaries* that permit the transfer of knowledge across contexts or *hard boundaries*, where informal learning may produce a different knowledge than that acquired in a formal context (Harris, 2006)?

Harris (2006), citing Bernstein (1999), raises another fundamental epistemological issue, that of vertical or horizontal discourses and their associated knowledge structures which impact ways of learning, curricular context, and the suitability of RPL assessment protocols (see Harris (2006) and Bernstein (1999)). While a full discussion on the manifestations of philosophical differences regarding knowledge is outside the scope of this chapter, despite these differences, however, a process has emerged as a viable approach to determining the validity and usefulness of prior knowledge in formal institutions' credentialing protocols where RPL applicants are required to align their prior knowledge to institutional requirements that are usually expressed in course/module/unit or program outcomes.

The varying and often discordant discourses attempting to define RPL protocols indicate that, as with any and all facets of higher education, recognizing prior learning is a philosophically based and often contested academic process. As such, learning must be positioned at the heart of RPL. Citing Kolb (1984) and Boud, Keogh, and Walker (1985), Shalem and Steinberg (2006) hold that "Much current research and policy of RPL is premised on the notion that 'experiential learning' . . . that is, learning from experience, can be made equivalent to a disciplined academic way of learning" (p. 98). While the pedagogical complexity of such a process is not disputed, three pillars of RPL are widely recognized as essential factors in an academically rigorous process: clear learning outcomes that serve as a blueprint for learners' guidance, the creation of a portfolio that serves as the vessel for the presentation of learners' knowledge, and qualified assessors who serve as evaluators of learners' work.

Learning outcomes, providing direction and guidelines for RPL applicants. How do learners identify, construct, and display their experiential knowledge? Ironically, as Michelson (2006) points out, while purporting to honor the individual learning of each applicant, most RPL processes ask learners to conform to "universalised academic norms" (p. 148) that meet institutional standards, thereby articulating their knowledge in recognizable academic language. To do so, applicants must be mentored or coached in that language, assistance that is usually offered by RPL personnel. Even with such help, framing their knowledge in the appropriate lexicon is challenging for learners.

The learning portfolio, providing a vehicle for presentation. The RPL portfolio is a learning portfolio rather than a performance or showcase portfolio; as such, its task is to provide the vehicle for learners to clearly demonstrate their experiential knowledge in the format adopted by the institution. Developing an RPL portfolio comprises both product and process: in today's world, the product is usually an electronic portfolio mounted on a platform such as Mahara; the process is one of deep thinking and reflection of one's learning, situated in the institution's academic context of outcomes and language.

The portfolio is a daunting document that is often criticized for constraining learners' perceived experiential learning. Realistically, however, in this sense, portfolios do not differ from any assessment instrument used in education. Critical thought recognizes that *all* assessment is flawed in some ways and to some degree (Conrad & Openo, 2018). All assessment privileges one audience over another. All assessment depends on someone's epistemological stance.

However imperfect assessment processes are, they remain integral to higher education. In the case of portfolio assessment, compared, for example, to examinations, candidates are given the opportunity to build on and develop their understanding of their own relevant knowledge, usually with the assistance of mentors or coaches. The portfolio development process involves several stages of reflective inquiry by learners to identify the acquired experiential knowledge from any number of locales or sources, formal or informal – work environments, past informal or non-credentialled study, volunteer work, faith life, domestic experience. RPL tools exist for this preliminary step of the process (Sansregret, 1993). That recalled knowledge is then situated – one could say massaged – to align with institution-provided learning goals or outcomes.

Criticism notwithstanding, the reflection required for this step of RPL is praised by successful RPL candidates who are exposed to and educated in this skill often for the first time. The discovery by learners of their tacit, hidden, or unidentified learning from past experiences is rewarding and creates a new – and triumphant – sense of self-esteem which is considered by RPL practitioners to be one of the most important aspects of the process, both for learners and for those who assist learners through the process. Assessors, too, often comment on the visible evidence of meaningful reflection present in portfolios. A short, autobiographical piece of writing usually required in the portfolio provides the opportunity for learners to reflectively position their learning within their life stories.

A final task for portfolio applicants requires the inclusion of documentation attesting to the experiences that they have named as knowledge sources. Such documentation can take many forms including letters from those who are or have been in positions of observation or evaluation of the learners' performance in whatever venue. Locating such documentation, while often tedious and laborious for learners, is regarded as a checks-and-balance mechanism to assure authenticity and rigor. That said, the heart of the portfolio remains the learners' expression of knowledge, with documentation serving a supporting role.

Assessors, providing quality and informed evaluation. If learners' learning comprises the heart of the RPL portfolio, then those who assess learners' work provide the lifeblood that feeds the process. As qualified and engaged teachers are deemed to be the appropriate assessors of students' work in higher education institutions, so too are RPL assessors tasked with that moral and academic authority. That said, the selection and training of assessors is a critical aspect of the process. Assessors must be intimately familiar with the intended outcomes of the program, module, or course with which they are RPL-associated. However, more than that, they must appreciate the spirit of prior learning assessment. They must accept the notion that not all valid knowledge comes from textbooks. Not all knowledge can be broken up neatly into a course or module-sized box. As Michelson (2006) explains, if all knowledge is:

> . . .situated knowledge, then similarity to academic knowledge cannot be the sole criterion for assessment; there will be times at which a path of inquiry with compelling explanatory power will lead to knowledge that is not congruent with academic forms of truth. (p. 156)

This discussion leads directly back to issues of power and politics within academia: Whose knowledge counts? Whose knowledge should be credentialled? This foundational discussion cannot be avoided and likely will not ever be satisfactorily or quietly resolved. However, as Michelson (2006) concludes, "by substituting dialogue and mutual recognition for what was unidirectional judgment, we destabilise the basis on which validation is given and invite a sharing of epistemological authority" (p. 157) – whether welcomed within the institution or not.

RPL Benefits Learners

Ample evidence from the field indicates that recognizing prior learning serves students well. Becky Klein-Collins, Vice-President of the US-based Council for Adult and Experiential Learning (CAEL), reported these statistics in a Lumina-hosted session:

- The average number of PLA credits earned by students is 15.
- Cost savings for adult students range from $1,500 to $10,200.
- Time savings for adult students' completions with PLA credits range from nine to 14 months.
- "Tipping point" analysis for PLA completers' data indicate that adult students see increased effects with 15 or more PLA credits. (2020)

The benefits of RPL to learners' higher education experience and progress are many. Successful RPL completers will achieve their educational goals more quickly, save tuition costs by earning RPL credits toward their program of study, benefit from an individualized RPL process that allows them to tailor their program of study around their prior experience, benefit from cognitive development resulting from rigorous RPL demands, experience personal growth from reflective activities contained with RPL processes, recognize the integration of their prior (and present) learning with past experience, and experience increased self-esteem and confidence following the formal recognition of their prior learning.

Institutional Infrastructure and Process for RPL

A major stumbling block for many institutions that express an interest in implementing an RPL process is the institutionally complex nature of the task. Unlike many higher educational processes which operate within programs or units or faculties – for example, an arts faculty or a science faculty, where most day-to-day decisions can be made by the top-ranked administrator – the RPL process must span the entire institution; it must encompass, equitably, all programs. In fairness, it must offer the same opportunities to all learners.

In some cases, institutions will initiate an RPL in one program area as a pilot study in order to determine the efficacy of their process before expanding that process to the institution at large. The Open University of the Netherlands, as an aid to the implementation process, has developed a task chart that outlines the various responsibilities and actions that comprise an RPL process. In it, they categorize task, its implications, and, importantly, *wider* institutional implications (EUCEN, n.d.)

To best successfully position the RPL process within an institution, the creation of an independent unit or center is advised (Conrad, 2008). This center should stand alone, detached from academic units, in order that its decisions can be perceived to be fair and not influenced by faculty or program personnel. Ideally, this independent center or unit will be led by an experienced academic who is knowledgeable in epistemology and assessment. Because the RPL process will span the institution, the RPL champion – for the RPL leader *must* be a champion for the process, given the probable pushback and/or misunderstanding of the process by colleagues within the institution (Osman, 2006; Van Kleef, 2014) – will require skills in communication as well as a broad knowledge of institutional academic structure and requirements. An RPL leader should be invited to engage in pan-institutional meetings, both academic and administrative, to initiate, present, explain, and even defend RPL processes as they pertain to learners' engagement with the process and the integration of their RPL-earned credit into their academic status.

Although the establishment of such a unit or center is key to RPL success within an institution, such hubs have historically not been perceived as necessary or fiscally possible by institutional administrators. In an ideal situation, RPL personnel will minister to the needs of learners both academically, via an assessment process, and administratively, in collaboration with administrative personnel. However, in many cases, RPL practitioners find themselves working alone, shouldering not only the responsibility for many learners' academic assessment but also the subsequent administrative tasks.

New Patterns of Accreditation of Students' Learning

The prior discussion of RPL rests within – and takes its function and importance from – the larger discussion of accrediting students' learning. To that end, prior learning and recognition advocates have long recognized that the learning obtained by students enrolled in higher education programs of study forms only a partial representation of an individual's acquired knowledge. Accordingly, RPL processes have provided pathways for learners to bring forward and capitalize on their prior or experiential learning.

However, as outlined earlier, these pathways have not been without hurdles and bumps. Also, with a nod to technology and education's current advances in media, Pittinsky declared in 2015 that higher education "must find ways to credential better – with more information and in more accessible ways – using the transformative technology we now have available." Pittinsky unapologetically acknowledged that our society – he referred specifically to the United States – is a credentialing society and that higher education institutions are the "gatekeepers of many of those credentials" (2015).

The societal and economic push for credentials is not germane to this discussion save to say that they exist, have always existed in the modern world, and will no doubt continue to exist. However, Pittinsky (2015) raises the issues of access and scalable logistics to question the reasonableness of current credentialling protocols. He suggests that there are innovative trends that can contribute to better meeting societal and labor market needs and expectations of higher education graduates. Of interest to this RPL-centered discussion are open education, massive open online courses (MOOCs), and micro-credentialling.

As Pittinsky points out, innovative processes have been developed to meet evolving societal needs. The broadest category of innovation, open education is, as leading scholar Laura Czerniewicz (2020) points out, neither a simple nor single-faceted concept. However, attempts to open education have proliferated around the world, at all levels of education, contesting traditional views of access, equity, and diversity (Conrad & Prinsloo, 2020). MOOCs, a type of openness, implemented in 2008, provide opportunities for access to higher learning *en masse* with some provision for accreditation. Currently, however, micro-credentialling offers perhaps the most concrete innovation toward accreditation for learners at many levels, including higher education.

It should be noted that innovation and variations in the credentialling of students' learning directly affects the long-regarded bibles of student achievement – the transcript. That logistical discussion is not a part of this chapter.

Micro-credentialling in Higher Education

Micro-credentialling is defined as a "representation of learning, awarded for completion of a short program that is focused on a discrete set of competencies (i.e., skills, knowledge, attributes), and is sometimes related to other credentials" (HEQCO, n.d.). The recent move to micro-credentials is closely linked to workplace recovery plans that will necessarily follow the Covid-19 pandemic which has affected global systems from 2019 into the foreseeable future (Marcus, 2020). The pandemic has shifted priorities and protocols, in education as well as in most other major societal-life areas. Educational research on the effects and outcomes of the changes wrought in education has resulted in new data on related topics that examine not only the effects of the "pivot" to what has been termed *emergency remote learning* but also on prospective and future avenues to credentialling and student success. Educators continue to look to the future of higher education to determine the long-term effects of Covid's enormous impact on educational systems.

Among other studies, Marcus (2020) reports that "stackable" bachelor's programs in the U.S.A – those that permit the accumulation of degree credits via a series of short courses – at Western Governors University has doubled in size during Covid-19. Similarly, MIT and Harvard's online provider, edX, has experienced a 14-fold rise in enrollment during approximately the same timeframe. The University System of Georgia has initiated a "nexus degree" which comprises certifications that add up to associate degrees initially and then bachelor's degrees.

In the UK, the Open University has partnered with FutureLearn to offer a range of micro-credentials as have the University of Glasgow and Coventry University, among others. In Europe, the challenges and opportunities for micro-credentials in higher education were addressed in a report coordinated by Italy and Germany that included participants from Finland and the European Distance Education Network (EDEN). The report noted that students approved of micro-credentials, and the demand for such learning was acknowledged, but "certification is perceived as optional" (Uggeri & Hudak, 2019, p. 37). In conclusion, the report recognized the need and potential usefulness of micro-credentials but noted bureaucratic concerns around the development of such and of a related "digital passport for education" (p. 37).

The American National Student Clearinghouse Research Center that tracks the process of bachelor degree candidates reports that more than 40 percent of those learners will not complete within six years (Marcus, 2020). Creating micro-credentialling paths toward degrees is seen as a solution to such a high attrition rate. The president of Brigham-Young University's online arm, BYU Pathway Worldwise, praised micro-credentialling in this way: "If you were design [college] from scratch, this is how you'd do it" (Marcus, 2020).

Tooley and Hood (2021) speculate that micro-credentials can serve teachers well as they seek new and immediate new skills with which to adapt their practice to Covid-19 realities:

> High-quality micro-credentials verify a small, discrete, and evidence-based competency that a teacher demonstrates by submitting evidence of application from their practice (as assessed by a validated rubric). The associated resources and assessment are offered digitally in an asynchronous, self-paced format, which is crucial for schools forced into remote learning.

Professional and continuing education providers have traditionally been more nimble as regards meeting workplace and employer needs; therefore, it is not surprising that continuing teacher education, for example, has realized the value of micro-credentials. Traditional, credentialled higher education, on the other hand, has historically been slow to adapt to change given its need to adhere to strict oversight and rigorous academic vetting of new protocols.

Leveraging micro-credentials into students' credentialling options begins to meet the needs of fast-changing economies and societies by focusing on an individual's competencies, skills, and knowledge. In this way, the gap between learning and work is lessened; access to learning is increased; and individualism is valued. From these changes result increased equity among learners and the lessening of the negative effects of social and economic diversity among learners. The recognition of prior learning can be key to these changes.

Klein-Collins and Travers (2020) note accurately that the recognition of prior learning has not changed much in many decades; they ask, subsequently, how the practice can be thought of differently so as to meet future learning needs. They note, however, that higher education has experienced some shifts in "how learning is defined, valued, delivered, credentialled, and supported" (p. 2). New types of credentialling include the emergence of "short-term, competency-based, and stackable" (p. 2) micro-credentials as well as the recognition of less-formal modes of learning such as that offered by open programs and MOOCs, described above.

RPL and Assessment in the Larger Picture: Issues of Equity, Access, and Inclusion

Issues of equity, diversity, and inclusion have received more prominence in recent years. Injustices of the past in many parts of the world – slavery and colonialism, for example – are being revisited, often accompanied by attempts to right those historical wrongs. In the field of higher education, the turns toward open education, open educational resources (OER), and open education practices (OEP) have touted access and equity as primary concerns. However, additionally, cultural responsiveness has been deemed an important aspect of equitable education and training. The complementary states of educational openness and global "village-ness" have awakened educators to the importance and complexity of culture. Also, from outside the field of higher education itself, employers and the workforce have been calling for not only more highly skilled workers but also more cognitively prepared graduates from institutions of higher learning.

Recently, the pandemic-induced sudden and dramatic pivot to emergency remote learning has increased even further the attention to culture, inclusion, equity, and access in education. Taken together, these facets raise the profile of socially just assessment (Montenegro & Jankowski, 2020). As regards the interest of this chapter, new calls for equity and social justice in assessment resonate with the mandate and vision of RPL, which has been articulated above.

Equity and social justice rail against the many long-entrenched imbalances and inequities in education described here:

The dynamics of power and oppression. Traditional educational philosophies and teaching approaches have supported positivist and didactic approaches to learning both in presentation style and assessment techniques (Conrad & Openo, 2018). Classrooms have been teacher-centric from primary school to university classrooms. However, these strategies and approaches have been changing for several years as learning philosophies have shifted from sage-on-the-stage to constructivist, learner-centered approaches which value learners' prior experience and recognize the potential and importance of guiding learners toward an authentic understanding of knowledge, one that resonates with them meaningfully rather than one that is forced upon them and construed in someone else's language or experience.

Thus, formerly, there was no question of whose knowledge was important and whose knowledge was disseminated; it was the knowledge of the teacher and the textbook which, in many countries, was the knowledge of the dominant culture. These "systems of power and oppressions influence[d] how students experience [d] college, engage[d] with the learning process, and [built] knowledge" (Montenegro & Jankowski, 2020, p. 7).

An uneven playing field. Neither education nor any aspect of society has ever provided equal access or opportunity to learners. Similarly, assessment protocols inevitably privilege some learners above others. For example, why does a pre-kindergarten child taking the Denver Developmental Screening Test not know what a hedge is when asked. Why does he not know? He does not know about hedges because he lives on a farm and has never seen a hedge or heard one being discussed around the farm kitchen table. Therefore, he is marked as deficient on this question. (The Denver test was revised in 1992 to address the difference in norms in, for example, ethnic groups.) "It takes a conscious, intentional approach to make [social equity] happen, alongside potentially hard conversations" (Montenegro & Jankowski, 2020, p. 8).

Subjectivity and the lack of critical consciousness. A critical consciousness is necessary to recognize our own subjectivity and subsequently, to recognize our own biases and stances on power and privilege. A popular expression, "don't ask a fish about water," refers to the fact that we cannot easily see beyond or outside of our own fishbowl existence (Don't ask the fish, n.d.). Stepping out of our own fishbowl, or our own comfort zone, however, requires conscious effort, attention, and reflection (Rose, 2013).

Institutional culture, language, and the will to change. Teachers' individual willingness to adapt to cultural, access, or equity challenges may be thwarted by an oppressive or tone-deaf institutional administration or culture that does not or will not provide or foster a climate that is receptive to change. In some cases, new language is required in order to even begin the discussion. In a similar discussion, Spence (2020) criticizes our current language as old and faltering; it cannot meet the needs of a changing society. At the very least, a leader is needed – a champion. However, educators are busy, multitasking professionals, already dealing with myriad issues and personalities; the advent of Covid in 2019 has only increased and complicated demands on their time. Who will take on the mantle of change-agent? "No one wants to waste their time or, worse, share their thoughts and see no action taken in response; thus adding to feelings of being unheard or unseen" or overworked (Montenegro & Jankowski, 2020, p. 15).

RPL and Social Justice

Social justice, long an important item on global agendas for change, forms a fundamental pillar to RPL's *raison d'être,* although its attention to this cause may not be obvious to those benefitting from the process – the learners. Learners perceive their own set of welcome benefits at the microlevel: they save money and time. The recognition of their prior learning permits them to complete a degree program more quickly and cheaply.

However, to those in positions to shape educational policy and programs, the awareness of RPL's contribution to social justice – equity and inclusion – is paramount (Wong, 2014). For while RPL provides a logistical framework for assessing prior knowledge, it does not answer the fundamental epistemological questions of knowledge that remains: Whose knowledge is valued, whose is not valued? Whose experiential learning is included, whose is excluded? The acknowledgment of valued knowledge is key to equity and inclusion. Many global RPL initiatives – in South Africa, Scotland, Australia, and Europe – have emphasized social justice in their platforms (see, for example, Cameron & Miller, 2004; Guimarães & Mikulec, 2020).

Future Potential and Challenges for RPL

The recognition of prior learning has, over the years, been "represented as an emancipatory strategy to facilitate access to higher education" (Peters, 2006) for those for whom access has been difficult or denied. However, despite these high ideals, the path has not been smooth. Although scholars such as Felder looked forward in 2017 to "continued reflection by assessment professionals on the ways that current assessment efforts either centralize issues of equity or serve to perpetuate them . . . pushing the scholarly conversation forward towards wider understanding and action," progress has been slow.

Ten "sketches of innovative pedagogies" for 2021, recently featured in Canada's Contact North/Contact Nord biweekly online newsletter (2021), were drawn from scholarship from the UK's Open University; they include the following:

1. Best learning moments
2. Enriched realities
3. Gratitude as a pedagogy
4. Equity-oriented pedagogy
5. Using chatbots in learning
6. Hip-hop education
7. Student co-created teaching and learning
8. Telecollaboration for language learning
9. Evidence-based teaching
10. Corpus-based pedagogy

While some of these innovations may seem more easily understandable and accessible to the reader than others, the notable point is that none of them mentions anything specific about assessment, prior learning, or inclusion. Indeed, while equity-oriented pedagogy may hint at innovation leading to increased openness or access to learning – a move that might rely on RPL – it does not explore this notion.

This author, while considering the future of RPL and assessment several years ago, wrote:

> Re-examining assessment strategies, however, has emerged as the hallmark pedagogical issue linking traditional higher education practice to the innovations that attempt to challenge it. Finding the assessment 'fit' to legitimise open learning is somewhat akin to finding the Northwest Passage to claim the treasures of the East. Within the quest, RPL's potential seems, to its champions at least, to offer an accessible and proven solution. (Conrad, 2014, p. 331)

At the time of writing, one might ask, what has changed? At 2020's European Higher Education Bologna Process Implementation Report gathering, a presentation examining the current status of RPL in Europe concluded that little progress had been made even though accommodating legal frameworks have been created (Crosier, 2021). In spite of this provision, higher education lags behind adult education, vocational education, and the labor market in making use of RPL. Among the reasons given for this lag are these: there is little political advantage connected to individuals benefitting from RPL, and societal benefit is not well understood by governments; higher education is perceived to be sufficiently inclusive already; higher education has not championed or lobbied for increased implementation of RPL. Potential RPL applicants are also deemed to be unaware of its potential benefits to them.

In Canada, the Canadian Association for Prior Learning Assessment (CAPLA) continues, at the time of writing, to offer training in RPL processes; its focus includes college and university level study as well as private and labor enterprises. In considering the future of RPL in Canada, CAPLA looks to micro-credentialling as potentially providing a boost to RPL's momentum. Luff, Travers, and Piedra (2021) highlighted Canada's 2020 Future Skills Council Report which directly called for the expansion of RPL for broader employer use. Their call is reinforced by UNESCO's Institute for Lifelong Learning that asserts that RPL implementation meets the growing need of citizens for opportunities for continued and lifelong learning.

Beyond higher education, private institutions promote RPL processes via online training. The International Training Centre's (ITC) "E-Learning Course on Recognition of Prior Learning," offered in the spring of 2021, sought to attract policymakers, managers in employment sectors and human resources, and stakeholders in NGOs and others in the fields of skills development. A Certificate of Completion was offered.

Final Words

This chapter aimed to elucidate the recognition of students' prior learning within the larger context of accrediting that learning. Both topics point to important issues around learning: quality, access, and equity. Accrediting higher education learning is an historic and usually traditional process that is carefully managed by institutions;

RPL provides one facet of that total picture. Unfortunately, it is a facet not often fully understood, and therefore its affordances – for learners, employers, and society – are unappreciated, its process unimplemented or, perhaps, implemented badly.

Higher education institutions worldwide have adapted to and welcomed the concepts of open learning and micro-credentialling to varying degrees in order to hasten students' academic progress and provide greater and more equitable access to students. RPL's long history has proven it a worthy piece in the puzzle of accrediting learning. As education's responses to the still-current pandemic evolve, will RPL take its place among other solutions? While this writer is dubious, the hope remains.

References

Bernstein, B. (1999). Vertical and horizontal discourse: An essay. *British Journal of Sociology of Education, 20*(2), 157–173.

Boud, D., Keogh, R., & Walker, D. (Eds.). (1985). *Reflection: Turning experience into learning*. London, UK: Kogan Page.

Brookfield, S. D. (1986). *Understanding and facilitating adult learning*. San Francisco, CA: Jossey-Bass.

Cameron, R., & Miller, P. (2004). RPL: Why has it failed to act as a mechanism for social change? Southern Cross University. Retrieved from https://www.academia.edu/3439569/RPL_Why_has_it_failed_to_act_as_a_mechanism_for_social_change

Conrad, D. (2008). Situating prior learning assessment and recognition (PLAR) in an online learning environment. In T. Anderson (Ed.), *The theory and practice of online learning* (2nd ed., pp. 75–90). Edmonton, AB: Athabasca University Press.

Conrad, D. (2014). RPL in higher education: Past, present and potential. In J. Harris, C. Wihak, & J. Van Kleef (Eds.), *Handbook of the recognition of prior learning* (pp. 315–335). Leicester, UK: NIACE.

Conrad, D., & Openo, J. (2018). *Assessment strategies for online learning: Engagement and authenticity*. Edmonton, AB: Athabasca University Press.

Conrad, D., & Prinsloo, P. (Eds.). (2020). *Open(ing) education: Theory and practice*. Leiden, Netherlands: Brill.

Crosier, D. (March 21, 2021). *Current status of RPL: What progress have we made in the EHEA?* Swedish Council for Higher Education. Retrieved from https://www.uhr.se/contentassets/e9abf4935ad94f308eaf84082313a608/david-crosier_eacea_rpl-in-he_present-status.pdf

Czerniewicz, L. (2020). Opening education: Complex is as simple as it gets. In D. Conrad & P. Prinsloo (Eds.), *Open(ing) education: Theory and practice*. Leiden, Netherlands: Brill.

Dewey, J. (1938). *Experience and education*. New York, NY: Macmillan.

Distance Education Accrediting Commission (DEAC). (2021). *Transfer of credit.* Retrieved from https://www.deac.org/Student-Center/Transfer-Of-Credit.aspx

Don't ask the fish. (n.d.). https://www.dontaskthefish.com/

Duvekot, R. (2014). Lifelong learning policy and RPL in the learning society: The promise of Faure? In J. Harris, C. Wihak, & J. Van Kleef (Eds.), *Handbook of the recognition of prior learning* (pp. 65–85). Leicester, UK: NIACE.

EUCEN. (n.d.). Recognition of prior learning. *The BeFlex project.* Retrived from http://www.eucen.eu/BeFlexPlus/TrainingMaterials/08_RPL.pdf

Felder, P. (2017). *On the importance of cultural responsive assessment.* Urbana, IL: University of Illinois and Indiana University, National Institute for Learning Outcomes Assessment (NILOA).

Guimarães, P., & Mikulec, B. (2020). The paradox of utilitarian recognition of prior learning: The cases of Portugal and Slovenia. *European Journal for Research on the Education and Learning of Adults, 12*(1), 109–122.

Harris, J. (2006). Questions of knowledge and curriculum. In P. Andersson & J. Harris (Eds.), *Re-theorising the recognition of prior learning* (pp. 51–76). Leicester, UK: NIACE.
International Training Centre (ITC). (2021). E-learning course on recognition of prior learning. Retrieved from https://www.itcilo.org/courses/e-learning-course-recognition-prior-learning
Kanwar, A., & Carr, A. (2020). The impact of Covid-19 on international higher education models for the new normal. *Journal of Learning for Development, 7*(3), 326–333.
Kelly, R. (2021). 6 steps to move prior learning assessment forward. *Campus technology*. Capella University. Retrieved from https://campustechnology.com/articles/2021/02/10/6-steps-to-move-prior-learning-assessment-forward.aspx
Klein-Collins, B. (2020). *Making the case for the recognition of learning: Evidence from the field to scale effective practices and policies.* Retrived from https://www.wiche.edu/events/making-the-case-for-rl/
Klein-Collins, B., & Travers, N. (2020). Learning recognition and the future of higher education – A vision for a post-pandemic learning ecosystem. CAEL. Retrieved from https://www.luminafoundation.org/wp-content/uploads/2020/10/a-vision-for-a-post-pandemic-learning-system.pdf
Knowles, M. (1970). *The modern practice of adult education*. Chicago, IL: Follett.
Kolb, D. (1984). *Experiential learning*. Englewood Cliffs, NJ: Prentice-Hall.
Luff, M., Piedra, D., & Travers, N. L. (2021). *Will the micro-credential craze reset the recognition agenda in Canada?* CAPLA Education and Training Spring Webinars. 2021 Spring Webinar | CAPLA.
Marcus, J. (2020, June 2). Urgency of getting people back to work gives new momentum to "microcredentials." *The Hechinger Report*. Retrieved from https://hechingerreport.org/more-students-start-earning-stackable-credentials-on-their-way-to-degrees/
Michelson, E. (2006). Beyond Galileo's telescope: Situated knowledge and the recognition of prior learning. In I. P. Andersson & J. Harris (Eds.), *Re-theorising the recognition of prior learning* (pp. 141–162). Leicester, UK: NIACE.
Montenegro, E., & Jankowski, A. (January 2020). *A new decade for assessment: Embedding equity into assessment praxis* (Occasional Paper No. 42). University of Illinois and Indiana University, Urbana, IL. National Institute for Learning Outcomes Assessment (NILOA).
NBCC. (2021). *Recognition of prior learning*. Retrieved from https://nbcc.ca/admissions/recognition-of-prior-learning
Osman, R. (2006). RPL: An emerging and contested practice in South Africa. In P. Andersson & J. Harris (Eds.), *Re-theorising the recognition of prior learning* (pp. 205–220). Leicester, UK: NIACE.
Osman, R., Shalem, Y., Castle, J., & Attwood, G. (2000). *The recognition of prior learning: Early lessons, challenges and promise*. Paper presented at the Joint Education and Trust conference, Midrand, South Africa.
Peters, H. (2006). Using critical discourse analysis to illuminate power and knowledge in RPL. In P. Andersson & J. Harris (Eds.), *Re-theorising the recognition of prior learnin* (pp. 162–192). Leicester, UK: NIACE.
Pittinsky, M. (2015). Credentialing in higher education: Current challenges and innovative trends. *EDUCAUSE, 50*(2). Retrieved from https://er.educause.edu/articles/2015/3/credentialing-in-higher-education-current-challenges-and-innovative-trends
Rose, E. (2013). *On reflection: An essay on technology, education, and the status of thought in the twenty-first century*. Toronto, ON: Canadian Scholars' Press.
Sansregret, M. (1993). *Prior learning assessment: The portfolio*. Montreal, Canada: Hurtubise.
Shalem, Y., & Steinberg, C. (2006). Portfolio-based assessment of prior learning: A cat and mouse chase after invisible criteria. In P. Andersson & J. Harris (Eds.), *Re-theorising the recognition of prior learning* (pp. 97–116). Leicester, UK: NIACE.
Spence, H. (January 2020). We need new vocabulary to accurately describe today's 'senior.' *Hamilton Spectator*. Retrieved from https://www.therecord.com/opinion-story/9803063-we-need-some-new-vocabulary-to-accurately-describe-today-s-senior-/

Tooley, M., & Hood, J. (2021, March 5). Leveraging educator micro-credentials to meet the moment. *EdNote*. Retrieved from https://ednote.ecs.org/leveraging-educator-micro-credentials-to-meet-the-moment/

Uggeri, M., & Hudak, R. (2019). Challenges and opportunities of micro-credentials in Europe. *MicroHe*. Retrieved from https://microcredentials.eu/wp-content/uploads/sites/20/2019/12/WP3-Interviews-with-Key-Stakeholders-Decision-Makers-Overall-Summary-Report.pdf

uPlanner. (2016). Common challenges for accreditation in higher education institutions. Retrieved from https://uplanner.com/en/blog/desafios-para-acreditar-programas-de-educacion-superior/

Van Kleef, J. (2014). Quality in PLAR. In J. Harris, C. Wihak, & J. Van Kleef (Eds.), *Handbook of the recognition of prior learning* (pp. 206–232). Leicester, UK: NIACE.

Vygotsky, L. (1978). *Mind in society*. Cambridge, MA: MIT Press.

Wong, A. (2014). Recognition of prior learning and social justice in higher education. In J. Harris, C. Wihak, & J. Van Kleef (Eds.), *Handbook of the recognition of prior learning* (pp. 178–205). Leicester, UK: NIACE.

Digital Information and Library Services in ODDE 48

Towards a Collaborative Digital Library Model

Christopher M. Owusu-Ansah and Antonio da Silva Rodrigues

Contents

C. M. Owusu-Ansah (✉)
University of South Africa & College Librarian, College of Agriculture Education, Akenten Appiah-Menka University of Skills Training and Entrepreneurial Development, Mampong, Ghana
e-mail: cmfum@uew.edu.gh

A. d. S. Rodrigues
Department of Information Science, University of South Africa, Pretoria, South Africa
e-mail: trodriqu@unisa.ac.za

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_45

Abstract

This chapter is anchored on *Collaboration* being a new construct in the Digital Library Reference Model proposed by the DELOS Network of Excellence on Digital Libraries. The chapter argues that distance learning library services will be significantly enhanced with a collaboratively implemented digital library service taking into cognizance the role of collaboration in strategic planning and policy development, provision of digital collections and information services, and technological infrastructure and skills development in the distance education context. The study concludes that the collaborative model for implementing digital libraries in open, distance, and digital education (ODDE) can ensure that digital libraries are collaboratively designed leading to wider acceptance and use in ODDE.

Keywords

Collaboration · Collaboration model · Digital Library Reference Model · Digital libraries · Distance learning library services · Embedded library model

Introduction

Reference Models have been appropriated to support the development and implementation of user-centred digital libraries (Candela et al., 2007). For instance, the Digital Library Reference Model, the brainchild of the DELOS Network of Excellence on Digital Libraries, supports the development and implementation of collaborative learning models such as open education and other post-distance education models (Tammaro, Ciancio, De Rosa, Pantò, & Nascimbeni, 2017). Digital libraries facilitate collaboration in these types of learning in two ways: as learning objects integrated into open educational delivery platforms and virtual learning environment platforms serving as qualified educational infrastructure in their own right (Owusu-Ansah, Rodrigues, & van der Walt, 2019; Tammaro et al., 2017). These pathways to collaboration, notwithstanding, there remains a chasm between digital library teams at the organisational level and the distance education community (Courtney & Wilhoite-Mathews, 2015; Zhang, Liu, & Mathews, 2015). This results in the need for more suitable models for integrating digital libraries into open, distance education, and digital education (ODDE) (Owusu-Ansah et al., 2019).

This chapter explores the potential of the Digital Library Reference Model for developing a collaborative model for integrating digital libraries. According to Candela et al. (2007), the Reference Model provides the framework for developing all the components of an educational digital library. These components are as follows:

1. The appropriate policies to guide the implementation of the digital library
2. A definition of digital library users and their rights and responsibilities
3. The nature of the digital collections and services
4. The acquisition of the right ICT resources to enable the digital library and ensure access to it

The Digital Library Reference Model (Candela et al., 2007) is one of the most useful frameworks for the development and implementation of digital libraries to support practice in several professional fields including the digital humanities (Zhang et al., 2015). The model is aimed at providing a simplified theoretical foundation for the development and implementation of complex systems (Candela et al., 2007). As a reference model, it embodies "a minimal set of unifying concepts, axioms and relationships within a particular problem domain, and is independent of specific standards, technologies, implementations, or other concrete details" (Candela et al., 2007, p. 25). Proposed by the DELOS Network of Excellence on Digital Libraries, the Model is part of the Digital Library Manifesto, and it is expected to bridge the gap existing within current theoretical approaches and ensure a "common basis for communication within the digital library community, and to help focus further advancement" (Candela et al., 2007, p. 25).

Although other models such as the 5S framework by Fox, Gonçalves, and Shen (2012) and Soergel's Framework for Digital Library Research (Soergel, 2002) and other models of digital libraries were considered equally relevant in developing educational digital libraries, the Digital Library Reference Model was seen as more appropriate for this chapter due to its relative comprehensiveness and practical orientation. For instance, Soergel (2002) conceptualized that for digital libraries to be sustainable and be useful, digital libraries must support professional practice such as teacher education or medicine; provide innovative methods of intellectual work; and enhance collaboration in professional communities. He represents these ideas in 11 themes insisting that digital library researchers address all the concerns raised therein. Soergel's Model represents a comprehensive research vision for the development of digital libraries. A basic practice-oriented framework in the form of the Digital Library Reference Model, however, was considered more appropriate for this handbook.

According to Owusu-Ansah (2020), conceptions of digital libraries have evolved over the years from a content-centered system that supports specific information provision to one that "delivers innovative, evolving, and personalised services to users" (p. 237). This has led to the development of a new definition for digital libraries as "a virtual organisation that comprehensively collects, manages, and preserves for the long-term rich digital content, and offers to its user communities specialised functionality on that content, of measurable quality and according to codified policies" (Candela et al., 2007, p. 157).

Background of the Digital Library Reference Model

The Model (Fig. 1) describes the digital library as a three-tier construct with each representing three notions of conceptions in the digital library universe (Candela et al., 2007). The most important component is the digital library management system (DLMS), which may often be proprietary or commercial product (or set of components), a generic piece of software providing basic functionality required by the particular digital library (Werla & Mazurek, 2011). The second tier is the digital

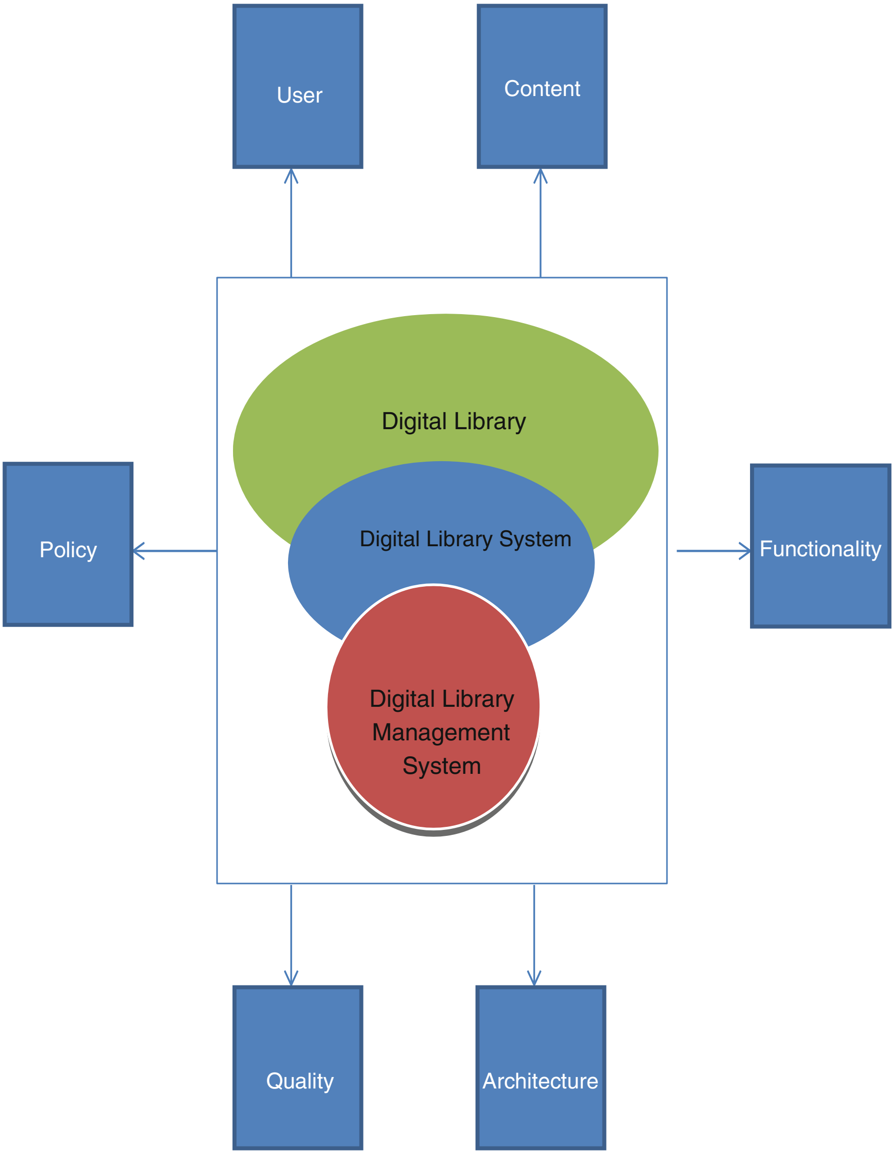


Fig. 1 DL, DLS, and DLMS: a three-tier construct with six DL concepts. (Source: Werla & Mazurek, 2011, p. 2)

library system (DLS) which enriches the digital library management system with the specific functionality and/or configuration required by the digital library (Werla & Mazurek, 2011). Lastly, the third layer is the digital library (DL) consisting of the organization (institution) collecting and preserving digital content and providing access to it.

Composition of the Digital Library System

The digital library system is composed of six core elements, namely, user, content, policy, functionality, architecture, and quality (Candela et al., 2007). All these concepts, according to the authors, impact the performance of digital libraries. These components are basic to every digital library and are explained further in the next sections.

User

Candela et al. (2007) refer to users as actors that interact with the digital library. These actors may be human or machine agents. Users include the end-users, who further comprise information creators, consumers, and librarians; the designers who use the knowledge to define, customize, and maintain the digital library for functionality to immediate and potential users; the administrators who determine the software needed to construct the digital library based on the end-users' expectations; and the application developers who develop the software needed to ensure appropriate digital library deployment (Anunobi & Ezeani, 2011). In ODDE, users consist of distance learners, their instructors, educational administrators, and librarians. All of these groups of users play critical roles in the distance education field and may exploit digital library services to support teaching and learning through effective collaboration (Tammaro et al., 2017; Zhang et al., 2015).

User is also a notion for the rights of these actors while exploring the digital library. In ODDE, the rights of users while accessing the digital library include the provision of remote access to digital collections, a right that may be secured through the implementation of favorable user policies for distance learners (Calhoun, 2014, p. 127). Furthermore, it may also include the profile of users as individuals or as a group. The profile of distance learners may be seen in the context of the digital divide in terms of access to relevant technologies, information literacy, and technology skills (Courtney & Wilhoite-Mathews, 2015). To meet the dynamic information needs of ODDE students (Oladokun, 2014), it is important to understand their ICT and information competencies as this is a requirement for effective utilization of digital resources for academic purposes (Liebenberg, Chetty & Prinsloo, 2012). Furthermore, Owusu-Ansah, Rodrigues, and Van Der Walt (2018a, 2021) advocated for the development of appropriate user policies and rights and deliberate instructional practices favorable to distance education to assure the knowledge, skills, and positive attitudes in and towards digital libraries.

Content

The content constitutes manipulated data and information that is made available to users, and these include primary objects, annotations, and metadata (Candela et al., 2007). Furthermore, Witten et al. (2010, p. 39) describe the content in terms of the document format, and these may include texts, multimedia, or image. According to Candela et al. (2007), content is an umbrella term for all sorts of information objects that are found, managed, and supplied by digital libraries. According to the Association of College and Research Libraries (ACRL) Standards for Distance Learning Library Services (2008), resources for distance education should, among others:

- Meet all students' needs in fulfilling course assignments
- Enrich the academic programs
- Meet teaching and research needs
- Support curricular needs
- Facilitate the acquisition of lifelong learning skills
- Accommodate students with varying levels of technological access (i.e., low bandwidth)

Consequently, digital library collections for distance learners must be capable of supporting these goals in ODDE.

Policies

These consist of the conditions, rules, terms, and regulations governing the digital library and its users (Candela et al., 2007). Policies guide how digital libraries will be used and how their applications will evolve, and these may include content guidelines, access policies, and preservation policies (Riddle, 2015). Policies are designed by people such as digital library managers, managers, and stakeholders (Innocenti, Vullo & Ross, 2010). Gallagher, McMenemy, and Poulter (2015) emphasized the need to inform users of acceptable or non-acceptable behavior while using the public digital library facilities. Instances of specific policies include acceptable user behavior (Robinson, 2019), digital rights management (Mwanzu, 2021), privacy and confidentiality (Avuglah, Owusu-Ansah, Tachie-Donkor, & Yeboah, 2021), charges to users (Rousmaniere, Ciarkowski, & Guild, 2020), and collection delivery (Candela et al., 2007). In ODDE institutions and their libraries, policies originate from the institutional strategic plan (Owusu-Ansah et al., 2018a). In this chapter, therefore, policies are discussed as components to be factored into a strategic plan. The ACRL Standards (2008) espouse the development of strategic plans for the provision of distance learning library services. This must be an iterative process that includes evaluation, updating, and refinement. Furthermore, strategic planning for any distance learning library service such as a digital library must be factored into the library-wide mission statement and goals and in consonance with that of the institution (ACRL, 2008).

Functionality

The functionality concept refers to the services offered by the digital library to its users. According to Candela et al. (2007), the most common of these services include registration of new information objects, search, and browse. Anunobi and Ezeani (2011) note that these services support the management of the collections, provide replication and reliable storage, aid in query formation and execution, and help in name resolution and location. The functions of the digital library must reflect the particular needs of the digital library community and/or the specific requirements relating to the information resources it contains (Candela et al., 2007). For distance learners, the provision of discovery systems that enable seamless access to distributed information sources is very critical (Calhoun, 2014, pp. 66–67). Again to enhance access and use of digital content and services, distance learners must be provided with a wide range of informational, instructional, and user services in the form of digital reference services (ACRL, 2008). Also, the integration of open access models of digital library resources can considerably enhance the functionality of digital libraries in respect to the discoverability, interoperability, and usability of digital content, resources, and services (Liebenberg, Chetty, & Prinsloo, 2012; Toledo, 2017).

Architecture

The architecture involves the enabling technology which ensures that the services and content offered by the digital library are well integrated into hardware and software components (Anunobi & Ezeani, 2011). According to Candela et al. (2007), the architecture component provides a clear framework with which to address the issue of complexity in digital libraries and interoperability across different digital library systems. To enhance the acceptability of digital libraries, they must be accessible, and the architecture component makes this possible. Distance learners require access to ICT as an enabler. Academic libraries must, therefore, provide the relevant technological infrastructure to facilitate access to online and digital resources for distance learners (Maddison, 2013). In distance education, enabling technologies for digital library services include computers and networking facilities, assistive technology, and remote access technology, among others (Omotayo & Haliru, 2020).

Quality

This concept represents the platform for determining the characteristics and for evaluating the content and behavior of the digital library (Anunobi & Ezeani, 2011). Quality consists of parameters that can be used in measuring not just the content but also the specific information of objects or services associated with them (Candela et al., 2007). According to Soergel (2002), evaluation of digital library quality may be completed with either a qualitative or quantitative approach. Objective measures may be evaluated for quality using quantitative methods, whereas subjective parameters are better evaluated with qualitative approaches. Several authors such as Saracevic (2000), however, report that evaluation of digital library services has been lacking in practice due to factors such as the complexity of digital libraries, lack of comprehensive knowledge of the nature of digital libraries, low level of interest among digital library developers for evaluation of their services, and lack of funding for evaluation activities, among others. The situation has improved over the past decade with numerous studies reporting successful evaluation of digital libraries (Alzahrani, Mahmud, Ramayah, Alfarraj, & Alalwan, 2019; Heradio, Fernández-Amorós, Cabrerizo, & Herrera-Viedma, 2012; Shen, Gonçalves, & Fox, 2013; Xie, Joo, & Matusiak, 2018), albeit on the user perspective. Alzahrani, Mahmud, Ramayah, Alfarraj, and Alalwan (2019) examined the critical success factors of digital libraries using the DeLone and McLean (2003) information system success model. Two dimensions of digital library quality were identified, namely, system and information quality. The system quality dimensions in their study referred to the extent to which a digital library was "user-friendly" and remained responsive and useful without difficulties to the user. On the other hand, information quality involves a user's perspective of the value of a digital library. The dimensions of information quality include timeliness, the accuracy of content, completeness, relevance, and consistency of the digital library service. Furthermore, Xu and Du (2018) alluded to service quality as being responsible primarily for user satisfaction. In the same vein, user satisfaction results in further use of the digital library system (Alzahrani et al., 2019). Xie, Joo, and Matusiak (2018) examined a set of evaluation criteria of digital libraries from the perspective of academic stakeholders. The ten dimensions of quality were collections, information organization, interface design, system and technology, effects on users, services, preservation, administration, user engagement, and context. Despite the crucial role of evaluation in digital library projects, they are often not factored into the digital library development cycle (Chowdhury, 2016). Xie et al. (2018) noted the critical place of evaluation in digital library implementation pointing out that evaluation involves "the process of determining merit, worth or valuation of [the digital library], or the product of that process" (p. 854). It does appear, however, that evaluations of digital libraries focus more on the user perspective rather than the detriment of developers' perspective (Rahimi, Soleymani, Hashemian, Hashemian, & Daei, 2018).

Other Actors in the Digital Library Universe

In addition to the core concepts discussed above, Candela et al. (2007) describe the roles of four main actors within the digital library universe who variously interact with the three-tier framework and the core concepts. These are digital library end-users, digital library designers, digital library system administrators, and digital library application developers.

Digital library end-users are the ultimate clients of the digital library as they exploit the digital library functionality for providing, using, and managing the digital library content as well as some of its other constituents. The digital library is a full entity that serves the functional needs of end-users. Furthermore, digital library end-users comprise content creators, content consumers, and librarians.

Digital library designers comprise the organizers and initiators of the digital library from the application point of view. They exploit their knowledge of the application semantic domain to define, customize, and maintain the digital library so that it is aligned with the information and functional needs of its end-users. To perform this task, they interact with the digital library management system to provide functional and content configuration parameters.

Digital library system administrators, on the other hand, ensure the successful implementation of the digital library from the physical point of view. They select the software components necessary to create the digital library system needed to serve the required digital library and decide where and how to deploy them. They interact with the digital library management system by providing architectural configuration parameters, such as the selected software components, the hosting nodes, and the allocation of the components.

Digital library application developers are the implementers of the software parts needed to realize the digital library. They develop the software components of the digital library management system and digital library system, to achieve the necessary functionality (Candela et al., 2007).

Initial Framework for Developing Digital Libraries for ODDE

This chapter adapts the Digital Library Reference Model and proposes a new model for developing and implementing digital libraries for ODDE. This has become necessary as the existing model does not meet the emerging challenges of the ODDE information environment (Arthur-Nyarko, Agyei, & Armah, 2020; Chou, 2018). Some of these challenges include new barriers of information access relating to the cost of subscription (Joachim Schöpfel & Claire Leduc, 2012), unfair policies relating to information provision in ODDE (Owusu-Ansah et al., 2018a), and unequal access to technology in ODDE (Lusigi, 2019).

In the new model, three core concepts, namely, policy, content, and architecture, are considered critical success factors for implementing digital libraries in ODDE. The necessity for a simplified construct has never been so important to enhance the implementation of a collaborative digital library in ODDE. They are adapted here as strategic planning and policy development, digital content and information services, and technological infrastructure and skills development. Furthermore, the two other concepts, the user and functionality, are subsumed under the three critical concepts. For instance, users may consist of underqualified teachers upgrading their skills through ODDE whose information needs must determine what manner of content the digital library is populated with. As a result, the user component is considered inseparable from the content component. Similarly, functionality, which represents the range of services the digital library provides, is also seen as an aspect of the content. Consequently, the user, content, and functionality are intertwined and discussed as aspects of distance learners' information needs. The new model is, therefore, portrayed in Fig. 2 and explained thereafter.

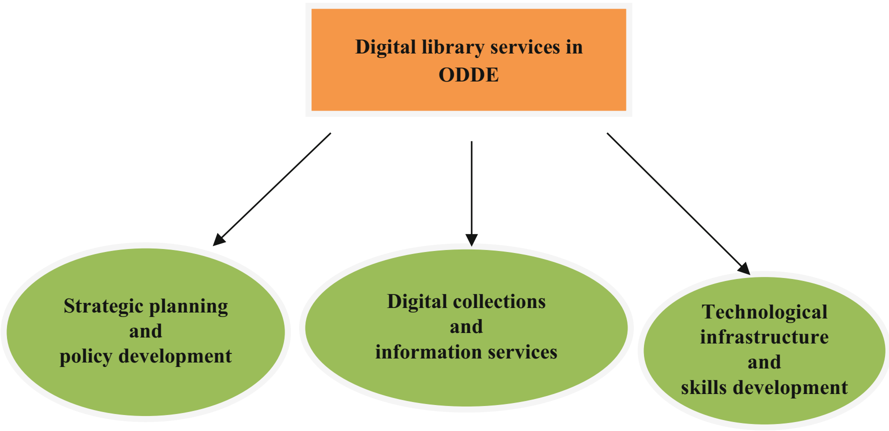


Fig. 2 The initial construct of the digital library framework in ODDE. (Source: Author construct, 2020)

Strategic Planning and Policy Development

The success of every digital library project depends on the availability of policies and strategies in terms of the sustainability of its services and resources. Plans and policies on the digital library must include endorsed documents such as strategic plans, policy documents, and action statements. Strategic planning in digital libraries must take into consideration the economic, social, and ethical aspects of sustainability (Calhoun, 2014, p. 83).

From the economic point of view, there must be ongoing funding and a successful business model for recovering investments, and actions towards this goal may include ongoing business planning, determining user needs and providing satisfactory services, and being accountable. According to Chou (2018), the absence of a long-term plan funding policy can negatively impact the resourcefulness and functionalities of a digital library. ODDE stakeholders, like other members of the academe, are confronted with several financial challenges in respect to access to quality information for their academic work (Fyfe et al., 2017). Among these include the high cost of subscription access and unsustainable models of information delivery in the electronic information realm. Increasingly, library information is held behind paywalls, a phenomenon of "pay to read" or "pay to download" (Björk, 2017). This is also referred to as the subscription access model, as opposed to the open access model which rather requires, in some cases, the authors to pay for the cost of the publication, so that the public can have free access to the content of the article on the Internet. The paywall model, so-called because one cannot access an article because there is a "wall," that is the subscription charges, has become a major barrier to access to library resources in the ODDE community especially in the Global South (Collyer, 2018). Libraries in ODDE in these emerging regions of the world can eliminate this barrier by fashioning out collaborative policies in the form of library consortia and collaborative information-sharing schemes (Mohd, Yusof, & Umar, 2014; Sachin, 2018). Fyfe et al. (2017) view the idea of consortial access to digital library scholarly content in ODDE as akin to the strategies adopted by large commercial publishers manifested in mergers and acquisitions to consolidate their "oligopolistic" economic gains (p. 10). In the same vein, ODDE institutions and their planners stand to gain by forging "mergers" in the form of library consortia to acquire licensed digital content while benefitting from the shared experiences of each institution. Sachin (2018) argues that consortia agreements have a number of advantages including, among others, ensuring that the information needs of a larger population of users are met while also catering for the technical capacity of the personnel responsible for the implementation and operation of the digital library.

From the social perspective, libraries implementing digital libraries must have policies and strategies geared at providing long-term access to resources (Adjei, Mensah, & Amoaful, 2019; Baro, 2016); maintaining visibility and community awareness (Gireesh Kumar, 2020); and providing ongoing access to content and services that are valuable to the users (Siyao, Whong, Martin-Yeboah, & Namamonde, 2017). Finally, from the ethical point of view, a digital library may be sustainable if it has in place policies and strategies to provide equitable services to marginalized users such as distance learners by providing remote access to its content and resources (Chou, 2018) and at the same time upholding the rights of content producers and creators through policies and plans (Mwanzu, 2021; Calhoun, 2014, p. 83). At the same time, policies are used to manage access to digital resources (Arms, 1998). Chou (2018) maintains that there is a need for enduring funding and maintenance plans to ensure the financial sustainability of the digital library as it seeks to avoid losing the trust and credibility of its users.

Digital Collections and Information Services

Lesk (2005, p. 2) argues that the most important thing for digital library developers to consider is the content to meet user needs. Candela et al. (2007) asserted that content comprises "managed information" elements such as primary objects, annotations, and metadata. They argue that these may come in the form of special collections, maps, schematic data, or computer-generated graphics; copyright-free materials; and collections. Tedd and Large (2005, pp. 51–60) classify digital library resources into full-text materials, metadata sources, multimedia materials, and general websites. Many experts (Simamora & Gunawan, 2001; Ferguson et al., 2002; Perrault, 2007; Bower & Mee, 2010) are of the view that digital library resources provide essential remote support to meet distance learners' information needs. Distance learners require digital content in various formats and from different sources for a variety of purposes such as completing assignments, writing dissertations, and supplementing tutorial lessons. In the context of ODDE, the effective use of digital library content requires opening access to digital resources. The need for opening access to research has never been greater in the twenty-first century. Simply, open access involves making the results of research freely available to everyone

(Björk, 2017). In the age of high-speed Internet and computer infrastructure vis-à-vis pressing global, regional, and national challenges and emergencies such as the COVID-19 Pandemic and terrorism, several global bodies including the European Research Council are advocating immediate access to research results within their jurisdictions (Abdelrahman, 2020). This and other global efforts towards knowledge-sharing have given further impetus to the concept of open access publishing.

According to Abdelrahman (2020), there are three basic types of open access publishing. These are Gold, Hybrid, and Green Open Access. Gold and to some extent Hybrid publishing involve funding the cost of publications through article publication charges, government funds, or society grants. However, sometimes the inordinately high cost burden on authors from the Global South does not enable the widespread adoption and promotion of publishers of Gold and Hybrid journals in libraries from the Global South. Conversely, many institutions and libraries in emerging countries value the green road, representing modern models of sustainability. The green road, also known as Green Open Access involves the use of repositories for publishing scholarship. Consequently, academic libraries implementing digital libraries are focusing their lean resources on promoting green publishing through institutional and subject repositories (Kakai, Musoke, & Okello-Obura, 2018; Toledo, 2017). The infrastructure of these repositories is such that they promote collaboration and sharing of resources through the adoption and implementation of licensing regimes that enhance sharing, discoverability, and interoperability in ODDE (Ntim & Fombad, 2020).

Technological Infrastructure and Skills Development

Technological infrastructure ensures that the services and contents offered by the digital library are well integrated into hardware and software components (Anunobi & Ezeani, 2011). The infrastructure consists of the appropriate technical infrastructure and resources that ensure access to relevant information to digital library users. Furthermore, these include software and hardware, programs, and standards to ensure seamless access to information. The different components of technology enable networking and interoperability of different information technologies and tools. In this chapter, the following are considered critical to the deployment of digital library services in distance education: ICT infrastructure (computers, networking, connectivity, etc.); interoperability of different information systems (the seamless provision of distributed information services); and the use of appropriate software in the provision of digital library services for distance education. In ODDE, the significant challenge posed by lack of stable Internet connectivity and computing infrastructure has been noted to impact the uptake of new information models such as OERs and MOOCs (King, Pegrum, & Forsey, 2018).

Similarly, without the right mix of information and technology skills, distance learners may not be able to exploit the opportunities offered by the digital library. From the perspective of the ODDE community, in particular, some of the issues discussed in respect of technological and information skills include the level of computer experience, types of computer skills, availability of training programs, methods of training, the general perception of ICT skills, and challenges to digital library usage (Besseah, Achiro, Mhando, & Salau, 2017; Brewer, Rick, & Grondin, 2017; Saikkonen & Kaarakainen, 2021; Yu, 2017).

The Collaborative Model for Implementing Digital Libraries in ODDE

Previous findings (Owusu-Ansah et al., 2018a, 2018b) justify the use of the Digital Library Reference Model proposed by the DELOS Network of Excellence on Digital Libraries in developing and implementing an educational digital library for ODDE. In this chapter, three main variables adapted from the model, namely, strategic planning and policy development, digital collections, and information services, technological infrastructure, and skills development, were considered to be critical success factors.

From the literature (Owusu-Ansah et al., 2018a), it has emerged that strategic planning and policy development is the basis for the integration of digital libraries into distance education, and this involves establishing a formal need for using digital libraries in distance education as captured in the organizational mission, developing specific policies and rules for developing appropriate digital content and services, and obtaining the funding needed to sustain these services. All these constitute efforts at ensuring the sustainability of the digital library (Chowdhury, 2016). Digital collections and information services also involve the provision of appropriate digital library services and creating awareness and use of these resources in distance education (Okoroma, 2018). The technological infrastructure consists of technical infrastructure and networking resources required for digital libraries, while skills consist of technology and information literacy skills needed by distance learners for the effective use of digital library resources, respectively (Aheto & Cronje, 2018; Baro, Obaro, & Aduba, 2019; Deal, 2016; Pratama & Scarlatos, 2020).

Again, previous studies (Owusu-Ansah et al., 2018a, 2018b, 2019) buttressed the need to consider integrating factors such as the need for librarians to understand their role in distance education and embrace collaboration with distance education stakeholders as these actions constitute the most effective approaches to integrating digital libraries into distance education (Owusu-Ansah et al., 2019). Through collaboration with distance education instructors (faculty) and coordinators (administrators), librarians are enabled to implement critical services such as information literacy and (digital) reference services in distance education. Furthermore, Tammaro et al. (2017) pointed out the need to make changes to how teaching and learning are done in distance education to enhance the usability of digital library resources in distance education. These changes can be made possible through collaboration between library staff and distance education instructors on the one hand and with distance education administrators on the other (Zhang et al., 2015). Furthermore, the collaboration between librarians in different ODDE institutions can result in, among others, the following:

Enhancing Seamless Information Access in ODDE Through Inter-library Cooperation

The development of inter-library cooperation may be a viable response to the high and unsustainable cost of digital library resources for the ODDE community (Mazurek & Werla, 2011; Olesova & Melville, 2017). This may manifest as the use of sustainable information models for providing access to information for ODDE stakeholders. There is a need for policies to mitigate the effect of the paywall phenomenon (Björk, 2017; Chou, 2018). One of such economic policies is the idea of a library consortium. Since the ODDE community pervades one academic community, it makes sound economic sense for institutions implementing this type of education to resort to collaborative digital library service in the form of a library consortium to serve not just the needs of the ODDE community but their on-campus communities as well. The uniqueness of a collaborative digital library effort in respect to the economic factor is the fact that members may benefit from learning new skills, obtaining a stronger voice, optimizing resources, and eliminating operational flaws while empowering the users of the digital library (Pereira & Franco, 2020).

Furthermore, within each ODDE community, librarians must collaborate actively with ODDE stakeholders through a collaboration policy or an explicit statement on collaboration in a strategic document for supporting the implementation of digital library services in ODDE (Owusu-Ansah et al., 2018a). In his editorial on collaboration in the academic library sector, Atkinson (2019) pointed out the need for a documented policy on the scope, goals, and objectives as well as outcomes and outputs among participants during collaborative initiatives involving academic libraries and other partners. Such a policy must also detail roles, accountability, and procedures for getting things done. Eventually, these will culminate in strategic guidelines and standard operating procedures for the members of the team (Atkinson, 2019).

Embedded Library Services as an Anchor of Collaboration

The implementation of digital libraries in distance education stands to benefit tremendously through the development of embedded library services which can appreciably raise the visibility and usability of digital library resources in distance education (Woodward, 2015). Several goals of embeddedness have been discussed in the literature including course design (Olesova & Melville, 2017; Skarl & Bosque, 2019), research support (Besseah et al., 2017; Brewer et al., 2017), open educational resources (Goodsett, Loomis, & Miles, 2016), and information literacy (Scheidt et al., 2016; Scheurer & Nadir, 2018; Schwenger, 2016).

In the distance education context, embeddedness requires librarians to seek collaboration with faculty counterparts in the development of online courses to enhance student learning. Olesova and Melville (2017) opined that embedded librarian collaboration with an online course faculty requires librarians to be involved in setting learners up, designing for content organization, developing instructional strategies, and addressing learning management issues. On the other hand, the impetus for a collaboration such as this may be, among others, the creation of dedicated distance library services with dedicated staffing equipped to perform both systemic and snap tasks to integrate library resources within the distance learning curriculum (Owusu-Ansah, Rodrigues, & Van Der Walt, 2018a). For instance, a long-term, systemic task may involve the embedded librarian creating a distance education Web page on the library website with a link to the distance education website where most or all relevant digital library resources are explicitly linked to academic tasks. Again, embedding may involve simple, snappy, tasks such as taking a snapshot of Online Public Access Catalogue results containing relevant books on a particular topic in a course and posting simple information on how to borrow a book. These outcomes of the embedded digital libraries were re-echoed by the European Library Automation Group when they explored the potential for cooperation between libraries and the academic community (Tammaro et al., 2017). These efforts are poised to elevate library service provision in open distance education from beyond cooperation to collaboration (Olesova & Melville, 2017).

A Framework for the Collaborative Digital Library Model in ODDE

In view of the overwhelming need for collaboration between librarians and distance education stakeholders to ensure integration of digital library resources into distance education (Owusu-Ansah et al., 2018a, 2018b, 2019), this study readjusts the initial proposed theoretical framework to include an integrating factor of collaboration between librarians and distance education stakeholders as shown in Fig. 3.

Figure 3 represents the development of an educational digital library for ODDE with the collaborative digital library framework. This framework, however, proposes another component in the ODDE context, *collaboration*. Collaboration was recognized as a key factor for the successful integration of digital library resources into distance education. Collaboration is critical in the areas of strategic planning and policy development, services and technology, marketing, training, and innovating teaching and learning in distance education with digital library resources.

The significance of the framework is outlined as the following:

1. It presents a simplified theoretical foundation for the development and implementation of digital libraries in ODDE.
2. With the collaboration component, the framework isolates some important challenges distance education stakeholders and librarians are likely to encounter in using digital libraries. Some of these challenges include lack of strategic plans and policies for digital library use in distance education, poor technological infrastructure and information skills, lack of awareness of digital resources, and

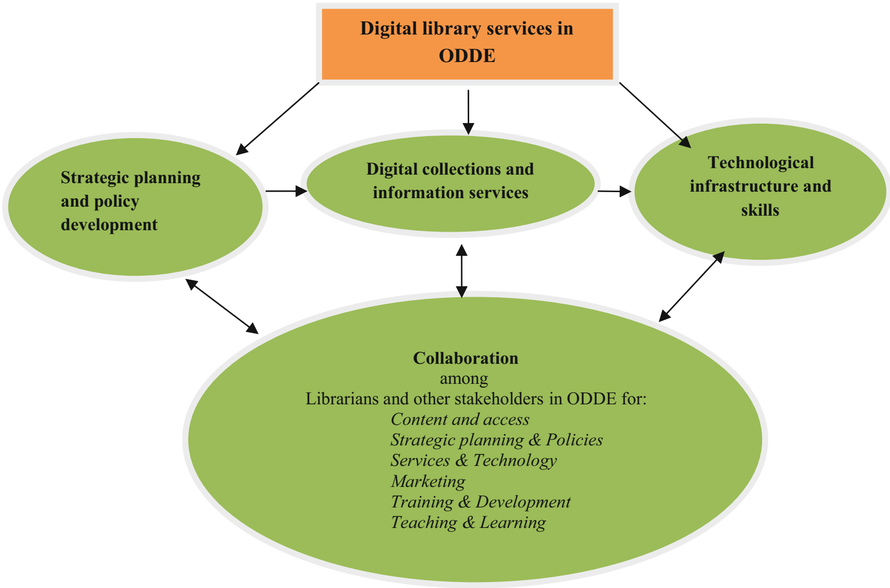


Fig. 3 Collaborative model for digital libraries in ODDE

lack of integration of library resources into distance teaching and learning. Some experts are of the view that lack of collaboration in information literacy instruction can impact negatively digital library use (Buck, Islam, & Syrkin, 2006; Figa, Bone, & Macpherson, 2009).

3. Lastly, the collaboration component will enhance librarians' and ODDE stakeholders' awareness of the barriers to put in control mechanisms at every stage of the integration.

Conclusion

For successful implementation of digital libraries in ODDE, this chapter proposed ***collaboration*** as an independent component of the original digital library framework developed by the DELOS Framework on Digital Libraries. Collaboration is considered a critical success factor for digital library implementation. The updated framework holds the potential to deepen efforts aimed at integrating digital libraries into the curriculum of distance learners. The thrust of the model is that there is a need for collaboration between librarians and ODDE stakeholders, on the one hand, and with librarians in other ODDE institutions, on the other, in the areas of planning, designing services, selecting software, marketing, training, and transforming teaching and learning in ODDE with digital library resources.

References

Abdelrahman, O. H. (2020). Overview of the principles and practices of open access publishing. In *Digital libraries – Advancing open science*. IntechOpen. https://doi.org/10.5772/intechopen.95355.

Adjei, E., Mensah, M., & Amoaful, E. A. (2019). The story so far-digital preservation in institutional repositories. *Digital Library Perspectives*. (world). https://doi.org/10.1108/DLP-12-2018-0039.

Aheto, S.-P. K., & Cronje, J. (2018). Digital device ownership and learning environment preferences of students in South Africa and Ghana. *Turkish Online Journal of Distance Education, 19*(3), 93–111.

Alzahrani, A. I., Mahmud, I., Ramayah, T., Alfarraj, O., & Alalwan, N. (2019). Modelling digital library success using the DeLone and McLean information system success model. *Journal of Librarianship and Information Science, 51*(2), 291–306.

Anunobi, C. V., & Ezeani, M. I. (2011). Digital library deployment in a university: Challenges and prospects. *Library Hi Tech, 29*(2), 373–386.

Arms, W. Y. (1998). Implementing policies for access management. *D-Lib Magazine*, February Issue.

Arthur-Nyarko, E., Agyei, D. D., & Armah, J. K. (2020). Digitizing distance learning materials: Measuring students' readiness and intended challenges. *Education and Information Technologies, 25*, 2987–3002.

Association of College and Research Libraries. (2008). *Standards for distance learning library services*. American Library Association. http://www.ala.org/acrl/standards/guidelinesdistancelearning. Accessed 19 Aug 2015.

Atkinson, J. (2019). Collaboration by academic libraries: What are the benefits, what are the constraints, and what do you need to do to be successful? *New Review of Academic Librarianship, 25*(1), 1–7. https://doi.org/10.1080/13614533.2019.1575016.

Avuglah, B. K., Owusu-Ansah, C. M., Tachie-Donkor, G., & Yeboah, E. B. (2021). Privacy practices in academic libraries in Ghana: Insight into three top universities. *IFLA Journal, 47*(2), 196–208. https://doi.org/10.1177/0340035220966605.

Baro, E. E. (2016). Digital preservation practices in university libraries: A survey of institutional repositories in Nigeria. *Preservation, Digital Technology & Culture, 45*(3), 134–144.

Baro, E. E., Obaro, O. G., & Aduba, E. D. (2019). An assessment of digital literacy skills and knowledge-based competencies among librarians working in university libraries in Africa. *Digital Library Perspectives, 35*(3/4), 172–192. https://doi.org/10.1108/DLP-04-2019-0013.

Besseah, B., Achiro, D., Mhando, J., & Salau, S. A. (2017). Embedding digital and research-literacy support program into postgraduate studies curriculum: A proposed program for sub-Saharan African postgraduate schools. *Library Review, 66*(8/9), 586–594. https://doi.org/10.1108/LR-02-2017-0012.

Björk, B.-C. (2017). Open access to scientific articles: A review of benefits and challenges. *Internal and Emergency Medicine, 12*(2), 247–253.

Bower, S. L., & Mee, S. A. (2010). Virtual delivery of electronic resources and services to off-campus users: A multifaceted approach. *Journal of Library Administration, 50*(5/6), 468–483.

Brewer, L., Rick, H., & Grondin, K. A. (2017). Improving digital library experiences and support with online research guides. *Online Learning, 21*(3). https://doi.org/10.24059/olj.v21i3.1237.

Buck, S., Islam, R., & Syrkin, D. (2006). Collaboration for distance information literacy instruction. *Journal of Library Administration, 45*(1–2), 63–79. https://doi.org/10.1300/J111v45n01_04.

Candela, L., Castell, D., Pagano, P., Ihanos, C., Ioannidis, Y., Kontrika, G., . . . Schuldt, H. (2007). Setting the foundations of digital libraries: The DELOS manifesto. *D-Lib Magazine, 13*(3/4).

Calhoun, K. (2014). *Exploring digital libraries: Foundations, practice, prospects*. Facet Publishing.

Chou, C. (2018). Collaboration makes global digital libraries sustainable and ethical. *Proceedings of the Association for Information Science and Technology, 55*(1), 775–776. https://doi.org/10.1002/pra2.2018.14505501111.

Chowdhury, G. G. (2016). How to improve the sustainability of digital libraries and information services? *Journal of the Association for Information Science and Technology, 67*(10), 2379–2391. https://doi.org/10.1002/asi.23599.

Collyer, F. M. (2018). Global patterns in the publishing of academic knowledge: Global North, global South. *Current Sociology, 66*(1), 56–73.

Courtney, M., & Wilhoite-Mathews, S. (2015). From distance education to online learning: Practical approaches to information literacy instruction and collaborative learning in online environments. *Journal of Library Administration, 55*(4), 261–277. https://doi.org/10.1080/01930826.2015.1038924.

Deal, E. (2016). Teaching information literacy and library skills to online nursing students: A selected annotated bibliography. *Codex: The Journal of the Louisiana Chapter of the ACRL, 3*(4), 33–54.

Delone, W.H., & McLean, E.R. (2003). The Delone and McLean model of information systems success: a ten-year update. *Journal of Management Information Systems, 19*(4), 9–30.

Ferguson, J., Fowler, J., Hanley, M., & Schafer, J. (2002). Building a digital library in support of distance learning. *Journal of Library Administration, 37*(3/4), 317.

Figa, E., Bone, T., & Macpherson, J. R. (2009). Faculty-librarian collaboration for library services in the online classroom: Student evaluation results and recommended practices for implementation. *Journal of Library & Information Services in Distance Learning, 3*(2), 67–102. https://doi.org/10.1080/15332900902979119.

Fox, E. A., Gonçalves, M. A., & Shen, R. (2012). Theoretical foundations for digital libraries: The 5S (societies, scenarios, spaces, structures, streams) approach. *Synthesis Lectures on Information Concepts, Retrieval, and Services, 4*(2), 1–180.

Fyfe, A., Coate, K., Curry, S., & Lawson, S., & Moxham, N., & Røstvik, C.M. (2017). *Untangling academic publishing: A history of the relationship between commercial interests, academic prestige and the circulation of research*. Discussion Paper. University of St Andrews. http://eprints.bbk.ac.uk/19148/1/UntanglingAcPub.pdf

Gallagher, C., McMenemy, D., & Poulter, A. (2015). *Management of acceptable use of computing facilities in the public library: Avoiding a panoptic gaze?* Journal of Documentation.

Gireesh Kumar, T. K. (2020). *Role of libraries in enhancing the research visibility and collaboration of academics*. LISACON 2020. http://eprints.rclis.org/42238/1/Role%20of%20Libraries%20in%20Enhancing%20the%20Research%20Visibility%20and%20Collaboration%20of%20Academics.pdf

Goodsett, M., Loomis, B., & Miles, M. (2016). Leading campus OER initiatives through library–faculty collaboration. *College & Undergraduate Libraries, 23*(3), 335–342.

Heradio, R., Fernández-Amorós, D., Cabrerizo, F. J., & Herrera-Viedma, E. (2012). A review of quality evaluation of digital libraries based on users' perceptions. *Journal of Information Science, 38*(3), 269–283.

Innocenti, P., Vullo, G., & Ross, S. (2010). Towards a digital library policy and quality interoperability framework: The DL.org project. *New Review of Information Networking, 15*(1), 29–53.

Kakai, M., Musoke, M. G. N., & Okello-Obura, C. (2018). Open access institutional repositories in universities in East Africa. *Information and Learning Science, 119*(11), 667–681. https://doi.org/10.1108/ILS-07-2018-0066.

King, M., Pegrum, M., & Forsey, M. (2018). MOOCs and OER in the global south: Problems and potential. *The International Review of Research in Open and Distributed Learning, 19*(5), 1.

Lesk, M. (2005). *Understanding digital libraries* (2nd ed.). Boston, MA: Elsevier.

Liebenberg, H., Chetty, Y., & Prinsloo, P. (2012). Student access to and skills in using technology in an open and distance learning context. *The International Review of Research in Open and Distance Learning, 13*(4), 250–268.

Lusigi, A. (2019). Higher education, technology, and equity in Africa. *New Review of Information Networking, 24*(1), 1–16. https://doi.org/10.1080/13614576.2019.1608576.

Maddison, T. (2013). Learn where you live: Delivering information literacy instruction in a distributed learning environment. *Journal of Library & Information Services in Distance Learning, 7*(3), 264–277. https://doi.org/10.1080/1533290X.2013.806276.

Mazurek, C., & Werla, M. (2011). Network of digital libraries in Poland as a model for national and international cooperation. In *IATUL 2011 conference: Libraries for an open environment: Strategies, technologies and partnerships*.

Mohd, H., Yusof, R., & Umar, R. (2014). *Initiatives towards formation of academic library consortium in Malaysia*. Library Management. Emerald Publishing Group.

Mwanzu, A. (2021). Perceptions of librarians on the usefulness of DRM Technology in Protecting against copyright violation. *Library Philosophy and Practice (e-Journal)*, *5517*.

Ntim, K. K., & Fombad, M. (2020). A model for open access institutional repositories usage for university libraries in Ghana. *Information Development*. https://doi.org/10.1177/0266666920937343.

Okoroma, F. N. (2018). Awareness, knowledge and attitude of lecturers towards institutional repositories in university libraries in Nigeria. *Digital Library Perspectives*.

Oladokun, O. (2014). The information environment of distance learners: A literature review. *Creative Education, 5*, 303–317.

Olesova, L. A., & Melville, A. D. (2017). Embedded library services: From cooperation to collaboration to enhance student learning in asynchronous online course. *Journal of Library & Information Services in Distance Learning, 11*(3–4), 287–299.

Omotayo, F. O., & Haliru, A. (2020). Perception of task-technology fit of digital library among undergraduates in selected universities in Nigeria. *The Journal of Academic Librarianship, 46*(1), 102097. https://doi.org/10.1016/j.acalib.2019.102097.

Owusu-Ansah, C. M., Rodrigues, A. d. S., & van der Walt, T. B. (2019). Integrating digital libraries into distance education: A review of models, roles, and strategies. *Turkish Online Journal of Distance Education, 20*(2), 89–104.

Owusu-Ansah, C. M. (2020). Conceptions of digital libraries: An African perspective. *Digital Library Perspectives, 36*(3), 231–247.

Owusu-Ansah, C. M., Rodrigues, A., & Van Der Walt, T. (2018b). Factors influencing the use of digital libraries in distance education in Ghana. *Libri, 68*(2), 125–135.

Owusu-Ansah, C. M., Rodrigues, A. D. S., & Van Der Walt, T. (2018a). Going the full distance: Strategic support for digital libraries in distance education at the University of Education, Winneba in Ghana. *Journal of Librarianship and Information Science*. https://doi.org/10.1177/0961000618772871.

Pratama, A. R., & Scarlatos, L. L. (2020). The roles of device ownership and infrastructure in promoting E-learning and M-learning in Indonesia. *International Journal of Mobile and Blended Learning (IJMBL), 12*(4), 1–16.

Pereira, R., & Franco, M. (2020). Library as a consortium perspective: A systematic literature review. *Journal of Librarianship and Information Science, 52*(4), 1126–1136.

Perrault, A. M. (2007). An Exploratory Study of Biology Teachers' Online Information Seeking Practices. *School Library Media Research*, 10.

Rahimi, A., Soleymani, M. R., Hashemian, A., Hashemian, M. R., & Daei, A. (2018). Evaluating digital libraries: A systematised review. *Health Information & Libraries Journal, 35*(3), 180–191. https://doi.org/10.1111/hir.12231.

Riddle, K. (2015). Creating policies for library publishing in an institutional repository. *OCLC Systems & Services: International Digital Library Perspectives, 31*(2), 59–68.

Robinson, E. (2019). *The panoptic principle: Privacy and surveillance in the public library as evidenced in the acceptable use policy* (PhD Thesis). University of Strathclyde.

Rousmaniere, P. F., Ciarkowski, E. F., & Guild, N. (2020). Bridging the library budget gap: An approach to creating fair user charges. *College & Research Libraries News, 44*(3), 65–71.

Sachin, Y. (2018). E-journal consortia for academic libraries. *International Journal of Information, 10*(2), 53.

Saikkonen, L., & Kaarakainen, M. -T. (2021). Multivariate analysis of teachers' digital information skills – The importance of available resources. *Computers and Education, 168*. Scopus. https://doi.org/10.1016/j.compedu.2021.104206.

Saracevic, T. (2000). Digital library evaluation: Towards evolution of concepts. *Library Trends, 49*(2), 350–369.

Scheidt, D., Carpenter, W., Fitzgerald, R., Kozma, C., Middleton, H., & Shields, K. (2016). Writing information literacy in first-year composition: A collaboration among faculty and librarians. In *Information literacy: Research and collaboration across disciplines*. The WAC Clearinghouse.

Scheurer, E. & Nadir, T. (2018). Research and Writing in the Disciplines: A Model for Faculty-Librarian Collaboration. *Georgia International Conference on Information Literacy*, 22. https://digitalcommons.georgiasouthern.edu/gaintlit/2018/2018/22

Schöpfel, J., & Leduc, C. (2012). Big deal and long tail: E-journal usage and subscriptions. *Library Review, 61*(7), 497–510. https://doi.org/10.1108/00242531211288245.

Schwenger, B. (2016). Enhancing Students' Tertiary Blended Learning Experience Through Embedding Digital Information Literacy. Journal of Perspectives in Applied Academic Practice| *4*(1), 71–77.

Shen, R., Gonçalves, M. A., & Fox, E. A. (2013). Key issues regarding digital libraries: Evaluation and integration. *Synthesis Lectures on Information Concepts, Retrieval, and Services, 5*(2), 1–110.

Simamora, L. S. P., & Gunawan, F. (2001). Indonesia electronic library design plan for supporting a distance learning environment. *Journal of Library Administration, 32*(1/2), 361.

Siyao, P. O., Whong, F. M., Martin-Yeboah, E., & Namamonde, A. (2017). Academic libraries in four sub-Saharan Africa countries and their role in propagating open science. *IFLA Journal, 43*(3), 242–255. https://doi.org/10.1177/0340035217712263.

Skarl, S., & Bosque, D. D. (2019). Going the distance for grads: What online graduate students want from the library. *Journal of Library & Information Services in Distance Learning, 13*(1–2), 167–183. https://doi.org/10.1080/1533290X.2018.1499250.

Soergel, D. (2002). A framework for digital library research: Broadening the vision. *D-Lib Magazine, 8*(2). www.dlib.org/dlib/. Accessed 2 Oct 2015.

Tammaro, A. M., Ciancio, L., De Rosa, R., Pantò, E., & Nascimbeni, F. (2017). Digital libraries in open education: The Italy case. In *Italian research conference on digital libraries* (pp. 32–41). Springer.

Tedd, L. A., & Large, A. (2005). *Digital libraries: Principles and practice in a global environment*. Munchen, Germany: Saur Verlag.

Toledo, A. (2017). Open access and OER in Latin America: A survey of the policy landscape in Chile, Colombia and Uruguay. In *Adoption and impact of OER in the global south* (pp. 121–141). Cape Town, South Africa: African Minds : Research on Open Educational Resources for Development.

Werla, M., & Mazurek, C. (2011). Network of digital libraries as a model for national and international cooperation. In *Proceedings of the IATUL conferences*. Paper 13. http://docs.lib.purdue.edu/iatul/2011/papers/13. Accessed 15 July 2015.

Witten, I. H., Bainbridge, D., & Nichols, D. M. (2010). How to Build a Digital Library. Elsevier Science. https://books.google.com.gh/books?id=HiJNbEy5f70C

Woodward, K. M. (2015). Students at the center in emerging academic models: Embedded information literacy and distance services in the University of Wisconsin System Flex degree. *Library Hi Tech News, 32*, 12–15. https://doi.org/10.1108/LHTN-04-2015-0023.

Xie, I., Joo, S., & Matusiak, K. K. (2018). Multifaceted evaluation criteria of digital libraries in academic settings: Similarities and differences from different stakeholders. *The Journal of Academic Librarianship, 44*(6), 854–863.

Xu, F., & Du, J. T. (2018). Factors influencing users' satisfaction and loyalty to digital libraries in Chinese universities. *Computers in Human Behavior, 83*, 64–72.

Yu, T. K., Lin, M. L., & Liao, Y. K. (2017). Understanding factors influencing information communication technology adoption behavior: The moderators of information literacy and digital skills. Computers in Human Behavior, 71, 196–208.

Zhang, Y., Liu, S., & Mathews, E. (2015). Convergence of digital humanities and digital libraries. *Library Management, 36*(4/5), 362–377. https://doi.org/10.1108/LM-09-2014-0116.

49 Evolving Learner Support Systems

From Distance to Digital Education

Santosh Panda

Contents

Abstract

With changing scenarios in globalization, technologization, and conception of twenty-first-century learners and learning, distance teaching institutions are also gradually changing their delivery strategies and learner support systems. This is more visible in the following: from separation of course design and learner support to both forming an integral part of blended teaching-learning; from physical and geography-based operation to more technology-enabled networked operation; from largely behaviorist model to more of constructivist and connectivist models of course design and learner support; and from a humanistic support system to more of strategic support system. In these changing scenarios,

S. Panda (✉)
Indira Gandhi National Open University, New Delhi, India

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_46

however, the changes in academic practices have not kept pace with technology changes; and technology and market, rather than the scholarship of teaching and support, dominate the support discourse and practice. These developments raise various research questions which need to be investigated further. The analysis in the chapter shows that the future of distance and online learning vis-à-vis learner support is poised to shift from the "course material-tutoring" system to the "networked-interactive-intelligent" system, though both will continue for quite some time to come. Institutional leaders, faculty, and other stakeholders need to engage with further articulation and reflection toward evolving a quality, productive, pedagogy-led, and learner-friendly support system.

Keywords

Learner support system · Learning support · Online and digital and blended learning · Networked learning and support · Tutoring and mentoring

Introduction

What Rumble (2001) had underlined some two decades back about the changing global-societal scenario holds good even today – that there is massive population growth and consequent demand for quality mass education, fast moving globalization and neoliberalism, decline of state power and increase in privatization, changing employment and living, and rise in information technology and knowledge economy. To these, we could add some of today's changing scenarios: increasing global free trade and mobility; changing twenty-first-century learners and learning; decreasing "education" and increasing "learning" and vocationalization; increase in the use of flexible, collaborative, and personalized social technologies and social networks; and not the least, the prolonged pandemic and consequent long-term impact on the entire lifestyle, including education. Add to these what Salmon (2019) describes as coming up of, alongside industrial revolution 4, the Web 4.1 (i.e., the symbiotic web) leading the Education 4.0 (Bonfield, Salter, Longmuir, Benson, & Adachi, 2020), alongside Globalization 4.0 (Samans, 2019).

In these changing scenarios, where new digital technologies (including artificial intelligence, chatbots, machine learning, big data, immersive technologies, learning analytics, and Internet of Things) are brought to the center stage of teaching-learning, distance teaching institutions (and more specifically, the open universities) have been at the forefront of constant changes in especially three aspects – (i) changing and flexible methods of delivery, (ii) use of new and changing media and technology, and (iii) increase in open and flexible educational practices. Historically, starting from the erstwhile correspondence education, the out-of-classroom education has evolved through distance education, open (university) education, digital and online learning, and blended learning. Alongside this development, the learner/learning support system has also undergone significant changes. The first attempt to scientifically explain distance education within a theoretical framework of "transactional distance," i.e., the interaction of dialogue, structure, and autonomy, along with the required learner support system for independent study was made in as early as 1972 (Moore, 1972, 1993), and a comprehensive theoretical framework for "dialogue" in the distance education instructional system was given by Gorsky and Caspi (2005), with actual discursive practices, learning outcomes, and support systems. Subsequent transformation from distance to online education/learning brought to the fore the inquiry-based theoretical discourses relating to cognitive presence, teacher presence, and social presence, and the required support systems for especially asynchronous learning (Garrison & Anderson, 2003).

Out-of-class educational delivery has taken many shapes, including the largest number of dual-mode universities, above 60 single-mode (open) universities, and significant number of virtual universities around the world (Tait, 2018). Depending on the nature of program design and instructional design and delivery, the learner support systems for these institutional types vary across pedagogic, technological, administrative/managerial strands. While there is a large chunk of learners who prefer a traditional print-based and study center-attended model, there are others who prefer an independent and seamless online learning, with built-in collaboration. During the past two decades of this century, most institutions have gradually moved to blended teaching-learning (including remote-teaching during Covid-19 notwithstanding) which did not require drastic structural as well as infrastructural changes. However, academic organization and administrative management of such blended design and delivery requires added understanding, training, and capacity building. More or less, each delivery strategy has included one or the other form of technology-enabled learning, and national strategies have invariably adopted a policy-technology-capacity building change management model (Mishra & Panda, 2020), especially in the Commonwealth.

Irrespective of the type of distance teaching institution, access, flexibility, and openness have been the major considerations in educational delivery, including learner support. While the traditional open universities have largely depended on home delivery and study center-based support, dual-mode universities have had a judicious mix of distance teaching-learning and on-campus library access and access to labs and practicum. Though the British vision and model of single-model open universities will still attract the developing countries grappling with mass higher education, the dual-mode (or even multimode) university-blended learning continues to be the focus and the future in many developed as well as progressive systems. Nonetheless, it may be underlined here that, irrespective of the system, the contours and trajectories of learner support system shall be different for largely "fresh full-time entrants" in dual-mode universities, and for largely "employed continuing education students" of open universities. In such diversified delivery contexts, the staffing, management, and development of the faculty and staff (so crucial to learner support) would also vary (Panda, 2004). Tait (2010) commented that: ". . .One of the tipping points we balance on is whether educational institutions can skill themselves quickly enough in the organization and management of online learning experiences to be able to satisfy their learners. . ." (pp. x–xi).

In the earlier formulation of distance education as industrialized system of education (Peters, 1983), the major concern was access to mass education, rather than organization of individualized student learning experiences. Issues like attrition, persistence, and dropout came up to the fore, and attempts were made to address these through learner support services including tutoring, counseling, academic advising, and regional and study center support services. Concerns for a humanistic approach to one-to-one learner support in the context of mass higher education were raised by Sewart (1993), and subsequently Rumble (2000) argued for the distance education community to be driven by the concern for planning "customer care and support" (in comparison to the campus-based counterparts) and prepare toward that.

With the advent of the World Wide Web (WWW), and especially the semantic web, the learning design, learner support, and institutional organization and management have undergone considerable changes (Panda, 2009). The emergent and contemporarily dominant blended learning model has also traversed beyond the judicious combination of F2F and online learning delivery, to include blending at every stage of design, development, delivery, and evaluation, and especially with due consideration to distance teacher/online instructor to be at the center stage of teaching and learner support (Garrison & Vaughan, 2008; Vaughan, Cleveland-Innes, & Garrison, 2013). In such a situation, the web provides for significant opportunities for learners to interact, collaborate, and engage among themselves as also with the teacher (which was less possible in traditional distance education). Both synchronous and asynchronous communication facilities enhance such collaboration, engagement, and the possibility of "reflection."

As we moved toward online learning, the nature of learner support did undergo considerable changes. Analyzing the types and nature of interaction in learner-learner, learner-content, and learner-instructor interaction, Anderson (2003) emphasized that while the issues of availability and access to technology as also faculty time need to be addressed, learner support is required to be designed for all three types of interaction in online learning (synchronous as well as asynchronous). Since in online learning there is possibility of simultaneous cocreation of content by students and instructors, learner support cuts across learning resources and learning support; needs to be conceptualized in an individualized, interactive, and cross-functional framework; and should be organized before, during, and after the learning process (Thorpe, 2003).

This introductory analysis clearly brings up three trends: (i) that with changing technology-enabled distance learning and the nature of learners, learner support has also undergone significant changes, (ii) that the established notion and practice of learner support as a separate activity from course design and development has undergone changes to include learner support as an integral part of course design/ learning design, and (iii) that learner support in the twenty-first century distance/ online/ blended learning is considered to be more individualized, network-based, and operates within a system of flexible open educational practices.

Learner Support Variables and Frameworks

Support Variables

Though there is no standardized conception on learner support, within a comprehensive coverage of open, distance, and online learning, Brindley, Walti, and Zawacki-Richter (2008) remarked that: "Learner support is most often used as a term subsuming all interaction between institutional personnel and students (prospective and registered) intended to assist them in meeting their objectives from point of first inquiry through graduation and beyond, often for a life time" (p.1).

In the traditional context of industrialized system of distance education, where the process of learning was largely depersonalized and students were treated as part of a production line, there was a felt need to personalize learning and provide for counseling and especially mentoring (Panda & Jena, 2001; Sewart, 1993). In the 1990s, lots of debate took place on "independence/autonomy" versus "interaction," and the right balance that the distance teaching institution and the distance teacher could maintain (Daniel & Marquis, 1979). These considerations notwithstanding, in reality, the offer of student support largely depended on the market, the package, the delivery system, the organizational image, and the organizational culture.

Though analyzed in the context of open university education, learner support was conceived of achieving three functions (Tait, 2000) – cognitive, affective, and systemic.

- Cognitive: This support is extended through the facilitation of learning within the standardized self-learning materials, and through tutoring/academic counseling.
- Affective: This support is provided through organization of communities of learners toward facilitative environment and increase in self-esteem.
- Systemic: Provision of transparent and student-friendly administrative processes and information management systems.

All the three need to work in tandem with the goal of making students comfortable, valued, and to effectively manage their studies.

In a detailed work, though based on the experiences of the UK Open University, Macdonald (2008) discussed the types of support that could be organized by an institution (Table 1) as also various tutor variables, the value they entail for students, and what more can be done to enhance the quality of learner support (Table 2).

Table 1 Types of support across individuals, groups, and peers

Types	Individual	Group	Peers
Formal	Assignment	Tutorials, practical	Collaborative projects
Informal	Individual needs	Group networks	Social networks

Source: Macdonald, 2008, p.18

Table 2 Tutor interventions/variables

Affective:	To build confidence in students
Dialogic:	To address individual student needs
Focusing:	To facilitate development of study skills
Reflective:	To provide for reflective tasks
Time management:	Student management of time, and management of assignment turn-around time

Source: Macdonald, 2008, p.22

Table 3 Learner support system variables

Institutional variables	Technology variables	Learner variables	Academic/pedagogic variables
Organizing development of learning resources (print, audio, video, and multimedia) Course delivery Support systems (pre, on-course, and poststudy) Support networks Learning analytics Learning space. Online redressal mechanism Physical facilities and personnel Reliable and valid service Cost-effectiveness and cost-efficiency Administration and logistic support; information management system	Media channels, and conferencing facilities LMS/online platform Online tools Social media and networks Assistive technologies Servers and data privacy	Needs and preferences Readiness, motivation Satisfaction Study skills (and learning to learn skills) Self-regulated learning, and metacognitive skills Media choice	Learning resources Teaching processes Interaction, collaboration, and engagement Culture and learning Gender and learning Education and support for the disabled Tutoring, counseling, and mentoring Independence versus interaction Teacher/ tutor roles, competencies, training, and development

Academic support in the formal institutional study could be individual-based (e.g., through assignment comments and grades), group-based (e.g., in the study center tutorials and practical labs), and peer-based (e.g., through group collaborative project work). Besides, informal channel is also open to address individual and group needs through institutional and/or professional networks.

From a functional point of view, a tutor's responsibility was much beyond dissemination and explanation of information to include more of humanistic dimensions of fostering confidence, development of skills of self-regulation and metacognition, and enhancing the ability to reflect.

Irrespective of modes of educational delivery, the variables of learner support system could be summarized to include and address a combination of or almost all the four types of variables listed in Table 3.

These institutional, technology, learner, and academic variables may vary across institutions (and, at the micro level, can be expanded to micro/contextual variables) but need to work in tandem within a macro institutional policy and system of learner support.

Support Frameworks

In a recent survey of institutional leaders, Tait (2018) reported that while some open universities have got into learning analytics, OERs and MOOCs, many others have been constrained to gradually close down their well-established physical study/ learner support centers. On the other hand, most have been lobbying with governments to establish national gateways/networks, along with Wi-Fi hotspots, e-learning platforms, related ICT infrastructure, and nationalized (and standardized) online examinations and automated learner feedback systems. For them, the change from the study center-based to network-based support (as also convenient mix of the two) could be traced through examination of a few frameworks as practiced by select distance teaching institutions.

Tait (2014) presented the evolution of the learner support framework at the UKOU over a period of time, starting with 1971:

- 1971–1976: local counselor, local module-tutor, regional center support, and 1-week residential schools
- 1976–2000: tutor counselor (initial tutoring and subsequent counseling), support of regional center, and residential schools
- 2000-present: module-based subject tutor, support of regional center with additional educational guidance team, and decline of residential schools
- 2014 onward: local based module tutor, program-wise national student support teams offering integrated subject-qualification-guidance support through phone and email (moving away from geography as the factor of learner support organization to subject and qualification-based support); end of student support as separate from course design, taken over through ICT

In case of the Indira Gandhi National Open University (IGNOU, India), which has the second largest distance education system in the world, and which was designed on the pattern of UKOU (i.e., headquarters-regional centers-study centers), learner support has undergone considerable changes, since its functional operation in 1987, in three distinct phases:

- Phase 1 (1987–1996): The regional support and other academic support units at the headquarters operated through regional centers in each state, which in turn operated through study centers and work centers (i.e., the contact point of students).
- Phase 2 (1996–2016): Besides the HQ-RC-SC model, the media center (with state-of-the-art media infrastructure and a dedicated educational satellite uplinked from the center) and the academic schools of studies also directly interacted with students for academic program-specific tasks.
- Phase 3 (2016-): Gradually, the open university centralized most administrative and organizational support at the headquarters, operated through technologies; and many study center academic and associated activities were handled by the faculty at the headquarters through the use of technologies and networks, though

the activities of academic counseling and practical continue at study centers/work centers.

In case of online learner support, in his theoretical framework, Rekkedal (2008) presented a case from NKI, Norway, comprising five stages of distance learning (along with support needs, responsibility center, and technology to address the support needs).

- Prospective phase: course choice, financial, practical aspects; generally handled by administration; with use of technologies like print, broadcast media, and Internet.
- Start-up phase: registration, material dispatch, induction, and follow-up; generally handled by administration with some faculty support; and through surface mail, phone, and email.
- Learning phase: (i) teaching, tutoring, academic support, social support, and assessment; by faculty; through phone, email discussion forums; (ii) practical support, technical support, resource library, learning groups, and local support; by administration and local faculty; and through F2F, phone, and email.
- Graduation: diploma accreditation; by administration; F2F.
- After graduation: further study, job opportunities, and alumni services; generally handled by administration; mix of print, F2F, Internet, and forums.

In case of online learning, Contact North-Contact Nord, Canada, outlined an eight-characteristics framework from online students' perspective (CN-CN, n.d.), which should be useful to other institutions and their faculty:

- Purposeful: learner support as integral part of institutional mission and strategic objectives
- Transparent: clear nodes and standards
- Accessible: seamless and 24 × 7
- Responsive: individual need-based, with definite turnaround time
- Interactive: interaction with institution, faculty, staff, and content
- Self-directed: independent skills and management
- Integrated: integrated across functions
- Open to change: prone to updating by new cohorts and by new changes

Based on the ARCS (affective-reflective-cognitive-systemic) model, a comprehensive analysis of various learner support frameworks in Asian distance education was undertaken by Jung and Hong (2014). In their revised model, and especially in relation to gender, the researchers located a five-variable support framework with associated subvariables (and which needs to be seen in relation to Tait, 2000):

- Affective: social, political, and emotional
- Cognitive: content, tutoring, assessment, and self-learning strategies
- Reflective: assistive guidance, developmental guidance

- Systemic: policy support, customized support
- Gender: life skill development, confidence building, and policy and learning environment

Given these and many institutional frameworks and subsequent changes in learner support systems due especially to technology sophistication, the traditional roles and competencies of distance teachers and tutors have also undergone significant changes. A tutor or online instructor undertakes all or most of these roles: designer, technologist, content expert, instructor, assessor, researcher, mentor, facilitator, adviser, colearner, and manager (Panda, 2019); therefore, continuous training and professional development inputs are essential to sustaining an effective support system.

Technology and Learner Support

As discussed above, the traditional distance education learner support system was based on the tasks of tutoring (F2F or technology-mediated), counseling (F2F or synchronous), organization of study center activities, and interaction through conferencing and interactive radio/TV. This model has undergone considerable changes in the past decade at the behest of the semantic web, availability of synchronous and asynchronous technologies, and related research on online and offline interaction (Table 4).

Across various synchronous technologies (including telephone, conferencing, and chats) and asynchronous technologies (including SMS, email, among others), the following four powerful technologies have been proved effective in facilitating reflective and inquiry-based learning.

- Blog: for *individual* articulation and reflection (Jimoyiannis, Schiza, & Tsiotakis, 2018; van Wyk, 2018)
- Wiki: for *collaborative* projects and collective/community reflection (Biasutti & EL-Deghaidy, 2015; Huang, 2019; Kim & Kim, 2020)
- Discussion forum: for *critical* discussion and inquiry-based *reflection* (Chaka, Nkhobo, & Lephalala, 2020; McDougall, 2015; Wu, 2021)
- E-Portfolio: for *self-critical reflection* and *self-management* (Chaudhuri & Cabau, 2017; Jenson & Treuer, 2014)

Table 4 Synchronous and asynchronous media vis-à-vis types of interaction

Interaction	Synchronous	Asynchronous
1. Learner-content	Teleconference, interactive radio, and virtual class	Interactive multimedia, web-based interaction, and facsimile
2. Learner-instructor	F2F counseling, telephone, chat, teleconferences, and interactive radio	Email, sms, discussion boards, facsimile, and online LMS
3. Learner-learner	Self-help group, chat group	Email, mail list, discussion board, facsimile, whatsapp, facebook, and online networks

It had been appropriately pointed out by Brindley et al. (2008) that, in case of traditional distance education, course production and learner support were distinctive activities which have now been blurred in the case of online and blended learning. When Tait (2000) and Simpson (2000) conceptualized and analyzed learner support at the time of the second generation distance education, various academic support and nonacademic guidance and support (including study skill development, feedback mechanisms, and graduate follow-up) were considered crucial. In the present context of Web 4.0 and changing institutional transformation, learner support has undergone considerable change. Tait (2014) revisited the reconfiguration of student support in the digital age, almost after one and half decades. Tracing the history from the earlier printed resources (didactic conversation), through the postal system and the telephone communication (synchronous conversation), and radio and television (radio wave) to the digital age (synchronous and asynchronous communication), Tait (2014) underlines that institutions have moved away from the behaviorist model to the constructivist and the connectivist, and that the earlier separation between course creation and learner support had resulted in “an integrated part of the overall curriculum design and learning and teaching system” (p.9).

It is worth noting that while there is still continuance of the traditional learner support models in a large number of distance teaching institutions, “the need for (such) reassessment is due both to the fact that while practice has moved on, scholarly analysis has not adequately done so, and secondly that practice itself in some second generation distance teaching institutions has not yet fully made the far-reaching changes that the digital revolution offers” (Tait, 2014, p.5). What has come up in the above analysis is that student success (or even dropout) is largely dependent on “effectiveness of learning design” (in which learner support is embedded), irrespective of the mode of (F2F, distance, and online) delivery. Further, the technological development of learning/learner analytics makes it easy to embed learner support with learning design, and to diagnose and facilitate student learning at every now and then, instead of waiting for periodic intervention (as in case of the traditional support model).

Management of Learner Support Services

Given the policy, plan, and infrastructure for a working learner support system, it is the actual implementation that matters – and how the entire process is managed and with what motive. The traditional as also the contemporary management of mass distance education (including MOOCs) was greatly influenced by what Peters (1983) described as the industrialized system of education – where there is hierarchical model of organization with line authority, line management, specialization of tasks and skills (and division of labor), centralized authority, dominance of interests of the institution, and quality control (subsequently, assurance). Subsequent changes went beyond the analogy of the machine to the analogy of the living organism and included the following: subsystem complexities, open system in constant interaction with the environment, diverse and flexible regulatory system as per changing environment, multiple ways of achieving the stipulated outcomes, and to be open and flexible enough to deal with the changing environmental challenges. In the distance education system, these entities operate too; there existed divisions in the traditional teaching functions including student support; and therefore there is a need that these discrete functions and changes operate in a coherent manner for effective teaching-learning, learner support, and quality of student learning.

It may be underlined that learner support in the traditional distance education (especially open university) delivery model was considered as part of institutional management. This functioned within a decentralized and distributed (and sometimes franchised) framework in which study center core activities of tutoring and counseling were *less visible*. In the case of online and blended delivery model, it forms an integral part of curriculum and assessment, with more faculty and student control, and is therefore *more visible*. Today, with more of accountability perspective and privatization dominating the institutional decision-making basket, education is being treated as a service industry and a tradable commodity, and students being treated as customers or clients. The humane and integrated personality development discourses have been considerably diluted to produce skilled knowledge workers in the knowledge economy. Distance education and the concomitant learner support have also been subjugated to this discourse. Therefore, it is not surprising that economy of scale and cost-efficiency have often dominated decision-making on how distance students should be supported. As an offshoot, the leaner/learning management system (including learning center and technology management) has been more "administratively" viewed. There is therefore a need to relook at the balance between leadership and administration imperatives, on the one hand, and faculty and student voice, on the other.

Issues, Challenges, and Suggestions

Stemming from the above discussions are some selective critical issues which distance educators, tutors/instructors, and institutional leaders need to address, especially in the changing context of globalization, technologization, and twenty-first century learning.

Independence Versus Interaction

The debates on "independence versus interaction" were captured by Daniel and Marquis (1979) in their seminal article in which issues relating to pedagogic (learning), social (community), and economic (cost-efficiency) dimensions were discussed. While more interaction was to increase not only cost but also social learning and social development, more independence was to decrease not only cost but also social learning. Distance teaching institutions had to make decisions to have the right mix, balancing institutional and student interests. When the debate started, interaction and communication did exist in forms of real and simulated communication (real at study centers, and simulated through self-learning materials) (Holmberg, 1989), though Daniel and Marquis (1979) referred to "human communication."

Both intellectual articulation and quality studies have underlined interaction as essential to “quality” learning (alongside independent study). On the other hand, distance teaching institutions struggle hard to ensure independent study (self-learning) in contexts where most learners do not have required study skills for self-learning, thereby demand for more interaction (meaning, more direct lecturing by teachers/ tutors at study centers, and through video lectures and teleconferencing sessions). This suggests that serious institutional scholarly policy decisions need to be made, on the one hand, to provide for mechanisms that facilitate independent study skills of learners, and on the other hand, ensure that interaction does not largely result in one-way communication from the peer or tutor or the mentor. At the same time, interaction also needs to be built into independent study of self-learning resources. This is clearly supported by the equivalency theory of Anderson (2003) that, given the three types of interaction (learner-content, learner-teacher, and learner-learner), “an instructional designer can substitute one type of interaction for one of the others (at the same level) with little loss in educational experiences” (p4). Even the student-teacher interaction can be minimized (with reduction in cost) and quality of learning maintained, in consideration of a variety of types and mixes of interaction that Anderson (2003) articulated.

Culture and Learner Support

In any educational context, and especially in open and distance learning where it is difficult to ascertain the cultural differences in goals and attitudes of learners, it is important that, besides addressing the psychological and technical distances, more of sociocultural distance is studied and addressed to. There are differences in the goals and attitudes of learners, influenced by the goals and attitude to education of their own culture. Gunawardena (2014), while underlining that there are individual differences in the goals and needs among students, exemplifies cultural differences and expectations between the western world and the global south. While in the western world the stress is on understanding the world and achieving personal goals of excellence, in the nonwestern world generally the emphasis is given to respect for elders/teachers, moral development, and contribution to the society (and development of skills to address those). Also, while in the former, there is stress on individual excellence but in a collaborative and experience-sharing environment, in the latter, students often work individually (without much collaborative engagement), though find comfort in community values and ethos. Teaching-learning therefore needs to address the cultural and linguistic affiliation so as to remove isolation of students and increase institutional and cohort affiliation. This is more so in online learning where diversified groups of students with cultural, age, gender, language, and socioeconomic status differences interact in the same course of study. There are also other critical feminist, queer, and disability perspectives to address to. This is where learner support is intrinsically associated with curriculum design, teaching-learning, and assessment. It therefore requires clear guidelines, transparent communication, and individualized counseling support and mentoring.

Gender and Learner Support

With more opening up of societies, gender issues are being articulated in a more transparent and just manner, more so in case of technology-enabled learning. In the context of traditional nononline form of ODL, deeper research and analyses are needed on cultural socialization, gender (across ethnic, class, educational backgrounds), and open distance learning, and the nature of support that could be appropriate and most effective. This could be extended further to the context of online learning (both synchronous and especially asynchronous) where there is more possibility of flexibility, voice, and collaborative reflection. Other areas of concern are access and gender equity, and technology-gender-online learning (Gnanadass & Sanders, 2018). Moreover, gender in distance education is also viewed not only from the perspective of access and equity, but also from the feminist perspective. A recent work on gender and distance education (Aneja, 2018) could be useful in further articulation from the points of view of: democratization from a gendered perspective, feminist pedagogical perspectives, and gender and social media in distance education (learning and support). For an elaborated model, also see Jung and Hong (2014).

Disability and Learner Support

Almost each nation has now a legal/constitutional policy for the disabled, and their education and training. Higher education institutions have been constantly struggling to facilitate education and learning for the disabled – there are distinguished requirements for visual, hearing, and mentally impaired adults, as also for those who are physically challenged and have learning disability. There are access and assistive technologies available, and the universal design for learning (UDL) promises cognitive/academic access across peer groups and across programs of study. Quite often, the facilitation gets limited to physical access to resources (digital and otherwise), technology (enabled learning), and human assistance. There are also other disadvantaged groups who need support, which is often limited to special study centers, special provisions, and special concessions like fee waive and reservation for them. In the institutional arrangement for addressing the access needs of disadvantaged distance learners, we have almost neglected the quality of learning and support interventions, which are generally left to the students themselves to deal with, and which therefore need to be institutionalized.

Technology-Enabled Learner Support

In spite of massive technological developments and institutional technology provisions, two practices remain as concerns, and which need to be addressed through institutional policy and leadership. First, even if many institutions have entered into (sometimes sophisticated) online learning, the traditional distinction between curriculum/ course design and learner support still persists. Second, massive technology deployment still stands as supplementary to media-mix, and media has not been "integrated" into curriculum design, course delivery, and learner support. This represents a patchy work (and could be considered more as “market-driven”) without due consideration to support across a student’s learning trajectory (to be considered as more “pedagogy-driven”). For example, one may consider scaffolding for constructivist inquiry (McLoughlin, 2002), instructional design strategies (Schutt, 2003), factors in scaffolding at-risk students in blended learning (Hughes, 2007), activity design for online blended learning (Macdonald, 2008), alignment in authentic online learning (Parker, Maor, & Herrington, 2013), four pillars including scaffolding with technology (Babacan & Thurgood, 2021), and designing learning experiences that are personalized, interactive, immersive, framed by microlearning, and skill-based (Guralnick, 2021), among others.

Ethics of Learner Support

Given that the main concern of distance education is access, equity, quality, lifelong education, and employability, there are ethical concerns relating to inclusiveness, nature of participation and support, institutional goals and support provisions, and fair decision-making. Visibility of professional ethics gets delayed in the traditional model of learning material and study center-based delivery and support, where as in seamless online distance learning, professional ethics is transparent and its visibility is immediate. Ethics embraces a larger canvas: institutional policies and plans of action, student autonomy and choice, faculty out-of-box concerns and actions on learner support (which is at times at odds with institutional plan and provision), and public/other stakeholder support for distance education (including parity of esteem). There is a need for provision of wider course baskets and media baskets to choose from; and also that the degree of openness and flexibility provided to the students forms part of ethical consideration and commitment. Tait (2000, 2003) had strongly argued for leadership and faculty introspection on issues relating to top-down/bottom-up leaner support and the democratic concern of student voice. This concern for voice is much above the usual client feedback and student satisfaction surveys. Kelly and Mills (2007) talk of (ethical) conflict in “being fair to all students and being responsive to individual student needs” (p.150). The authors point to ethical underpinnings in three important areas – institutional access and admission policy, teaching and learner support, and governmental policy – and caution us about the usual uncomfortable trade-offs. Here, two issues assume considerable importance:

- First, in a competitive market, for institutions to attract students is important, but more important is to support them to ensure that they succeed. This also involves appropriate and sufficient information counseling for prospective students to make informed choices, and also to facilitate their study skills.
- Second, in case of an open admission policy, there is an ethical danger of either compromising quality or accepting high rate of dropout. Therefore, the claim to parity of esteem needs to be seen from an ethical perspective too.

Quality and Parity of Esteem

The dual-mode universities have generally added open and distance (and online) learning to their profile in the name of access (or even increasing the gross enrollment ratio); therefore, services offered to the students are generally an add-on. It may be construed as unethical for distance teaching institutions to treat ODL as on add-on and to increase Gross Enrollment Ratio, and not able to provide for all types of support to their students that a full-time campus student gets. Conversely, it is unrealistic to ask those students to travel to mainstream campus to access those services like personal advice and counseling, career guidance, library resource support, and computer and other lab facilities (LaPadula, 2003). Will it then be fair to talk of "parity of esteem" and equivalence in quality?

Research

Decision-making for learner support systems must be based on research. Considerable research studies on learner support in distance and online learning have been undertaken during the 1980s till the first decade of this century, though the subsequent research studies focused more on technology-enabled "learning" (rather than "support"). Reviews and research analyses on learning/learner support may be accessed from Robinson (1995), Salmon (2000), Simpson (2000), Lee (2003), Brindley et al. (2008), Macdonald (2008), Jung and Hong (2014), Zawacki-Richter and Naidu (2016), Sanchez-Elvira Pariagua and Simpson (2018), Kara, Erdogdu, Kokoc, and Cagiltay (2019), and special issues of *The International Review of Research in Open and Distributed Learning* (2003, 1), and *Open Praxis* (2014, 1). Robinson (1995) had long back underlined that research should focus more on theory building as also building on the existing research systematically. Besides this important consideration, review of the research studies on learner support in ODL points to the following further research questions:

- How do students learn and what contribution do a variety of interaction and tutoring make to their learning vis-à-vis their behavior, needs, motivations, and study approaches? What are the various models to effectively combine student-independent study and their (online) interaction and engagement?
- What could be the most effective learner support with social technologies and social networks? What effect does social technology-based learner support have on student-independent self-regulated learning and self-directed learning?
- What are the most appropriate and effective support strategies in course-based and MOOC-based educational programs, and how to support such learning to be more interactive and engaging? What impact does such learner support have on student study, dropout, and success?
- How do interaction and knowledge construction take place in an online and/or blended learning environment, and what support and scaffolding strategies could

be used to facilitate voicing opinions, questioning, participating in interactions, self-review, peer review, peer mentoring, inquiring and reflecting, and confidence building?

- What is the future of learner support in distance, open, online, and blended learning, and especially in the context of Covid-19 and post-Covid (when especially the teachers and tutors have had considerable experience and expertise in dealing with remote teaching)? How do the variables of culture, gender, and learner support interact for satisfaction, confidence building, and learning?
- In what different ways the new technology innovations like artificial intelligence, Internet of things, machine learning, and learning analytics could be put to practice in enriching the quality of support, personalizing support, addressing the institutional administrative-academic-support "system" in an intelligent flexible manner, and in ensuring cost-effectiveness and cost-efficiency?
- What additional and changing competencies teachers and instructors need to develop for quality learner support in the changing contexts of open education, open pedagogy/teaching, and open educational practices? What about teacher/tutor attitude, perception, and development?
- What best institutional provisions can be ensured for quality support and quality student learning – relating to access, adequacy, effectiveness, institutional culture, administration and management style, infrastructure, and networks?

Conclusion

In future, distance learning organization and delivery is poised to shift from the study center-tutorial-learning materials model to more of resource based-networked-individualized and collaborative model, and a shift in the focus from "learning material" to "interactive learning and support system." Digitalization of operation and services could ensure more transparency, efficiency, and learner-friendliness. Institutional leaders will continue to grapple between access and equity, on the one hand, and efficiency and quality, on the other. Serious introspection is needed in respect of institutional preparedness for technology-enabled learning – moving beyond adequate and effective provision to more of integration, and pedagogy-determined and learner-friendly operation. Mere provision is not enough; it needs to be operationalized and equitably distributed, and continuously grappled with. The recent experiences of remote teaching and support during Covid-19, though enriching in terms of keeping the process going, compel us to seriously relook at the organization and delivery of online and blended learning, vis-à-vis student engagement and quality of learning and learner support.

References

Anderson, T. (2003). Getting the mix right again: An updated and theoretical rationale for interaction. *International Review of Research in Open and Distance Learning, 4*(2), 1–15.

Aneja, A. (Ed.). (2018). *Gender and distance education*. New Delhi & London, UK: Routledge.

Babacan, A., & Thurgood, M. (2021). Learner support services in an online learning environment. In H. Huijser, M. Kak, & F. F. Pardo (Eds.), *Student support services* (pp. 257–271). Singapore, Singapore: Springer.

Biasutti, M., & El-Deghaidy, H. (2015). Interdisciplinary project-based learning: An online wiki experience in teacher education. *Technology, Pedagogy and Education, 24*(3), 339–355.

Bonfield, C. A., Salter, M., Longmuir, A., Benson, M., & Adachi, C. (2020). Transformation or evolution? Education 4.0, teaching and learning in the digital age. *Higher Education Pedagogies, 5*(1), 223–246.

Brindley, J. E., Walti, C., & Zawacki-Richter, O. (2008). The current context of learner support in open, distance and online learning: An introduction. In J. E. Brindley, C. Walti, & O. Zawacki-Richter (Eds.), *Learner support in open, distance and online learning environments*. Oldenburg, Germany: BIS-Verlag der & Carl von Ossietzky Universitate.

Chaka, C., Nkhobo, T., & Lephalala, M. (2020). Leveraging Moya, whatsapp and online discussion forum to support students at an open and distance learning university. *The Electronic Journal of e-Learning, 18*(6), 494–515.

Chaudhuri, T., & Cabau, B. (2017). *E-portfolios in higher education: A multidisciplinary approach*. Springer Nature Switzerland AG.

CN-CN. (n.d.). How to build effective online learner support services. *Contact North-Contact Nord*, 1–7.

Daniel, J. S., & Marquis, C. (1979). Interaction and independence: Getting the mixture right. *Teaching at a Distance, 14*, 29–44.

Garrison, D. R., & Anderson, T. (2003). *E-learning in the 21st century*. London, UK: Routledge.

Garrison, D. R., & Vaughan, N. (2008). *Blended learning in higher education*. San Francisco, CA: Jossey-Bass.

Gnanadass, E., & Sanders, A. Y. (2018). Gender still matters in distance education. In M. G. Moore & W. C. Diehl (Eds.), *Handbook of distance education*. New York, NY: Routledge.

Gorsky, P., & Caspi, A. (2005). Dialogue: A theoretical framework for distance education instructional system. *British Journal of Educational Technology, 36*(2), 137–144.

Gunawardena, C. (2014). Supporting diverse online learners. In I. Jung & C. N. Gunawardena (Eds.), *Culture and online learning: Global perspectives and research* (pp. 79–90). Sterling, VA: Stylus.

Guralnick, D. (2021). Reimagining educational experiences via artificial intelligence and new technologies. In S. Jagannathan (Ed.), *Reimagining digital learning for sustainable development*. New York, NY: Routledge.

Holmberg, B. (1989). *Theory and practice of distance education*. London, UK: Routledge.

Huang, K. (2019). Design and investigation of cooperative, scaffolded wiki learning activities in an online graduate-level course. *International Journal of Educational Technology in Higher Education, 16*(11), 1–18.

Hughes, G. (2007). Using blended learning to increase support and improve retention. *Teaching in Higher Education, 12*(3), 349–363.

Jenson, J. D., & Treuer, P. (2014). Defining the e-portfolio: What it is and why it matters. *Change: The Magazine of Higher Learning, 46*(2), 50–57.

Jimoyiannis, A., Schiza, E. I., & Tsiotakis, P. (2018). Students' self-regulated learning through on-line academic writing in a course blog. In D. Sampson et al. (Eds.), *Digital technologies: Sustainable innovations for improving teaching and learning*. New York, NY: Springer.

Jung, I., & Hong, S. (2014). An elaborated model of student support to allow for gender considerations in Asian distance education. *The International Review of Research in Open and Distance Learning, 15*(2), 170–188.

Kara, M., Erdogdu, F., Kokoc, M., & Cagiltay, K. (2019). Challenges faced by adult learners in online distance education: A literature review. *Open Praxis, 11*(1), 5–22.

Kelly, P., & Mills, R. (2007). The ethical dimensions of learner support. *Open Learning, 22*(2), 149–157.

Kim, M. K., & Kim, S. M. (2020). Dynamic learner engagement in a wiki-enhanced writing course. *Journal of Computing in Higher Education, 32*, 582–606.

LaPadula, M. (2003). A comprehensive look at online student support services for distance learners. *American Journal of Distance Education, 17*(2), 119–128.

Lee, J.-Y. (2003). Current status of learner support in distance education: Emerging issues and directions for future research. *Asia Pacific Education Review, 4*(2), 181–188.

Macdonald, J. (2008). *Blended learning and online tutoring: Planning learner support and activity design*. Hampshire, UK: Gower.

McDougall, J. (2015). The quest for authenticity: A study of an online discussion forum and the needs of adult learners. *Australian Journal of Adult Learning, 55*(1), 94–113.

McLoughlin, C. (2002). Learner support in distance and networked learning environments: Ten dimensions for successful design. *Distance Education, 23*(2), 149–162.

Mishra, S., & Panda, S. (Eds.). (2020). *Technology-enabled learning: Policy, pedagogy and practice*. Burnby, Canada: The Commonwealth of Learning.

Moore, M. (1972). Learner autonomy: The second dimension of independent learning. *Convergence, 5*(2), 76–88.

Moore, M. (1993). Theory of transactional distance. In D. Keegan (Ed.), *Theoretical principles of distance education* (pp. 22–29). London, UK: Routledge.

Panda, S. (2004). People: Staffing, development and management. In H. Perraton & H. Lentell (Eds.), *Policy for open and distance learning*. London, UK: Routledge.

Panda, S. (2009). The world wide web and lifelong learning. In P. Jarvis (Ed.), *The Routledge international handbook of lifelong learning* (pp. 249–258). New York, NY: Routledge.

Panda, S. (2019). *Roles and competencies of distance and online teachers*. Keynote address at International Conference: Digital Education XXI Century. Moscow, October 15–16.

Panda, S., & Jena, T. (2001). Changing the pattern: Towards flexible learning, learner support and mentoring. In F. Lockwood & A. Gooley (Eds.), *Innovation in open and distance learning* (pp. 172–178). London, UK: Kogan Page.

Parker, J., Maor, D., & Herrington, J. (2013). Authentic online learning: Aligning learner needs, pedagogy and technology. *Issues in Educational Research, 23*(2), 227–241.

Peters, O. (1983). Distance teaching and industrial production: A comparative interpretation in outline. In D. Sewart, D. Keegan, & B. Holmberg (Eds.), *Distance education: International perspectives* (pp. 95–113). London, UK: Croom Helm.

Rekkedal, T. (2008). Internet based e-learning, pedagogy and support systems. In J. E. Brindley, C. Walti, & O. Zawacki-Richter (Eds.), *Learner support in open, distance and online learning environments*. Oldenburg, Germany: BIS-Verlag der & Carl von Ossietzky Universitate.

Robinson, B. (1995). Research and pragmatism in learner support. In F. Lockwood (Ed.), *Open and distance learning today* (pp. 221–231). London, UK: Routledge.

Rumble, G. (2000). Student support in distance education in the 21st century: Learning from service management. *Distance Education, 21*(2), 216–236.

Rumble, G. (2001). Re-inventing distance education, 1971? 2001. *International Journal of Lifelong Education, 20*(1–2), 31–43.

Salmon, G. (2000). *E-moderating: The key to teaching and learning online*. London, UK: Kogan Page.

Salmon, G. (2019). May the fourth be with you: Creating education 4.0. *Journal of Learning for Development, 6*(2), 95–115.

Samans, R. (2019). *Globalisation 4.0*. Geneva, Switzerland: World Economic Forum.

Sanchez-Elvira Pariagua, A., & Simpson, O. (2018). Developing student support for open and distance learning: The EMPOWER project. *Journal of Interactive Media in Education, 9*(1), 1–10.
Schutt, M. (2003). Scaffolding for online learning environments: Instructional design strategies that provide online learner support. *Educational Technology, 43*(6), 28–35.
Sewart, D. (1993). Student support systems in distance education. *Open Learning, 8*(3), 3–12.
Simpson, O. (2000). *Supporting students in open and distance learning*. London, UK: Kogan Page.
Tait, A. (2000). Planning student support for open and distance learning. *Open Learning, 15*(3), 287–299.
Tait, A. (2003). Management of services to students. In S. Panda (Ed.), *Planning and management in distance education*. London, NY: Routledge.
Tait, A. (2010). Foreword. In M. F. Cleveland-Innes & D. R. Garrison (Eds.), *An introduction to distance education: Understanding teaching and learning in a new era*. New York, NY: Routledge.
Tait, A. (2014). From place to virtual space: Reconfiguring student support for distance and e-learning in the digital age. *Open Praxis, 6*(1), 5–16.
Tait, A. (2018). Open universities: The next phase. *Asian Association of Open Universities Journal, 13*(1), 13–23.
Thorpe, M. (2003). Collaborative on-line learning: Transforming learner support and course design. In A. Tait & R. Mills (Eds.), *Rethinking learners support in distance education* (pp. 198–211). London, NY: Routledge.
van Wyk, M. M. (2018). Blog phenomenology: Student teachers' views of learning to teach economics. *International Journal of Web-Based Learning and Teaching Technologies, 13*(2), 62–77.
Vaughan, N. D., Cleveland-Innes, M., & Garrison, D. R. (2013). *Teaching in blended learning environments: Creating and sustaining community of inquiry*. Edmonton, Canada: AU Press.
Wu, B. (2021). Influence of MOOC learners discussion forum social interactions on online reviews of MOOC. *Education and Information Technologies, 26*, 3483–3496.
Zawacki-Richter, O., & Naidu, S. (2016). Mapping research trends from 35 years of publication in *Distance Education*. *Distance Education, 37*(3), 245–269.

50 Administrative Support System

An Integrated Approach to Open, Distance, and Digital Education Ecosystems

António Moreira Teixeira

Contents

Abstract

Administrative support provided to teachers, learners, and staff is critical for ensuring the quality of the teaching and learning experience in open, distance, and digital education (ODDE). Having been seen for a long time as a peripheral function, administrative support is now recognized as playing a decisive role in suppressing student dropout, improving teaching effectiveness, and promoting learning success. This chapter examines in detail how administrative support systems are organized and should be redesigned to efficiently assist stakeholders. This analysis is conducted in the framework of the ongoing digital transformation process of higher education institutions (HEIs). Reference models for

A. M. Teixeira (✉)
Department of Education and Distance Learning, Universidade Aberta, Lisbon, Portugal
e-mail: Antonio.Teixeira@uab.pt

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_48

implementing digital learning innovation are described and analyzed. The chapter proposes that administrative student support in ODDE should not be organized as a separate autonomous structure. It is argued that in such complex and unstable innovation-driven institutional environments, the learner, faculty, and staff administrative support system should be designed as a hub of resources and services operating within an open and flexible learning ecosystem. It is suggested that multidisciplinary teams are set across the HEIs to collaboratively design, deliver, and support ODDE provision. Administrative staff professional development is also suggested to be reorganized in this innovative framework.

Keywords

Open education · Distance education · Digital education · Online learning · Administrative support · Learner support · Digital transformation · Higher education institutions

Introduction

Digital technologies have significantly transformed the way we live, work, learn, and exercise our citizenship. Mobile internet associated with an increasingly powerful and cost-effective computing and data sharing capability has made it possible to establish networks and communities, learn and develop skills, build and disseminate knowledge in an increasingly agile and autonomous way. Recognizing this fact, higher education institutions (HEIs) have been steadily moving from the traditional face-to-face classroom environment to an increasingly hybrid or fully digital territory (Teixeira & Mota, 2020; van der Zwaan, 2017). HEIs realized the future survival and expansion of their educational provision would depend largely on their ability to provide online education (Bates, 2019; Seaman, Allen, & Seaman, 2018). Many have dramatically increased their provision of fully online courses as a result of the expansion of massive open online courses (MOOCs) offering. The need to upscale access to quality higher education worldwide as well as widen participation has contributed substantially to consolidate this trend.

An ecologically friendly social and political atmosphere has favored the development of more sustainable formats of education delivery as it is the case of open, distance and digital education (ODDE). In recent years, open education has become a core component of open science which extended the principles of openness to the whole research cycle. An open knowledge ecosystem is thus being built with important implications on how the higher education, research, and innovation landscape organizes and operates (Burgelman et al., 2019; Teixeira & Mota, 2020).

The movement toward the mainstreaming of ODDE was dramatically accelerated by the global impact of the SARS-CoV-2 pandemic (Witze, 2020). However, the widespread implementation of emergency remote teaching and learning – ERT&L (Czerniewicz et al., 2020; Hodges, Moore, Lockee, Trust, & Bond, 2020) resulting from the forced closing down of campuses has demonstrated how most HEIs were unprepared for this new scenario. Having the time and the resources to move beyond a crisis mitigation stage, they need to speed up the process of digital transformation (Dx).

In order to be successful, this transition requires HEIs not only to adjust their methodologies and procedures, but also to transform their organizational cultures (Grajek & Reinitz, 2019). This implies changes on the overall institutional governance and infrastructure as much as on how technology is integrated in educational practices. Administrative support, which has previously been seen as a peripheral function, plays a central role in HEI's organization nowadays and has become essential for meeting the new demands and assuring the success of teaching and research (Ryttberg & Geschwind, 2017).

Administrative support, once defined as the institutional assistance given to the design and delivery of quality education programs and courses, can currently be best described as the institutional capability to support the participation of all in quality research, teaching and learning experiences. It involves policies, finance, supply chain, human resources development and management, research administration, student affairs, as well as digital technologies to provide support services in an efficient, effective, and sustainable way to their stakeholders, that is, learners, faculty, and staff.

As HEIs embrace ODDE, by that changing their traditional mode of providing education, the way learner as well as teacher and staff support is offered must be transformed as well. Distance and traditional learners, for instance, each have unique support needs which should be met with differently designed services. Sánchez-Elvira Paniagua and Simpson (2018) claim that non-academic learner support in ODDE should aim particularly to developing learners organizational and affective skills. It deals therefore with the emotional stresses of study and staying motivated. Administrative learner support is usually provided in the form of funding, guidance, oversight, and other kinds of assistance (Meyer & Barefield, 2010; Ryan, Hodson-Carlton, & Ali, 2005). As such, it can include both action taken *with* a learner and action taken *for* a learner, including such diverse areas as:

- Program policies and regulations
- Student recruitment, admission and enrolment
- Academic counselling
- Financial aid, billing and payment
- IT infrastructure policies and procedures
- Human resources training and professional development
- Course materials and learning resources creation and sharing
- Libraries, archives, and repositories
- Student assessment and certification
- Student mobility and international exchange
- Student employability and further academic options
- External and internal communication
- Estates and facilities management (particularly in the case of campus-based HEI)
- Quality assurance

All these operations affect in some way the quality of the individual learning experience and consequently need to be adjusted to the specific needs and requirements of ODDE learners (Sánchez-Elvira Paniagua & Simpson, 2018; Tait, 2014; Zuhairi, Karthikeyan, & Priyadarshana, 2020; Aoki & Pogroszewski, 1998). The same applies to the respective support positions which also need to be redesigned, adjusted, and provided with timely training so that they can adequately fulfill the requirement for the services they provide in an online environment (Restauri, 2004). To facilitate this transformation, administrative support should be provided in the framework of a holistic institutional innovation strategy which promotes synergies across the HEI and involves all academic bodies and operational sectors (Teixeira, Bates, & Mota, 2019).

Also, as clearly demonstrated in the context of the pandemic, ODDE teachers feel much more engaged if they can rely on a strong infrastructure which supports their technological, economical, and emotional needs. Faculty members who perceive that they have the backing of a fully developed and well-designed support structure for ODDE, are rarely apprehensive about accepting the challenge. In cases where faculty apprehension abounds, it is usually due to a serious lack of administrative support in one or more critical areas (Meyer & Barefield, 2010). The online teaching needs of faculty often go unmet by the institutional infrastructure because administrators frequently fail to understand how technology rapidly changes the way learning must be designed and instruction must be delivered to meet learner demand. Technology also has great impact on other factors such as student admissions, registration, faculty, and staff development; and faculty workload are impacted tremendously by ODDE, yet HEIs are usually unprepared to handle the changes (McQuiggan, 2007). As demonstrated by ERT&L, distance and digital education programs are often developed in haste to meet growing demand, but without assuring a proper infrastructure, policies, and administrative support (Tallen-Runnels et al., 2006; Teixeira, Bates, & Mota, 2019). In this chapter we discuss successful models and practices for organizing and running administrative support in ODDE, focusing in particular on the main stakeholder – learners.

Applying a Holistic Approach to Institutional Change

The first step to assure a sustainable ODDE provision is to assure strong governance support to educational innovation. Leadership across HEIs needs to focus on promoting ODDE and commits to change of educational practices, which implies that the leaders of HEIs need to develop a holistic vision which can inspire the stakeholders, be a reference for strategic planning, and engage all actors in the process.

Literature embodies many different models and strategies which describe and explain how learning innovations and educational change may be successfully introduced. Most of these models are grounded on empirical evidence. In relation to ODDE integration specifically, we can point out four main approaches: grassroots bottom-up, network-based, strategically driven, and collaborative (Laird, 2004). The first approach identified by Laird follows a grassroots inspiration and has been prevalent in most HEIs. In this scenario, individual faculty members develop innovative educational practices in complete autonomy and in an undisruptive scenario. Their initiatives do not fall into any institutional strategy and are not supported by institutional policy. As such, faculty members have exclusive control over how their ODDE program or course is created and delivered and receive no specific contribution from administrative support. This model although providing large freedom for experimentation, but lacks capability to replicate and disseminate innovative practices.

A variant of the described model applies to when these bottom-up individual initiatives are part of networks or special interest groups. Teams of teachers support each other in conducting an innovative educational practice. They share the tasks and collaborate in disseminating the results. As each department in the institution operates independently from any other departments administrative support cannot be provided systematically. This model limits the impact, overall quality, and transferability of results.

A more successful and resilient approach is to engage the HEI in a strategically driven transformation of its educational practices. This could be organized applying a bottom-up model, in which individuals or small teams of volunteers conduct innovative educational practices with the special support of dedicated institutional R&D centers or support services. This approach is what Laird calls Distance Education model. A specialized unit or sub-department is established and operates independently from the rest of the campus, having no real connection to the traditional academic mission of the campus. In this model, administrative support is provided in a systematic way channeled through the provision of services to the specialized structures. In fact, since the 1960s, HEIs have been establishing Teacher and Learning Centers (TLCs) designed to support learning innovation. These units intend to act as hubs for educational reforms (Pérez-Sanagustín et al., 2022; Singer, 2002). However, they traditionally focused their activities as labs for the improvement of teaching skills and transfer of knowledge on student learning. This configuration is only efficient to support pockets of incremental innovation but does not escalate easily.

Recent literature (Holt, Palmer, & Challis, 2011; Pérez-Sanagustín et al., 2022) has suggested a significant shift in the TLCs design concept. It enhances the need for assuring that other major stakeholders, such as learners or managers, also participate in the activities. It emphasizes the strategic role of TLCs as the designers and sustainers of open education networks encompassing powerful forms of learning both across, and up and down the organization. This clearly represents a more holistic and transformational approach as it is based on a collaborative-based model.

Literature finds teamwork to be vital for an effective implementation of ODDE (McKenzie, Ozkan, & Layton, 2006; Restauri, 2004). The most successful way to induce disruptive educational change in the digital age lies on system integration and applying a teamwork approach where experts from each critical area of the infrastructure are intimately involved in the developmental process throughout its course (Laird, 2004). In this model, all the campus resources and services are being involved and traditional instruction is unified with online learning design and facilitation. This generates a synergistic effect that allows technology, infrastructure, and resources to be shared by all faculty and staff. The online learning and the traditional learning infrastructure are combined and share resources equally, generating a true learning ecosystem. In such context, all sorts of administrative support (from policies to financial management and certification) are provided to relevant stakeholders according to their needs and at each stage of institutional development, in a coordinated, strategically driven, and network-based way.

Such a system approach which is particularly suited to ODDE can be used either in a stand-alone version or in the framework of an inter-institutional collaboration network which fosters organizational learning even further (Srivastava & Frankwick, 2011). This is the reference model adopted for example in the Portuguese distance higher education regulation (MCTES, 2019). In such a scenario, different and even competing HEIs form alliances to support each other, sharing know-how, infrastructure and resources, as well as jointly developing new educational provisions. External collaboration could also extend to specialized public agencies or nongovernmental organizations which can share know-how and resources for addressing specific target groups (e.g., students with special educational needs or disability – *SEND*) (Behling & Linder, 2017; Brinthaupt et al., 2019).

The collaboration methodology maximizes efficient use of administrative and technological resources, minimizes redundant systems and costs, and allows faculty to provide better quality instruction in a more productive atmosphere (Paolucci & Gambescia, 2007). Administrative support services are either realigned to support ODDE or new personnel are hired to provide the specific support needed. A collaborative methodological process may seem more expensive and difficult to organize and implement at the onset, but in the long run it can save critical faculty from resigning in frustration and encourage more student enrolment (Meyer & Barefield, 2010). Evidence shows this collaboration approach to be the best for assuring sustainable disruptive change of educational practices.

Aligning Administrative Support with a New Learning Ecosystem

It is hard to imagine a well-functioning HEI without well-functioning administrative support services. This is critical for assuring a successful experience for both learners and faculty. It should be noted though that the notion of learner support is relatively recent. It was absent in the first generation of correspondence education. As Tait (2014) explained, this idea of learner support only became an important part of ODDE theory and practice from the second generation onwards, when the pedagogical foundations of open and distance education shifted toward the recognition of the humanity of the individual student, and the identification of the affective dimensions of the learning experience, along with the cognitive and systemic dimensions (Tait, 2000). As a result, learner support became paramount and learner support systems came to be seen as critical elements for ensuring learner retention (Compora, 2003; Krauth, 1999; Aoki & Pogroszewski, 1998). The model inaugurated by the Open University (OU UK) in Europe, in the early 1970s, and soon replicated across the world, gave the tutor the role of providing individual support to students both subject specific and supportive of progress and success. This support included assistance related to administrative and other systemic issues.

In the analogue age, support to ODDE learners meant the HEIs should be able to assure some sort of geographic proximity to learners. Inspired by the OU UK model, large-scale open and distance education universities separated the curriculum creation system from the learner support system. Consequently, they established large networks of local or regional study centers as well as examination centers spread across their territories which provided proximity support to learners. As HEIs moved online, learner support become an integrated part of the overall curriculum design and learning and teaching system, and no longer a separate subsystem in its concerns, professional sub-groupings, and scholarly literature (Tait, 2000; Compora, 2003).

Similarly, administrative support should not be seen as an independent element in the HEI system but as a hub of services that provides support to learners, faculty, and staff. As such, administrative support should cooperate closely and permanently with the learner support system, the faculties, and the technical departments. The success factor is therefore how each of the key components of an administrative support system can provide valuable support for the stakeholders (learners, faculty and staff).

In an increasing number of countries, the provision of ODDE programs and courses is regulated by specific legislation. Several strict pedagogical and technical requirements are imposed to HEIs as a condition for operating as ODDE providers. In the Portuguese case (MCTES, 2019), mentioned in the previous section, HEIs are required to have an appropriate technological infrastructure and support services as well as specially trained learner support staff amongst other conditions. It is mandatory for HEIs to develop integrated administrative management systems that ensure the dematerialized processing of all academic processes, including online communication systems for student attendance that allow for applications, enrollments, registrations, access to assessment results and other administrative documentation, and information be accessible online (MCTES, 2019: art. 9).

While the support services each HEI choose to offer may vary according to the national regulation, students' characteristics, the pedagogical approach followed, and the institutional culture, the decision-making is greatly driven by accreditation guidelines. In recent years, quality assurance agencies worldwide have been setting quality and accreditation standards for ODDE provision which share many similar elements (Ossiannilsson, Williams, Camilleri, & Brown, 2015). This establishes a good reference for the organization of administrative support systems.

Policies

A cornerstone to all these set of standards is the requirement for HEIs to support the implementation of ODDE with appropriate policies, structures, and processes, which take into account all ethical and legal considerations and are embedded in the institution's organizational culture and values. This framework should provide guidance on ODDE organization, ensure protection against academic fraud, as well as accessibility and participation for all learners, and proper and timely administrative and technical support for all users of the digital learning ecosystem.

Pedagogical Approach

A successful innovation strategy must also be able to align academic and legal regulations with an institutional pedagogic model, which serves as a reference for ODDE organization and practice. Such a tool allows for an easier and coordinated adjustment of the administrative and technical structure with the concrete needs of faculty and learners. An example of this interdependence may be found in how HEI must ensure the security and fitness for purpose of the e-assessment system (Foerster et al., 2019). Certainly, one of the factors contributing to that goal is the implementation of protective measures which guarantee learner authentication and anti-plagiarism technologies which track learners' identity and work authorship. However, this must be always complemented with a code of practice which regulates the retrieval, storage, and use of learner data, and establishes for which purposes learning analytics is carried out. Such a combination of policy, technology, and a code of practice will ensure quality as well as information integrity, validity, and data protection. When external proctoring systems may be used, quality assurance procedures and security measures need also be implemented for external partners providing ODDE systems or services.

A prior condition to e-assessment practices as with other processes is that stakeholders, most especially teaching staff and learners, are informed about the methods and the criteria used for grading learners' work. This is once again partly assured by the pedagogical model, which establishes a framework for e-assessment design, and by clear communication from teachers. However, it also partly depends on how administrative support services confirm the information and apply those rules for certification and other processes. As such, an additional a code of conduct for learners must be in place. A code which includes recommendations on good practice and information on how cheating and plagiarism must be avoided and the consequences and sanctions such misconduct will lead to.

Learner Support

The interdependence of factors which characterizes teaching and learning processes in such complex fully digital or hybrid environments calls for a highly integrated response from the HEI organization. This is expressed in closer and interconnected cooperation between governance, administration, and faculty. In what specifically regards learner support, this means administrative support services and technical infrastructure and support services should work in a very coordinated way and in close communication with faculty and other stakeholders. Consequently, HEI are required to implement efficient learner support policies and strategies, which provide access to well-resourced support services for learner's counselling, orientation, tutoring, and facilitation in order to increase retention and success. As previously stated, learner support must cover not only pedagogical, but also technological and administrative-related needs, ensuring that services are timely and adequate to learners' profiles and needs, and considering the IT skills of the learners.

Technological Infrastructure

Infrastructure support for ODDE faculty needs should be a well-organized effort with a never-ending process of improvement. At whatever state the current infrastructure is, there is always room for improvement, but the implementation of ODDE requires certain considerations not normally an issue in a campus conventional teaching environment. Meyer and Barefield (2010) distinguish different sets of priorities according to each of the three stages of ODDE implementation: foundation, development, and maintenance.

One of the most critical priorities in the foundation stage is to ensure a cooperative atmosphere between administration support and faculty (McLean, 2006), as well as to train technology support staff to be extremely supportive and responsive to the immediate needs of the learners and faculty (Jennings & Bayless, 2003). Another paramount condition to be secured is permanent connectivity to teachers and learners. Online registration, billing and payment system, online bookstore, and online library services are essential parts of the basic foundation needed to support ODDE provision. These online services should be well established in advance of implementation of ODDE programs and courses (Tallen-Runnels et al., 2006).

Learning Resources

In the development stage, additional factors need be taken into consideration which requires administrative support to teachers and learners. These relate for instance to the production and/or distribution of learning materials to all learners. In an ODDE environment it is recommended the extensive use of open educational resources (OER), notably MOOCs. Such a decision allows for easier access to resources and the possibility for teachers and learners to contribute to its updating and improvement continuously. This calls for the dissemination of an open culture amongst faculty and other stakeholders as it has implications regarding intellectual propriety rights. The institutional adoption of open science policies, including open access to scientific publication and open licensing, is instrumental. Such an institutional strategy requires for administrative support services to adjust policies and procedures (Inamorato dos Santos, Punie, & Castaño-Muñoz, 2016). Universal accessibility to learning content and support services should also be assured and must be embraced by HEI as a major goal.

Assessment and Certification

As fully demonstrated during the pandemic, another critical element in the development stage is to ensure e-assessment integrity and security. From a conventional perspective, stakeholders may wonder how can tests be proctored or learners be monitored while taking a test online and at a distance? An increasing number of solutions are available in the market. However, the best strategy is to redesign assessment and certification practices making full use of Ed Tech tools. This refers for example to the implementation of ePortfolios and micro-credentials.

Communication

Accreditation standards usually require HEI to have information management systems which enable agile, complete, as well as representative collection of data and indicators derived from all aspects related to ODDE methodology, authenticity, and authorship technologies. Feedback procedures with the learning environment and the educational digital technologies used are also called for. This typically relates to the following aspects: ease of use for all learners' profiles; as well as privacy in relation to personal data, legal requirements, and ethical aspects involved. The HEI are expected to ensure as well the collection and dissemination of relevant information from stakeholders (learners, academic staff, support staff) for the effective management and enhancement of the ODDE methodology. The purpose of this is to promote improvements in the learners' learning experience.

An important additional element is that HEI must publish openly reliable, complete, and up-to-date information, accessible to learners before and after enrolment, on the ODDE practices, the pedagogical model which supports them, the minimum hardware requirements to make full use of the digital environment, the institutional learning, and technical support provided.

Quality Assurance

Finally, at the maintenance stage, the process of continuously monitoring and evaluating new online technology assumes high importance. Updating technology only when there is value added ensures that decisions to upgrade technology are only made when it can be proven that there will be value added with the updated technology (Ryan et al., 2005). Periodically assessing and updating the quality of course content and delivery, as well as of support services, is a process that is much more critical in an online environment than with campus courses because technology and online learners demands change much more rapidly. Quality assurance plays a critical role in this context.

From Digital Transition to Digital Transformation

The sustained expansion and further development of ODDE within an increasingly hybrid HEI landscape calls for the development of Dx. As indicated in a report by the Spanish Rector's Council, the Dx of HEI is no longer an option. Each university must therefore design, arrange, and execute a digitization plan that will allow it, depending on its reality and university model, to evolve as an organization throughout the process (Crue-TIC, 2018). Nevertheless, the most important challenge is the transformation of the organization itself as a deep change in both culture and leadership is required (Grajek, & Reinitz, 2019). HEI must evolve from the concepts of benefit/expense to vision/purpose, from hierarchy to collaboration networks, from control to trust and empowerment, from systemic planning to experimentation and acceptance of error as part of the learning process, and from opacity to transparency. The changes to be made affect the vision, culture, processes, and services (Crue-TIC, 2018).

There is growing evidence that HEI are embracing Dx, intentionally or not, as a matter of survival and a preparation for the still very uncertain future that emerges in the post-pandemic age (Reinitz, 2020). The objective is to become proficient and effective in the new digital or hybrid environment while, at the same time, keeping high academic standards. In fact, recent surveys confirm that most HEI leaders view Dx as a high priority and are committed to induce change in their institutions (Jensen, 2019). However, evidence also shows they are divided in how Dx translates into action. When asked to assess whether change is mainly being pushed top-down by the leadership and through an institutional-wide strategy or whether it is mainly developing as bottom-up, building on different opportunities and experiences across the different faculties or administration, results are not homogeneous. Although Dx seems to be part of the institutional strategic planning in most HEI around the world today, only in some cases there is reference to an actual digital roadmap or strategy in place to support its implementation (Jensen, 2019).

Reinitz (2020) identifies three stages in this transition: the 3Ds (digitization, digitalization, and Dx). The first and most basic step is digitization. The term refers to the transition from an analogue to a digital form. It can be described as a simple analogue-to-digital conversion of existing data and documents. A typical example of this stage is digitizing paper records and making them available online. In this case, neither are the processes optimized nor the document and data changed. They are simply encoded in a digital format. From learning materials to administrative documents most HEI across the world today have its information produced and shared in digital format and even openly accessible online. This has allowed for the automation of many manuals and paper-based processes which improve accessibility and work-flows. On a recent study on German universities, Gilch and others (2020) have concluded that digitization strategies are targeted at administrative support (61.8%) almost as much as at teaching and learning (69.6%). The objective most frequently associated with this is to increase the administrative services' quality and the administration's efficiency.

For administrative support, digitization involves four major operations. The first is to digitize all documents produced or used in its procedures (e.g., legislation, policies, regulations, and written procedures). The second is to assure that all administrative data is digitally retrieved, processed and managed according to established procedures protecting personal privacy and the integrity of the information. Thirdly, is to move all internal or external communication to digital media (either using email or other digital communication platforms). Finally, it implies providing online access to data and documents according to specific institutional policies. This can done at four levels, as defined by Gilch and others (2020):

- Level 1 – Information is provided online
- Level 2 – Forms can be downloaded
- Level 3 – Forms can be completed online
- Level 4 – The process is completely digitized

Administrative managers are responsible in a top-down approach for the establishment or further development of a digital infrastructure, the optimization of the university's internal IT services and for the establishment of digital workflows in administration (Gilch et al., 2020).

The second stage in the journey toward digital transition is digitalization. This refers to the use of digital technologies and information to transform individual institutional operations. Evidence shows that most HEIs are using digital technologies and data not simply to move activities online, but to generate integrated digital environments where information is at the core. This involves, for instance, streamlining the enterprise resource planning (ERP), the invoice workflow and the travel management. As recent studies also indicate (Gilch et al., 2020), this transition may be conducted gradually. In fact, HEIs prefer to prioritize the digitalization of more critical administrative processes first, as the following:

- Application procedure
- Enrolment
- Notification of examinations and grades

Independently of the pace in which the transition is managed, digitalization implies that all other typical procedures will be handled completely digitally as well (e.g., payroll, procurement, research administration, invoice processing, application for jobs, traveling and accommodation application, and accounting).

Lastly, Reinitz (2020) distinguishes digitalization from a third and final stage, Dx. The term is used to describe a situation in which an institutional strategy to transform the strategic direction or value proposition of the HEI is in place. In some regions, notably Europe, policy is playing a critical role in promoting Dx. The new EU Digital Education Action Plan (2021–27) is most certainly a strong evidence of that. Dx represents an extra step by which all education and research-related institutional processes are disruptively changed as a result of digital technology possibilities. The organization's entire operating model including administrative support is to shift and not just teaching practices. In order to assure the Dx journey is carried out, governance and leadership need to be focused on promoting educational innovation. There needs to be a holistic vision that inspires the institution's community, aligns strategic planning with it, and engages all relevant actors in the process.

Dx allows HEIs to develop an increased capacity to accommodate openness, complexity, and diversity. As stated in previous sections, ODDE learners are more diverse in profile, expectation, and needs than traditional ones. This results not only from the heterogeneous nature and geographical dispersion of the student population. It has been noted by literature that individual students are increasingly following more complex trajectories, moving from one HEI to another, changing between degrees and even fields of knowledge, mixing formal and nonformal learning offerings, and designing their own pathway (Haas & Hadjar, 2020). These phenomena have clear implications for administrative support. Enrolment in a degree, for example, does not represent necessarily an intention of the student to complete it. As such, the relation between enrolment and completion/dropout does not allow the identification of certain factors within the educational trajectory that may have led to one or the other outcome (Haas & Hadjar, 2020). HEI policies and administrative procedures must be adjusted in accordance. They should become highly flexible, transparent, and customizable. In addition, managers and administrative staff have to be also able to tailor them to meet personalized requirements. Moreover, interacting in a hybrid or in a fully online environment requires specific training and expertise. This implies administrative staff should be digitally competent and be recruited and trained for operating in this new context.

Another key aspect of HEI will be to develop a coherent and multifaceted educational ecosystem, one which includes both the several elements of the learning environment (the learning management system, the digital repositories, the virtual and remote labs, and the e-assessment system) and the administrative and technical support services as well. Considering that this is a cultural change process, HEI should also strive to make this ecosystem open, promoting the use, reuse, and remix of OER, and assuring universal accessibility and digital inclusion (Czerniewicz, 2018; Teixeira & Mota, 2020).

One central feature of the digital society is the way in which knowledge and information are produced and distributed in networks that often escape the control of organizations and institutions. HEI are facing an "age of super-complexity" in which knowledge claims are no longer made solely by universities, but knowledge production is increasingly built in private firms and non-academic organizations (Baltaru & Soysal, 2018). According to Wiley and Hilton (2009), universities responded to the radical changes technological innovation brought upon human society by increasing connectedness, personalization, participation, and most especially openness, since it is a prerequisite to affordable, large-scale progress in the other areas.

Open professional collaboration and inter-institutional alliances are key in the digital age. Based on Hagel and Brown (2005), Wiley and Hilton (2009) suggest that universities will have to rely on "dynamic specialization" strategies, committing to eliminate resources and activities that no longer differentiate them and concentrating on accelerating growth on what truly distinguishes them in society in order to be or remain successful. They identify five critical functional areas in university organization. These are: structuring and providing access to content; tutoring and learning support services; curating and providing access to research materials; acting as a hub for social activities; and assessing learning and awarding degrees. Wiley and Hilton (2009) expect HEIs focus on developing truly world-class expertise in one or two of these functions and outsource the others.

The implementation of such a model has major organizational and management implications (Teixeira, 2012). Innovative universities, as described by Christensen and Eyring (2011), will have to evolve from a closed environment to an open network one in which data and resources are openly and freely shared with fellow institutions and also with the community. This implies a major change in academia and its validation practices, as well as in many other aspects of how HEIs operate (Weller, 2014). However, even the most flexible universities are traditionally much stable organizations, not changing its basic structure and processes over the years. As such, leaders find it much more difficult to reengineer them as learning organizations (Senge et al., 2000). In fact, higher education has historically avoided competitive disruption.

By unbundling teaching and learning processes and outsourcing services, namely administrative support (Teixeira, Bates, & Mota, 2019), as well as "rebundling" them into new forms (Czerniewicz, 2018), according to different variable contexts, HEIs will gain flexibility, critical dimension, and resource capacity. This will equip these institutions to respond promptly to a rapidly changing environment, thus carrying on their mission of providing quality learning opportunities for all.

Role-Changing: Redesigning Professional Development

Looking ahead at the digital futures of higher education, we can anticipate artificial intelligence (AI) and robots will be playing an increasingly important role in assisting teachers to teach and learners to learn more efficiently. This however does not mean classrooms will be replaced by teaching and learning machines. The purpose of Dx is not so much to automate processes, but to add data intelligence. The same principle applies to administrative support in HEI.

Although processes will be increasingly automated, HEI readiness to overcome the challenges of the new normal will depend heavily on how well their faculty and support staff will be prepared. It is urgent to rethink professional development in HEI. The pandemic crisis has highlighted the importance of teachers' digital competences (Gewerc, Persico, & Rodés-Paragarimo, 2020). However, not much attention has been given to the need for administrative support staff to develop further their digital competences as well. Similarly to faculty, these competences need to be acquired and developed in authentic contexts. This implies staff should be trained in immersive online-based settings and not in traditional in-person environments. Otherwise, they will not be properly prepared as they will lack the experience of working, communicating, and learning online. In addition, they need to train to operate in increasingly learner-centered contexts in which personalization of support services and learner participation in its management are key elements.

A healthy ODDE provision must be preceded by a healthy online development program for both faculty and staff. Staff mentoring could be very effective to help remember and put into practice what was learned in the training sessions. Training that takes place without mentoring is quickly forgotten and refresher training is required, but training that is followed by a well-organized mentoring program has proven to be very effective in helping faculty remember what was discussed in the classroom (Mandernach, Donnelli, Dailey, & Schulte, 2005). The same can be applied to administrative staff.

The administrative support staff usually view themselves as back-office actors. However, in a disruptively changing environment as Dx, they are called to shape their roles themselves and have a larger participation. This implies a certain amount of ambiguity and insecurity as they are bound to operate in a cultural environment dominated by academic norms and values which may be strange to them. Moreover, they must perform a mix of roles which are midway between administrators and academics. In fact, administrative support staff to ODDE teachers and learners may fall into the category identified by Whitchurch (2009) and confirmed by Ryttberg and Geschwind (2017) of blended professionals working in a third space. In the words of Musselin (2007), most of them are project-oriented employees. In fact, they regard their tasks at hand as more important than belonging to a specific organizational unit.

Therefore, setting up an open collaboration culture supported by fluid communication and multidisciplinary teamwork is essential to disseminate educational innovation and ensure a supportive institutional environment for quality ODDE development. Accordingly, it may be instrumental to ensure professional development of administrative support staff and technical support staff is conducted in a coordinated and whenever possible integrated way with faculty.

Conclusions

Spearheaded by the global impact of ERT&L, HEIs worldwide are accelerating the movement toward mainstreaming ODDE. As they move forward in this direction, it becomes critical for HEI to reorganize and adjust their existent infrastructures and services. In this context, major attention should be given to the redesign and readjustment of administrative learner support systems as their action is central to the quality of the ODDE learning experience. As literature recognizes, ODDE learners have unique support needs which should be met with services that adequately fulfill their mission in an online environment. ODDE faculty also feel much more engaged if they can rely on a strong infrastructure which supports their technological, economical, and emotional needs.

We have demonstrated in this chapter the importance of administrative learner support being provided in the framework of a holistic institutional innovation strategy involving the active participation of all stakeholders by which strong synergies are promoted across all sectors of the HEIs, academic and non-academic. Given this process leads to an institutional transformation it implies a deep change in both culture and leadership.

The possibilities of digital technology combined with the theoretical foundations of open and distance education which build upon universal accessibility and learning flexibility promote the use of collaborative pedagogical models. This leads ODDE to empower learner participation at all phases of the learning process. The introduction of learning analytics, AI, and adaptive technologies has allowed to combine scalability with personalization. An increased flexibility and customization in design, delivery, and support of ODDE programs and courses is therefore now being required by all stakeholders.

In this new emerging scenario, we have demonstrated that administrative learner support, as part of a wider administrative support hub of resources and services, should have a close collaboration and consequently participation in the integrated process of design and delivery of courses and programs. A system-wide approach is needed. We recommend therefore HEI to set up multidisciplinary teams involving faculty, learning designers, administrative, and technical staff, as well as alumni to coordinate design, delivery, and support of ODDE provision. In the same direction, we also suggest ensuring professional development of administrative support staff and technical support staff is conducted in a coordinated and whenever possible integrated way with faculty.

As HEI engage in Dx and ODDE provision expands, a new organizational model based on the principle of dynamic specialization is emerging. HEI are reorganizing as learning ecosystems and converging each other and with other non-formal learning institutions in large open networks. It is foreseeable that this new landscape will impact dramatically in the design and organization of administrative learner, faculty, and staff support systems, as each HEI may share its most efficient services with others and use other's services to replace its own less successful services. The resulting scalability will produce major gains in efficiency and a better service provided will also increase the quality of the learning experience. Moreover, this new open collaboration institutional model represents at best the affordances of open science and ODDE in higher education.

Cross-References

► Evolving Learner Support Systems
► Introduction to Infrastructure, Quality Assurance, and Support Systems of ODDE
► Supporting Learners with Special Needs in Open, Distance, and Digital Education

References

Aoki, K., & Pogroszewski, D. (1998). Virtual university reference model: A guide to delivering education and support services to the distance learner. *Online Journal of Distance Learning Administration, 1*(3). Retrieved from http://www.westga.edu/~distance/aoki13.html.

Baltaru, R. D., & Soysal, Y. N. (2018). Administrators in higher education: Organizational expansion in a transforming institution. *Higher Education, 76*, 213–229. https://doi.org/10.1007/s10734-017-0204-3.

Bates, T. (A. W.) (Ed.). (2019). *Tracking online education in Canadian Universities and Colleges*. [DX Reader version]. Retrieved from https://eduq.info/xmlui/bitstream/handle/11515/37136/canadian-national-survey-online-distance-education-2018-cdlra-2019.pdf?sequence=2&isAllowed=y

Behling, K., & Linder, K. (2017). Collaborations between centers for teaching and learning and offices of disability services: Current partnerships and perceived challenges. *Journal of Postsecondary Education and Disability, 30*(1), 5–15. Retrieved from https://files.eric.ed.gov/fulltext/EJ1144608.pdf

Brinthaupt, T. M., Cruz, L., Otto, S., & Pinter, M. A. (2019). A framework for the strategic leveraging of outside resources to enhance CTL effectiveness. *To Improve the Academy, 38*(1), 82–94. https://doi.org/10.1002/tia2.20089.

Burgelman, J.-C., Pascu, C., Szkuta, K., Von Schomberg, R., Karalopoulos, A., Repanas, K., & Schouppe, M. (2019). Open science, open data, and open scholarship: European policies to make science fit for the twenty-first century. *Frontiers in Big Data, 2*, 43. https://doi.org/10.3389/fdata.2019.00043.

Christensen, C. M., & Eyring, H. J. (2011). *The innovative university. Changing the DNA of higher education from inside out*. San Francisco, CA: Jossey-Bass.

Compora, D. P. (2003). Current trends in distance education: An administrative model. *Online Journal of Distance Learning Administration, VI*(II). Retrieved from https://www.westga.edu/~distance/ojdla/summer62/compora62.html~

Crue-TIC. (2018). TIC 360. Transformación Digital en la Universidad. Grupo de Trabajo de Directores TI de Crue-TIC. Crue Universidades Españolas. Retrieved from http://tic.crue.org/publicaciones/#tendencias

Czerniewicz, L. (2018). Unbundling and rebundling higher education in an age of inequality. *Educause Review, 53*(6), 10–24. Retrieved from https://er.educause.edu/articles/2018/10/unbundling-and-rebundling-higher-education-in-an-age-of-inequality

Czerniewicz, L., Agherdien, N., Badenhorst, J., Belluigi, D., Chambers, T., Chili, M., De Villiers. . . Wissing, G. (2020). A wake-up call: Equity, inequality and Covid-19 emergency remote teaching and learning. *Postdigital Science and Education, 2*(3), 946–967. https://doi.org/10.1007/s42438-020-00187-4

Decreto-Lei n.° 133/2019 do Ministério da Ciência, Tecnologia e Ensino Superior – MCTES. (2019). Diário da República: I Série, n° 168/2019. Retrieved from https://dre.pt/dre/detalhe/decreto-lei/133-2019-124392062

Foerster, M., Gourdin, A., Huertas, E., Möhren, J., Ranne, P., & Roca, R. (2019). *Framework for the quality assurance of e-assessment*. Barcelona, Spain: EQUANIE, AQU & ENQA. Retrieved from https://www.enqa.eu/publications/tesla-framework-for-the-quality-assurance-of-e-assessment

Gewerc, A., Persico, D., & Rodés-Paragarimo, V. (2020). Guest editorial: Challenges to the educational field: Digital competence the emperor has no clothes: The COVID-19 emergency and the need for digital competence. *Revista Iberoamericana de Tecnologias del Aprendizaje, 15*(4), 372–380. https://doi.org/10.1109/RITA.2020.3033208.

Gilch, H., Beise, A. S., Krempkow, R., Müller, M., Stratmann, F., & Wannemacher, K. (2020). Survey on the status of digitization at German HEI. *European Journal of Higher Education IT* 2020-1, EUNIS. Retrieved from https://www.eunis.org/download/2020/EUNIS_2020_paper_82.pdf

Grajek, S., & Reinitz, B. (2019, July 8). Getting ready for digital transformation: Change your culture, workforce, and technology. [Blog post]. Retrieved from https://er.educause.edu/articles/2019/7/getting-ready-for-digital-transformation-change-your-culture-workforce-and-technology

Haas, C., & Hadjar, A. (2020). Students' trajectories through higher education: A review of quantitative research. *Higher Education, 79*(6), 1099–1118. https://doi.org/10.1007/s10734-019-00458-5.

Hagel, J., & Brown, J. S. (2005). *The Only Sustainable Edge*. Boston: Harvard Business School Press.

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020, March 27). The difference between emergency remote teaching and online learning. [Blog post]. Retrieved from https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning

Holt, D., Palmer, S., & Challis, D. (2011). Changing perspectives: Teaching and learning centres' strategic contributions to academic development in Australian higher education. *International Journal for Academic Development, 16*(1), 5–17. https://doi.org/10.1080/1360144X.2011.546211.

Inamorato dos Santos, A., Punie, Y., & Castaño-Muñoz, J. (2016). *Opening education: A support framework for higher education institutions*. Luxembourg, Luxembourg: Publications Office of the European Union. JRC101436. https://doi.org/10.2791/293408.

Jennings, S. E., & Bayless, M. L. (2003). Online vs. traditional instruction: A comparison of student success. *Delta Pi Epsilon, 45*(3), 183–190.

Jensen, T. (2019). Higher education in the digital era – The current state of transformation around the world. International Association of Universities. Retrieved from https://www.iau-aiu.net/IMG/pdf/technology_report_2019.pdf

Krauth, B. (1999). Trends on support services for distance learners. In M. Beede & D. Burnett (Eds.), *Planning for student services: Best practices for the 21st century* (pp. 13–17). Ann Arbor, MI: Society for College and University Planning.

Laird, P. G. (2004). Integrated solutions to e-learning implementation: Models, structures and practices at trinity Western University. *Online Journal of Distance Learning Administration, 7*(3). Retrieved from https://www.learntechlib.org/p/193242

Mandernach, B. J., Donnelli, E., Dailey, A., & Schulte, M. (2005). A faculty evaluation model for online instructors: Mentoring and evaluation in the online classroom. *Online Journal of Distance Learning Administration, 8*(3). Retrieved from https://www.learntechlib.org/p/193203

McKenzie, B., Ozkan, B., & Layton, K. (2006). Tips for administrators in promoting distance programs using peer mentoring. *Online Journal of Distance Learning Administration, 9*(2). Retrieved from https://www.learntechlib.org/p/193209

McLean, J. (2006). Forgotten faculty: Stress and job satisfaction among distance educators. *Online Journal of Distance Learning Administration, 9*(2). Retrieved from https://www.learntechlib.org/p/193210

McQuiggan, C. A. (2007). The role of faculty development in online teaching's potential to question teaching beliefs and assumptions. *Online Journal of Distance Learning Administration, 10*(3). Retrieved from https://www.learntechlib.org/p/158575

Meyer, J. D., & Barefield, A. C. (2010). Infrastructure and administrative support for online programs. *Online Journal of Distance Learning Administration, 13*(3). Retrieved from https://www.learntechlib.org/p/52617

Musselin, C. (2007). *The transformation of academic work: Facts and analysis*. Berkeley, CA: UC Berkeley – Center for Studies in Higher Education. Retrieved from http://escholarship.org/uc/item/5c10883g

Ossiannilsson, E., Williams, K., Camilleri, A., & Brown, M. (2015). *Quality models in online and open education around the globe. State of the art and recommendations*. Oslo, Norway: International Council for Open and Distance Education – ICDE. Retrieved from https://files.eric.ed.gov/fulltext/ED557055.pdf

Paolucci, R., & Gambescia, S. F. (2007). Current administrative structures used for online degree program offerings in higher education. *Online Journal of Distance Learning Administration, 10*(3). Retrieved from https://www.learntechlib.org/p/158577

Pérez-Sanagustín, M., Kotorov, I., Teixeira, A., Mansilla, F., Broisin, J., Alario-Hoyos, C., . . . Gonzalez Lopez, A. (2022). A competency framework for teaching and learning innovation

centers for the 21st century: Anticipating the post-COVID-19 age. *Electronics, 11*, 413. https://doi.org/10.3390/electronics11030413.
Reinitz, B. (2020, June 1). *Consider the Three Ds when talking about digital transformation*. [blog post]. Retrieved from https://er.educause.edu/blogs/2020/6/consider-the-three-ds-when-talking-about-digital-transformation
Restauri, S. L. (2004). Creating an effective online distance education program using targeted support factors. *TechTrends, 48*(6), 32–39. Retrieved from https://link.springer.com/content/pdf/10.1007/BF02763580.pdf
Ryan, M., Hodson-Carlton, K., & Ali, N. S. (2005). A model for faculty teaching online: Confirmation of a dimensional matrix. *Journal of Nursing Education, 44(*8), 357–365. Retrieved from https://www.researchgate.net/publication/7631259_A_Model_for_Faculty_Teaching_Online_Confirmation_of_a_Dimensional_Matrix
Ryttberg, M., & Geschwind, L. (2017). Professional support staff at higher education institutions in Sweden: Roles and success factors for the job. *Tertiary Education and Management, 23*(4), 334–346. https://doi.org/10.1080/13583883.2017.1322631.
Sánchez-Elvira Paniagua, A., & Simpson, O. (2018). Developing student support for open and distance learning: The EMPOWER project. *Journal of Interactive Media in Education, 1*(9), 1–10. https://doi.org/10.5334/jime.470.
Seaman, J. E., Allen, I. E., & Seaman, J. (2018). *Grade increase: Tracking online education in the United States*. [DX reader version]. Retrieved from https://www.bayviewanalytics.com/reports/gradeincrease.pdf
Senge, P. M., Cambron-McCabe, N., Lucas, T., Smith, B., Dutton, J., & Kleiner, A. (2000). Schools that Learn: A Fifth Discipline Fieldbook for Educators, Parents & Everyone Who Cares About Education. New York: Doubleday.
Singer, S. R. (2002). Learning and teaching centers: Hubs of educational reform. *New Directions for Higher Education, 119*, 59–64. https://doi.org/10.1002/he.71.
Srivastava, P., & Frankwick, G. L. (2011). Environment, management attitude, and organizational learning in alliances. *Management Decision, 49*(1), 156–166. https://doi.org/10.1108/00251741111094491.
Tait, A. (2000). Planning student support for open and distance learning. *Open Learning, 15*(3), 287–299. https://doi.org/10.1080/713688410.
Tait, A. (2014). From place to virtual space: Reconfiguring student support for distance and e-learning in the digital age. *Open Praxis, 6*(1), 5–16. https://doi.org/10.5944/openpraxis.6.1.102.
Tallen-Runnels, M. K., Thomas, J. A., Lan, W. Y., Cooper, S., Ahern, T. C., Shaw, S. M., & Liu, X. (2006). Teaching courses online: A review of the research. *Review of Education Research, 76*(1), 93–135. https://doi.org/10.3102/00346543076001093.
Teixeira, A. (2012). Desconstruindo a universidade: Modelos universitários emergentes mais abertos, flexíveis e sustentáveis. Revista de Educación a Distancia, 32. Retrieved from https://revistas.um.es/red/article/view/233101.
Teixeira, A., Bates, T., & Mota, J. (2019). What future(s) for distance education universities? Towards an open network-based approach. *RIED. Revista Iberoamericana de Educación a Distancia, 22*(1), 107–126. https://doi.org/10.5944/ried.22.1.22288.
Teixeira, A. M., & Mota, J. (2020). The importance of being open: How European open universities can reposition in the post-pandemic higher education landscape. In *Enhancing the human experience of learning with technology: New challenges for research into digital, open, distance & networked education European distance and e-learning network (EDEN) proceedings 2020 research workshop*. Lisbon, 178–188. https://doi.org/10.38069/edenconf-2020-rw0020.
van der Zwaan, B. (2017). *Higher education in 2040: A global approach*. [DX reader version]. Retrieved from https://library.oapen.org/handle/20.500.12657/31675
Weller, M. (2014). *The* battle for open*: How openness won and why it doesn't feel like victory* [DX reader version]. https://doi.org/10.5334/bam.

Whitchurch, C. (2009). The rise of the blended professional in higher education: A comparison between the United Kingdom, Australia and the United States. *Higher Education, 58*(3), 407–418. https://doi.org/10.1007/s10734-009-9202-4.
Wiley, D., & Hilton III, J. (2009). Openness, dynamic specialization, and the disaggregated future of higher education. *The International Review of Research in Open and Distributed Learning, 10*(5). https://doi.org/10.19173/irrodl.v10i5.768
Witze, A. (2020). Universities will never be the same after the coronavirus crisis. How virtual classrooms and dire finances could alter academia: Part 1 in a series on science after the pandemic. *Nature, 582*(7811), 162–164. https://doi.org/10.1038/d41586-020-01518-y.
Zuhairi, A., Karthikeyan, N., & Priyadarshana, S. T. (2020). Supporting students to succeed in open and distance learning in the Open University of Sri Lanka and Universitas Terbuka Indonesia. *Asian Association of Open Universities Journal, 15*(1), 13–35. https://doi.org/10.1108/AAOUJ-09-201.

Supporting Learners with Special Needs in Open, Distance, and Digital Education

51

Serpil Kocdar and Aras Bozkurt

Contents

Abstract

Open, distance, and digital education (ODDE) is meant to provide unique educational opportunities for everyone, including learners with special needs. While promising flexible and accessible learning experiences for learners with special needs, ODDE may simultaneously result in the creation of certain barriers. Supporting learners with special needs in ODDE environments, therefore, becomes a critical task for all educational institutions. This chapter focuses on the challenges that learners with special needs encounter during their learning process in ODDE, as well as those mechanisms that can be used to support them in order to overcome these challenges, such as means of increasing accessibility,

This chapter was supported by Anadolu University Scientific Research Projects Commission under grant no.: 2107E058.

S. Kocdar (✉) · A. Bozkurt
Open Education Faculty, Distance Education Department, Anadolu University, Eskişehir, Turkey
e-mail: skocdar@anadolu.edu.tr; arasbozkurt@anadolu.edu.tr

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_49

recognizing Universal Design for Learning principles, using assistive technologies, providing accommodations, and adaptations in terms of pedagogical, managerial, social, and technical support. The chapter suggests that ODDE is inclusive in nature and that it should therefore further focus on empathy and care-oriented pedagogies. ODDE, inspired by openness philosophy, envisions equity, equality, and justice for every learner, including learners with special needs.

Keywords

Learner support systems · Learners with special needs · Open and distance learning · Inclusive education · Accessibility · Universal design for Learning

Introduction

Open, distance, and digital education (ODDE) is an umbrella term that is rooted in interchangeably used educational models, such as open education, distance education, online education, or digital education. As a generic broad term, the letters in ODDE abbreviation highlight, respectively, different aspects of the term. For instance, open refers to ODDE's theoretical and philosophical characteristics; distance refers to ODDE's pedagogical characteristics; and digital refers to technological characteristics, which includes online and digital tools, services, or environments. Finally, education refers to teaching and learning informed by open, distance, and digital practices.

Emphasizing that ODDE is a "notion with pluralistic and inclusive connotations, and a stance that defends widening participation" (Zawacki-Richter et al., 2020, p. 321), ODDE has always possessed a heterogeneous learner body through its welcoming of non-traditional learners (Wedemeyer, 1981) through flexible ways of delivering education and technological affordances to facilitate teaching and learning by fostering participation (Stöter, Bullen, Zawacki-Richter, & von Prümmer, 2014). The emergence of open universities has played a pivotal role (Tait, 2008) in providing learning opportunities for learners who were previously excluded from or unable to access conventional education (Bozkurt & Zawacki-Richter, 2021). In addition to traditional learners, ODDE ensures that the back door (Wedemeyer, 1981) is kept open for non-traditional learners; these include disadvantaged learners, such as those disadvantaged as a result of gender, remoteness, wealth, disability, ethnicity, language, migration, displacement, incarceration, sexual orientation, gender identity and expression, religion, and other beliefs and attitudes (UNESCO, 2020, p. 6), as well as learners with special needs.

The term learners with special needs is generally used to refer to learners that experience difficulties in learning due to their cognitive, physical, or sensory impairment; chronic illnesses; or psychosocial issues to the extent that the learner in question may require assistance in regard to their learning process (Laamanen et al., 2021). On review of the literature, it can be observed that there are also other commonly used terms that refer to learners who require special education, such as exceptional learners, learners with disabilities, learners with special educational needs and disabilities, disabled learners, and learners with disabling conditions (Kinash, Birt, & Judd, 2019; Kirk, Gallagher, Coleman, & Anastasiow, 2009; Laamanen et al., 2021; Repetto, Cavanaugh, Wayer, & Liu, 2010). Though there is diversity among those terms that define special needs, all these terms focus on a single purpose, which is that learners in these groups require learning practices to be modified according to their specific learning needs. In this chapter, the term learners with special needs is adopted because the focal point is the special needs of learners who require adaptations in their learning process in ODDE; however other terms will also be used and retained if they are deliberately used by those authors cited herein.

Learners with Special Needs in ODDE

When examining learners with special needs in a general sense, Reiser and Dempsey (2012) suggest four categories: visual involvement, auditory involvement, mobility involvement, and cognitive involvement. These four categories are the most commonly used when considering provision of support for learners with special needs in ODDE. Visual involvement includes any condition resulting in the loss of visual perception; auditory involvement includes both deaf and hard of hearing categories; mobility involvement refers to any difficulties experienced regarding the movement within the natural environment, such as arthritis, cerebral palsy, muscular dystrophy, multiple sclerosis, or traumatic brain injury; cognitive involvement includes learning disabilities, autism, traumatic brain injury, cerebral palsy, epilepsy, neurological impairments, and mental illness. Learners with special needs may experience one or more than one of these conditions, and therefore they may belong to one or more of these categories (Catalano, 2014). However, it is important to note that learners can also have temporary disabling conditions that belong to one or more of these groups, such as having a broken arm or leg or being pregnant.

According to the WHO statistics, 15% of the world's population experience disability in varying degrees and in different forms (WHO, 2011). As a result, an increase in the number of learners with special needs has been observed in all levels of education globally (Fichten et al., 2009; Kinash et al., 2019; Laamanen et al., 2021; Tesolin & Tsinakos, 2018). Repetto et al. (2010) indicate that learners with disabilities are at risk of dropping out of school due to certain reasons such as access problems, lack of support, inability to find a helpful person to connect with, fear of course failure, poor self-esteem, etc. In this sense, ODDE is considered to be a means of increasing access to equal opportunities in education, thereby eliminating the barriers of access emerging in face-to-face education (Jelfs & Richardson, 2010; Kinash, Crichton, & Kim-Rupnow, 2004).

ODDE not only offers learning opportunities in terms of spatial and temporal flexibility by allowing learners to study at their own pace, it also increases accessibility for those learners who would otherwise be unable to attend face-to-face classes (Fichten et al., 2009). Additionally, learners with special needs can experience the advantage of increased accessibility through the use of assistive technologies and multimedia involving speech, text, and audiovisual materials (Crichton & Kinash, 2013; Erickson & Larwin, 2016). Accordingly, these learners may perform better in online courses than in face-to-face courses (Stewart, Mallery, & Choi, 2010). As noted by several other researchers, empirical evidence suggests that learners with disabilities increasingly prefer to participate in online courses at a higher rate than other learners and that they recognize the benefits of ODDE (Alamri & Tyler-Wood, 2017; Moisey & Hughes, 2008). For example, Fichten et al. (2009) identify benefits of online learning from the perspectives of learners with disabilities; the most common benefits were the availability of online course notes, the support and enrichment of the learning process, help in understanding course content, the ability to learn from home and to work at one's own pace, the availability of online course resources other than notes, help in regard to time management, the convenience of communicating with peers/professors, and availability of information at any place and time. When the achievement level of learners with special needs is examined in ODDE, it can be observed that this level may be lower than that of learners without experience of any disabling condition. In a study in which the researcher compared the outcomes of disabled and non-disabled learners who were enrolled in distance-learning courses at the Open University UK (OUUK), Richardson (2010) found that disabled learners had lower grades, lower pass rates, and poorer course completion rates than their peers. In parallel to this, Wolanin and Steele (2004) indicate that learners with disabilities often need more time than their non-disabled peers for academic tasks, resulting in learners with disabilities taking twice as long as their non-disabled peers to complete their degrees. Supporting these statements, a study conducted by Moisey (2004) at Athabasca University revealed that learners with disabilities had a completion rate of 45.9%, which was lower than the completion rate for learners without disabilities (52.5%). These findings may be due to those challenges that learners with special needs encounter in online learning environments.

Challenges Encountered by Learners with Special Needs in ODDE

Moore and Kearsley (2012) describe online courses as "both a boon and a bane to disabled learners" (p. 113). Despite their affordances, many online courses may create barriers to learners with special needs (Barnard-Brak & Sulak, 2010; Edmonds, 2004; Moore & Kearsley, 2012). In this chapter, these barriers are examined according to five themes (Tesolin & Tsinakos, 2018):

Internal and external stereotypes: Invisibility of disability, having negative attitudes about requesting accommodations, and having negative perceptions on the ability to succeed may constitute a barrier to success among learners with special needs in ODDE. Identifying learners with hidden disabilities (e.g., learning disabilities or health-related impairments) is more difficult than identifying learners with visible disabilities (e.g., visually impaired learners, physically impaired learners) if these learners do not inform their instructors of their disability (Tandy & Meacham, 2009).

The learner's type of disability (e.g., visible or invisible) is critical because, as claimed by Barnard-Brak and Sulak (2010), learners experiencing visible disabilities tend to have more positive attitudes toward requesting accommodations in the online versus face-to-face learning environment as compared with learners who experience hidden disabilities (e.g., learning disabilities or health-related impairment).

Lack of infrastructure: Inadequate technical and policy frameworks can lead to failure among learners with special needs in ODL. Burghstahler (2002) mentions the digital divide – which she calls it as second digital divide – that learners with special needs experience; even if they have ostensible access to computers and the Internet, they may not have the opportunity to actually access these tools due to the inaccessible design of electronic sources or online learning environments. Additionally, a lack of policy frameworks, regulations, and guidelines and inadequate implementation of existing frameworks may also hinder learners with special needs.

Inaccessible education platforms, websites, and resources: Fichten et al. (2009) note that inaccessibility of websites and learning management systems (LMS) may cause a problem in terms of access for learners with learning, visual, and neuromuscular disabilities, and this problem remains even when they use screen magnification, screen reading, or dictation software. Furthermore, Fichten et al. (2009) add that visually impaired learners may encounter difficulties using certain websites when employing screen-reading technologies; additionally, fixed font size of materials or online maps and images can create problems for visually impaired learners.

According to the study conducted by Massengale and Vasquez (2016), incompatible content with screen readers, so that these readers are unable to read such content; the use of JavaScript requiring learners to be able to use a mouse; content opening in pop-up windows; and problematic links to text and tables without headers were the top five challenges encountered by learners with special needs. Comparatively, Moisey and Hughes (2008) emphasize that keyboards can be difficult or impossible to use for learners with fine motor problems or conditions such as carpal tunnel syndrome; learners with hearing impairments or communication disorders (e.g., aphasia, severe stuttering) may be unable to participate in audio-conferences; learners who experience learning disabilities or reading-comprehension problems may experience difficulties in understanding text-based materials.

Lack of qualified educators/training: This theme involves educators' lack of knowledge of accessibility, training needs, lack of interaction, disconnection with peers and instructors, and poor course design. Fichten et al. (2009) claim that staff who are responsible for deploying e-learning generally do not examine academic software that has already been purchased in regard to its compatibility with adaptive software such as screen readers. Additionally, they mention poor use of e-learning by some of the professors as well as these professors' lack of knowledge of working with e-learning.

Lack of interaction and communication: Online discussions and communication in ODDE may be cognitively demanding; for example, participating in synchronous chats can be difficult for visually impaired or dyslexic learners as it requires them to read and respond quickly (Tandy & Meacham, 2009). Additionally, inadequate communication with peers and instructors may constitute a barrier to success (Alamri & Tyler-Wood, 2017).

In sum, various strategies are needed to support learners with special needs, whose needs can vary according to their specific disabling condition and its corresponding severity (Barnard-Brak & Sulak, 2010; Edmonds, 2004). There may even be individual differences between learners who experience the same type of disabling condition (Griful-Freixenet, Struyven, Verstichele, & Andries, 2017). Therefore, it is crucial to provide different types of support according to the type and level of a disabling condition in order to enhance success in such a heterogeneous group of learners (Laamanen et al., 2021; Moisey, 2004).

Learner Support Systems in ODDE

Learner support in ODDE refers to all those activities that support learners' progress in their respective studies, which is considered as one of the key indicators of quality (Hall, 2003; Simpson, 2002). Spatial, temporal, and transactional distance between learners and instructors – which is underlined in the definition of distance education – can lead to challenges for learners when finding solutions to their problems during their learning process. Moore and Kearsley (2012) emphasize the direct relationship between learners' failure and dropping out of a program and the failure of the available learner support system. Therefore, establishing strong learner support systems plays a crucial role in learner motivation, engagement, and achievement in ODDE (Moore & Kearsley, 2012; Thorpe, 2002).

Services that support systems that are involved in an ODDE system typically involve "enquiry, admission and pre-study advisory services; tutoring; guidance and counselling services; assessment of prior learning and credit transfer; study and examination centers; residential schools; library services; individualized correspondence teaching; record keeping; information management, and other administrative systems; differentiated services for learners with special needs; materials which support the development of study skills, program planning or career development" (Tait, 2000, pp. 289–290). There are various classifications that examine support systems in the literature (Genç & Koçdar, 2020a). For example, Simpson (2012) classifies support services into two groups: those of academic and non-academic support. Support for cognitive issues related to a certain course or courses and instruction-related issues were considered under academic support, while affective and organizational aspects of learners' studies were considered under non-academic support. Berge (1995) categorized support needs into four groups: pedagogical, managerial, social, and technical. Services related to academic skills and course content can be listed under pedagogical support; services related to registration procedures, administrative acts, timetable, organization, evaluation, and procedural rules can be listed under managerial support; services related to improving human affairs, strengthening group dynamics, enhancing learner–learner or learner–instructor non-academic interaction, and minimizing the sense of isolation can be listed under the social support; and services related to the elimination of software- and hardware-related problems encountered by distance learners can be listed under technical support. In sum, the intention behind all these activities is to support and facilitate the learning process.

Supporting Learners with Special Needs in ODDE

Support systems have a critical role in the achievement of learners with special needs (Altinay, Altinay, Ossianilsson, & Aydin, 2018). For example, according to the results of the study conducted by Moisey (2004), learners with special needs at Athabasca University who received a greater number of different types of support services were found to have more success in their respective courses. On a review of the literature, it can be observed that discussions concerning supporting learners with special needs in ODDE are generally undertaken through the concepts of accessibility, Universal Design for Learning (UDL), use of assistive technologies, and accommodations or adaptations provided by educational institutions.

Accessibility

The most commonly mentioned issues regarding accessibility in ODDE are web accessibility, LMS accessibility, and accessible course/learning design.

Web accessibility: The term "accessibility" is widely used in the context of web design (Cooper, 2014). The World Wide Web Consortium (W3C) is an international web standards organization, and its Web Accessibility Initiative (WAI) creates detailed guidelines. As is noted on the W3C website, web accessibility refers to "websites, tools, and technologies are designed and developed so that people with disabilities can use them"; in other words, they are able to "perceive, understand, navigate and interact with the web and contribute to the web" (W3C, 2021). In addition, implying that accessibility is a broad concept, W3C emphasizes that web accessibility also benefits individuals without disabilities, such as elderly people with changing abilities due to their age; people experiencing temporary disabilities, such as having a broken leg; or people having a slow Internet connection. The WAI has developed detailed guidelines on how to ensure web accessibility such as WCAG 2 or WCAG 3 standards, which are universally accepted and frequently used. Various tools exist that can be used for accessibility testing of websites like WAVE accessibility evaluation tool (Massengale & Vasquez, 2016) or DYNO Mapper.

LMS accessibility: Similar to web accessibility, LMS are also needed to provide accessible online courses. Most of the LMS companies or providers strive to consider accessibility issues. For example, Blackboard, Desire2Learn, Canvas, and Moodle are committed to providing accessible course platforms and utilize standards that ensure accessibility. Furthermore, there are accessibility tools that help identify accessibility issues in an online course; for example, the University of Central Florida's Universal Design Online Content Inspection Tool (UDOIT) checks and reports accessibility, while Blackboard Ally helps make digital course content more accessible through technical design solutions.

Accessible course/learning design: The concepts of web and LMS accessibility consider the problem of accessibility from a more technical perspective. However, accessibility is not merely a technical issue but also a matter of learning design (Cooper, 2014). A course website or an LMS might be accessible; however, if the course is designed without addressing accessibility issues, learners will nevertheless experience difficulties when using the course materials. Therefore, designing course materials in a manner that is accessible to all learners, including those in disabling conditions, is important in the online learning environments (Cooper, 2014; Kinash et al., 2004; Massengale & Vasquez, 2016). For example, when delivering the information, multimedia can be used; the information can be presented through a text and a video at the same time. Principles of UDL can help designing accessible courses and learning environments.

Universal Design for Learning

Having its roots in architectural design, UDL is a framework for increasing the accessibility of learning environments for all learners (Lever-Duffy & McDonald, 2011). UDL focuses on removing barriers from the early stages of instructional design processes, eliminating the need to undertake adaptations for diverse learners (Reiser & Dempsey, 2012). The Center for Applied Special Technology (CAST) has developed the UDL Guidelines suggesting the instruction to be designed to support multiple means of engagement, multiple means of representation, and multiple means of action and expression (UDL, 2021). Presenting learning materials in multiple formats, strategies for optimizing individual choices, and autonomy or the use of multiple media for communication potentially improve learning not only for learners with special needs but also for all learners. This is because individuals learn and engage with learning materials in different ways and use different strategies as part of the learning process, for example, ESL learners, who are able to utilize captions in a video and who have better comprehension regarding the relevant content, and those learners who are hard of hearing or who have learning disabilities. Similarly, learners who lack time due to their professional and familial commitments will be able to benefit from audio materials while commuting or travelling, thereby learning in a similar manner to those with visual impairments. The metaphor "electronic curb-cut" is used to refer to accessible online content; just as the slopes facilitating physical access from sidewalks to streets are designed for wheelchair users, they can also be used by pedestrians of all kinds, people carrying luggage, and cyclists (Kinash et al., 2019; Tandy & Meacham, 2009).

Assistive Technologies

Assistive technologies refer to devices and software used by people to overcome barriers presented by their disability (Reiser & Dempsey, 2012). Learners with cognitive disabilities can benefit from optical character recognition software, word processing, and word prediction software, while learners who are deaf or hard of hearing will benefit from close captioning video phones, pocket talkers, and amplified phones (Lever-Duffy & McDonald, 2011; Reiser & Dempsey, 2012). Screen-reader software, text-to-speech software, screen-magnification software, dictation software, and refreshable Braille display can be used to support visually impaired learners (Reiser & Dempsey, 2012). Additionally, learners with mobility involvements will benefit from word prediction software, eye gaze software, voice recognition software, and mouth sticks (Kinash et al., 2019; Reiser & Dempsey, 2012). According to the study conducted by Fichten et al. (2009), the most commonly used software indicated by learners was software that improves writing quality, screen-reading software, scanning and optical character recognition software, and voice dictation software. Assistive technology facilitates access to websites, LMS, and content. In other words, these assistive technologies support learner–content and learner–interface interaction. However, the aforementioned software cannot be used effectively unless the website or LMS interface and the design of the course materials have been developed in accordance with the requirements of the software itself (Kinash et al., 2019). For example, it may not be possible to read certain older versions of PDF documents using a screen reader; therefore, it is important to provide a version of PDF that is compatible with screen readers in the course.

Accommodations or Adaptations Offered by ODDE Institutions

ODDE institutions by nature have a commitment to providing equal opportunities in education through the creation of open, flexible, and accessible learning environments for all learners. Accordingly, a growing number of learners with special needs are registering at ODDE institutions as they offer learning opportunities that are responsive to the various requirements of these learners (Hirose, 2014). Consequently, ODDE institutions place special emphasis on learners with special needs and reflect the underlying philosophies of ODDE in their regulations and guidelines. Furthermore, in most countries there exist national legislations that ensure that support systems are in place for learners with special needs (Hirose, 2014). ODDE institutions announce their regulations, standards, and guidelines on their respective websites (Anadolu University, 2021; Athabasca University, 2021; IGNOU, 2021; OUUK, 2021; UNED, 2021), and these institutions usually have specific support units for students with disabilities. Many ODDE institutions have an office that specifically serves learners with special needs, as is the case for Athabasca University, the OUUK, Anadolu University, Universitat Oberta de Catalunya (UOC), Universidad Nacional de Educación a Distancia (UNED), and Indira Gandhi National Open University (IGNOU), among others (Genç & Koçdar, 2020a). Learners usually inform their institutions about their special needs by presenting documentary evidence of their disabilities. ODDE institutions analyze learners' requests and determine the necessary adaptations to be offered. Consequently, they provide a wide variety of accommodations and adaptations for learners with special needs, which can be examined according to Berge's (1995) four categories as pedagogical, managerial, social, and technical support. Various examples among the practices of some ODDE institutions are presented below in accordance with these categories.

Pedagogical support: Course and exam accommodations can be listed in this category. Course accommodations refer to those changes to the course that do not affect course content (Moisey, 2004). In this regard, alternative formats for course materials are presented. For example, learners with special needs can use course materials in various formats according to their particular needs, such as e-books in DAISY or ePub formats; course materials in MP3 format, PDF, or Word formats; and interactive videos (Cooper, 2014; Genç & Koçdar, 2020b; UOC, 2021). In addition, transcriptions of audio/video materials, subtitle and sign language support for audio/video contents, and descriptions for visual contents are often provided. Extended contract time is provided in some universities (Moisey, 2004). Academic advising, which includes services like giving tips for study techniques and strategies, is often offered (Genç & Koçdar, 2020b). Providing electronic exam papers; exam papers in Braille; a large-font size, colored or audio exam papers; extra time in exams; deferrals; break times; scribe and/or reader support during examinations; and question exemptions can be listed among exam accommodations (Cooper, 2014; Genç & Koçdar, 2020a; Hirose, 2014; Moisey, 2004). Depending on their specific needs, learners can take the exams in a separate room; are allowed to bring equipment, food and drink, and/or medicine; etc.; in the case of bedbound learners, they are allowed to take exams at home. Learners also have the opportunity to have support services in on-site library services, such as assistive technologies, accessible library websites for screen-reader users, Braille books and printouts, computers with screen-reader software, or audiobooks.

Managerial support: Financial aid for academic-related expenses or transportation, assistive technology scholarships, lending assistive technologies, discount in tuition fees, service priority for registration or other issues relating to study centers and learners' enrollment in courses, buildings with elevator and ramps, large classrooms for face-to-face activities, wheelchair-compatible desks, ergonomic chairs or footrests, and special parking spaces are among those managerial support services offered by educational institutions (Genç & Koçdar, 2020a; Kim-Rupnow, Dowrick, & Burke, 2001).

Social support: Social support is the least observed type of support in ODDE institutions. Organizing concerts or activities that learners with special needs perform, assigning advisers, giving tips concerning learners' well-being, providing free online resources, preparing brochures on staying mentally healthy and coping with anxiety, and encouraging learner–learner interaction through social media groups, forums, e-mails, phone, and face-to-face communication are some of the social support activities provided by ODDE institutions (Genç & Koçdar, 2020a; OUUK, 2021).

Technical support: Lending computers, technical equipment, and assistive technologies, providing access to websites and LMS conforming to the WCAG 2.0 or other accessibility standards, providing information on the required level of computer use or recommendations about special hardware and software that might be needed, providing technical support for LMS use, and homework preparation and submission can be listed among technical support services.

The abovementioned pedagogical, managerial, social, and technical support services are just some examples from some of ODDE institutions; in this sense, it is important to note that those support systems of ODDE institutions that are mentioned herein, as well as those that could not be mentioned, may involve more services than those listed above. This is because ODDE institutions usually offer comprehensive and dynamic learner support systems for learners with special needs in connection with their commitment to providing open, flexible, accessible, and equal learning opportunities for all learners.

Further Remarks: Equity, Equality, and Justice

While the focus of this chapter was to discuss those challenges encountered by learners with special needs in ODDE, and to discuss support mechanisms in various dimensions – such as accessibility, UDL, assistive technologies, and pedagogical, managerial, social, and technical support – certain other issues remain, and these can also be taken into account in terms of learners with special needs. The authors of this chapter observed that the literature on learners with special needs mostly focuses on accessibility and support issues. However, considering that there is a gap in the literature, we would like to draw attention to some other issues which can be imported in terms of learners with special needs. According to Xiao (2021), “education is primarily about human beings, for human beings and by human beings” (p. 3), and such a notion requires that education is considered as extending beyond the educational process itself but as a practice for all and for everyone. Sharing the same vision, the United Nations (2015, 2021) introduced Sustainable Development Goals (SDGs); comprising 17 Goals, SDG4 (quality education) suggests ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all. These are different from practices for learners’ special needs as SDG4 defines inclusive education in a broader perspective and targets a wide range of learners by emphasizing equity, equality, and justice in any educational process. Likewise, UNESCO’s (2021) Futures of Education initiative argues that we need to expand our understanding of the right to education and take actions to prevent inequality in education. Ossiannilsson (2021) notes that “there is room for improvement in the technical area, but most importantly, it is critical to recognize the social dimensions of learning and education” by enacting “resilient open education for all in the context of social justice, human rights, and democracy” (p. 16). That being said, social and affective dimensions should not be neglected, and our practices can be informed by empathy and care-oriented pedagogies. These thoughts and global initiatives imply that inclusive education is not limited to learners with special needs, but rather addresses a broader audience to ensure equity, equality, and justice.

Conclusion

As introduced at the beginning of this chapter, ODDE offers a back door to education to those with and without special needs. By default, ODDE assumes that all learners are special but that learners with special needs require more attention. For learners with special needs, in addition to keeping the back door open for access to educational spaces, there is a further need to design the nature and contents of these spaces. These efforts range on a wide spectrum. For instance, at a nationwide macro-level, there is a need for guidelines, frameworks, and regulations that ensure that these learners are not left behind and that their participation is warranted assuming the learners are willing to enter educational spaces from either the front or the back door. At an institutional meso-level, and in addition to improving learning spaces and contents accessible, it must be ensured that learning support systems are available, that instructional design processes are guided by necessary requirements, and that adaptive technologies are used for learners with special needs. More importantly, at an individual micro-level, we need to show empathy and care for learners with special needs.

Another significant point is that support mechanisms should not only be provided during the educational processes but should be warranted before and after the educational process in order to ensure a completely inclusive education system. In this book chapter, most of the affordances reported covered practices that were implemented during the educational process. However, these practices can target before and after the educational processes. For instance, higher education institutions can provide guidance and counselling services before learners enroll in a program. Informing and guiding learners in advance about the scope of programs can be very helpful in aiding them to make the right decisions. Practices that are subsequent to the educational process can focus on career opportunities.

In sum, the core values and principles of ODDE support inclusiveness for learners with special needs and, indeed, for everyone. We have to center our arguments and practices around empathy and care-oriented pedagogies and think beyond accessibility and support issues. Such a stance will push all stakeholders in educational processes to design learning processes in a manner to welcome everyone by keeping front and back doors and ensure and enable equity, equality, and justice for every learner, including learners with special needs.

References

Alamri, A., & Tyler-Wood, T. (2017). Factors affecting learners with disabilities–instructor interaction in online learning. *Journal of Special Education Technology, 32*(2), 59–69. https://doi.org/10.1177/0162643416681497.

Altinay, Z., Altinay, F., Ossianilsson, E., & Aydin, C. H. (2018). Open education practices for learners with disabilities. *BRAIN–Broad Research in Artificial Intelligence and Neuroscience, 9*(4). https://www.edusoft.ro/brain/index.php/brain/article/view/874/1017.

Anadolu University. (2021). http://engelsizaof.anadolu.edu.tr/

Athabasca University. (2021). Accessibility services. https://asd.athabascau.ca/services/eligibility.php#apply

Barnard-Brak, L., & Sulak, T. (2010). Online versus face-to-face accommodations among college students with disabilities. *The American Journal of Distance Education, 24*(2), 81–91. https://doi.org/10.1080/08923641003604251.

Berge, Z. L. (1995). Facilitating computer conferencing: Recommendations from the field. *Educational Technology, 5*(1), 22–30. http://www.jstor.org/stable/44428247.

Bozkurt, A., & Zawacki-Richter, O. (2021). Trends and patterns in distance education (2014–2019): A synthesis of scholarly publications and a visualization of the intellectual landscape. *The International Review of Research in Open and Distributed Learning, 22*(2), 19–45. https://doi.org/10.19173/irrodl.v22i2.5381.

Burghstahler, S. (2002). Distance learning: The library's role in ensuring access to everyone. *Library Hi Tech, 20*(4), 420–432. https://doi.org/10.1108/07378830210452622.

Catalano, A. (2014). Improving distance education for students with special needs: A qualitative study of students' experiences with an online library research course. *Journal of Library & Information Services in Distance Learning, 8*(1–2), 17–31. https://doi.org/10.1080/1533290X.2014.902416.

Cooper, M. (2014). Meeting the needs of disabled students in online distance education – An institutional case study from the Open University, UK. *Distance Education in China, 12*, 18–27. http://oro.open.ac.uk/44281/.

Crichton, S., & Kinash, S. (2013). Enabling learning for disabled students. In M. G. Moore (Ed.), *Handbook of distance education* (pp. 216–230). New York, NY: Routledge.

Edmonds, C. D. (2004). Providing access to students with disabilities in online distance education: Legal and technical concerns for higher education. *The American Journal of Distance Education, 18*(1), 51–62. https://doi.org/10.1207/s15389286ajde1801_5.

Erickson, M. J., & Larwin, K. H. (2016). The potential impact of online/distance education for students with disabilities in higher education. *International Journal of Evaluation and Research in Education (IJERE), 5*(1), 76–81. https://files.eric.ed.gov/fulltext/EJ1094580.pdf.

Fichten, C. S., Ferraro, V., Asuncion, J. V., Chwojka, C., Barile, M., . . . Wolforth, J. (2009). Disabilities and e-learning problems and solutions: An exploratory study. *Educational Technology & Society, 12*(4), 241–256. https://www.jstor.org/stable/pdf/jeductechsoci.12.4.241.pdf.

Genç, H., & Koçdar, S. (2020a). Supporting learners with special needs in open and distance learning. In G. Durak & S. Çankaya (Eds.), *Managing and designing online courses in ubiquitous learning environments* (pp. 128–151). Hershey, PA: IGI Global. https://doi.org/10.4018/978-1-5225-9779-7.ch007.

Genç, H., & Koçdar, S. (2020b). Determining needs and priorities of learners with special needs for support services in an open and distance learning context in Turkey. *Open Praxis, 12*(3), 359–382. https://doi.org/10.5944/openpraxis.12.3.1102.

Griful-Freixenet, J., Struyven, K., Verstichele, M., & Andries, C. (2017). Higher education students with disabilities speaking out: Perceived barriers and opportunities of the universal design for learning framework. *Disability & Society, 32*(10), 1627–1649. https://doi.org/10.1080/09687599.2017.1365695.

Hall, J. W. (2003). Networked learning, convergence and accreditation. In S. Panda (Ed.), *Planning & management in distance education*. Great Britain, UK: Kogan Page Limited.

Hirose, Y. (2014). OUJ's new challenge: The supporting systems for the students with disabilities in the Open University of Japan. *Journal of the Open University of Japan, 32*, 93–99. https://lib.ouj.ac.jp/nenpou/no32/32_07.pdf.

IGNOU. (2021). Policy document. http://ignou.ac.in/ignou/aboutignou/icc/piu/Policy%20Document

Jelfs, A., & Richardson, J. T. E. (2010). Perceptions of academic quality and approaches to studying among disabled students and nondisabled students in distance education. *Studies in Higher Education, 35*(5), 593–607. https://doi.org/10.1080/03075070903222666.

Kim-Rupnow, W. S., Dowrick, P. W., & Burke, L. S. (2001). Implications for improving access and outcomes for individuals with disabilities in postsecondary distance education. *The American Journal of Distance Education, 15*(1), 25–40. https://doi.org/10.1080/08923640109527072.

Kinash, S., Birt, J., & Judd, M. M. (2019). Is technology enabling or disabling for diverse learners studying online? In M. G. Moore & W. C. Diehl (Eds.), *Handbook of distance education* (4th ed., pp. 285–310). Routledge. https://doi.org/10.4324/9781315296135.

Kinash, S., Crichton, S., & Kim-Rupnow, W. S. (2004). A review of 2000–2003 literature at the intersection of online learning and disability. *The American Journal of Distance Education, 18*(1), 5–19. https://doi.org/10.1207/s15389286ajde1801_2.

Kirk, S., Gallagher, J. J., Coleman, M. R., & Anastasiow, N. (2009). *Educating exceptional children*. Boston, MA: Houghton Mifflin Harcourt Publishing Company.

Laamanen, M., Ladonlahti, T., Uotinen, S., Okada, A., Bañeres, D., & Koçdar, S. (2021). Acceptability of the e-authentication in higher education studies: Views of students with special educational needs and disabilities. *International Journal of Educational Technology in Higher Education, 18*(4). https://doi.org/10.1186/s41239-020-00236-9.

Lever-Duffy, J., & McDonald, J. B. (2011). *Teaching and learning with technology.* Boston, MA: Allyn & Bacon.

Massengale, L. R., & Vasquez, E. (2016). Assessing accessibility: How accessible are online courses for students with disabilities? *Journal of the Scholarship of Teaching and Learning, 16*(1), 69–79. https://doi.org/10.14434/josotl.v16i1.19101.

Moisey, S. D. (2004). Students with disabilities in distance education: Characteristics, course enrollment and completion, and support services. *Journal of Distance Education, 19*(1), 73–91. https://files.eric.ed.gov/fulltext/EJ807840.pdf.

Moisey, S. D., & Hughes, J. A. (2008). Supporting the online learner. In T. Anderson (Ed.), *The theory and practice of online learning* (pp. 419–439). Edmonton, AB: AU Press.

Moore, M. G., & Kearsley, G. (2012). *Distance education: A systems view of online learning*. Cengage.

Ossiannilsson, E. S. (2021). Resilient sustainable education for the future of education: Emerging challenges. In A. Bozkurt (Ed.), *Handbook of research on emerging pedagogies for the future of education: Trauma-informed, care, and pandemic pedagogy* (pp. 16–43). IGI Global. https://doi.org/10.4018/978-1-7998-7275-7.ch002.

OUUK. (2021). How to get disability support and funding? https://help.open.ac.uk/browse/disability/disability-support-and-funding

Reiser, R. A., & Dempsey, J. V. (2012). *Trends and issues in instructional design and technology.* Boston, MA: Allyn & Bacon.

Repetto, J., Cavanaugh, C., Wayer, N., & Liu, F. (2010). Virtual high schools: Improving outcomes for students with disabilities. *The Quarterly Review of Distance Education, 11*(2), 91–104. https://eric.ed.gov/?id=EJ914162.

Richardson, J. T. E. (2010). Course completion and attainment in disabled students taking courses with the Open University UK. *Open Learning: The Journal of Open, Distance and e-Learning, 25*(2), 81–94. https://doi.org/10.1080/02680511003787263.

Simpson, O. (2002). *Supporting students in online open and distance learning*. London, England: Kogan Page.

Simpson, O. (2012). *Supporting students for success in online and distance education*. New York, NY: Routledge.

Stewart, J. F., Mallery, C., & Choi, J. (2010). A multilevel analysis of distance learning achievement: Are college students with disabilities making the grade? *Journal of Rehabilitation, 76*(2), 27–39. https://www.proquest.com/openview/a195f1f9587d1a3361c0914b7c2c1131/1?pq-origsite=gscholar&cbl=37110.

Stöter, J., Bullen, M., Zawacki-Richter, O., & von Prümmer, C. (2014). From the back door into the mainstream – The characteristics of lifelong learners. In O. Zawacki-Richter & T. Anderson (Eds.), *Online distance education – Towards a research agenda* (pp. 421–457). Edmonton, AB: Athabasca University Press. https://doi.org/10.15215/aupress/9781927356623.01.

Tait, A. (2000). Planning student support for open and distance learning. *Open Learning, 15*(3), 287–299. https://doi.org/10.1080/713688410.

Tait, A. (2008). What are open universities for? *Open Learning, 23*(2), 85–93. https://doi.org/10.1080/02680510802051871.

Tandy, C., & Meacham, M. (2009). Removing the barriers for students with disabilities: Accessible online and web- enhanced courses. *Journal of Teaching in Social Work, 29*, 313–328. https://doi.org/10.1080/08841230903022118.

Tesolin, A., & Tsinakos, A. (2018). Opening real doors: Strategies for using mobile augmented reality to create inclusive distance education for learners with different-abilities. In S. Yu, M. Ally, & A. Tsinakos (Eds.), *Mobile and ubiquitous learning: An international handbook* (pp. 59–80). Singapore, Singapore: Springer Nature Singapore Pte Ltd.. https://doi.org/10.1007/978-981-10-6144-8.

Thorpe, M. (2002). Rethinking learner support: The challenge of collaborative online learning. *Open learning, 17*(2), 105–119. https://doi.org/10.1080/02680510220146887a.

UDL. (2021). The UDL guidelines. https://udlguidelines.cast.org/

UNED. (2021). Exam accommodations. https://unedasiss.uned.es/solicitud_adaptaciones&idioma=en

UNESCO. (2020). Global education monitoring report 2020. United Nations Educational, Scientific and Cultural Organization. https://en.unesco.org/gem-report/report/2020/inclusion

UNESCO. (2021). Futures of education. https://en.unesco.org/futuresofeducation/

United Nations. (2015). Transforming our world: the 2030 Agenda for Sustainable Development. https://sustainabledevelopment.un.org/post2015/transformingourworld

United Nations. (2021). Sustainable development goals-SDG. https://www.un.org/sustainabledevelopment/education/

UOC. (2021). Adaptation services. https://www.uoc.edu/portal/en/compromis-social/equitat/diversitat-funcional/serveis/index.html

W3C. (2021). Introduction to web accessibility. https://www.w3.org/WAI/fundamentals/accessibility-intro/

Wedemeyer, C. A. (1981). *Learning at the back door: Reflections on non-traditional learning in the lifespan*. Madison, WI: University of Wisconsin Press.

WHO. (2011). *World report on disability*. World Health Organization. https://www.who.int/publications/i/item/9789241564182.

Wolanin, T. R., & Steele, P. E. (2004). *Higher education opportunities for students with disabilities: A primer for policymakers*. Washington, DC: Institute for Higher Education Policy. https://www.ihep.org/wp-content/uploads/2014/05/uploads_docs_pubs_opportunitiesstudentsdisabilities.pdf.

Xiao, J. (2021). From equality to equity to justice: Should online education be the new normal in education? In A. Bozkurt (Ed.), *Handbook of research on emerging pedagogies for the future of education: Trauma-informed, care, and pandemic pedagogy* (pp. 1–15). IGI Global. https://doi.org/10.4018/978-1-7998-7275-7.ch001.

Zawacki-Richter, O., Conrad, D., Bozkurt, A., Aydin, C. H., Bedenlier, S., Jung, I., . . . Xiao, J. (2020). Elements of open education: An invitation to future research. *The International Review of Research in Open and Distributed Learning, 21*(3), 319–334. https://doi.org/10.19173/irrodl.v21i3.4659.

Part VI

Learners, Teachers, Media, and Technology

Introduction to Learners, Teachers, Media, and Technology in ODDE

52

A "People-First" Approach

Vanessa P. Dennen

Contents

Abstract

This chapter provides an overview of the 13 chapters in Section 6 of *The Handbook of Open Distance and Digital Education* (ODDE), which focus on learners, teachers, media, and technology. Through these chapters, which explore the characteristics, competencies, skills, and roles that people need in ODDE contexts and the ways that media and technology support them, it becomes clear that all four areas work together systemically in the pursuit of learning. Three themes can be cultivated from the chapters: learners and instructors share common needs in online learning settings; the field has an ethical obligation to consider how technology-mediated and technology-based learning interventions affect learners and instructors; and the ongoing presence of a tension between human tasks and technology tasks in increasingly automated learning environments.

Keywords

Characteristics · Ethics · Learners · Media · Online learning · Teachers · Technology

V. P. Dennen (✉)
Florida State University, Tallahassee, FL, USA
e-mail: vdennen@fsu.edu

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_88

Introduction

The world of open, distance, and digital education (ODDE) may be driven by institutions and their desire to serve broader markets and transcend international borders, but the work of ODDE occurs at the local level, in individual classes and through individual people's interactions in the pursuit of learning. These interactions may involve course content, classmates, instructors (Moore, 1989), and interfaces (Hillman, Willis, & Gunawardena, 1994), or even interactions with networks (e.g., people, resources, and networks beyond the regular class boundaries; Dennen, 2013). Most of these types of interaction can be found in contemporary formal distance learning contexts, while more informal and smaller-scoped learning contexts may involve a smaller combination of interactions. Regardless of scope and context, the interplay of people, content, and technology is at the core of ODDE.

As the SECTION V title implies, the four main topics covered in this section are learners, teachers, media, and technology. Although each chapter focuses on one of these four topical categories, their contents and argument carry implications for the other topics in this section, too. In other words, successful online learning links learners, teachers, media, and technology a systemic and, in many ways, symbiotic relationship.

A People-First Approach to ODDE

A people-first approach to ODDE (Dennen, 2020) is one that continuously considers the needs of the humans for whom the online learning systems exist. When the COVID-19 pandemic began, educators and learners worldwide found themselves engaged in emergency remote teaching (Hodges, Moore, Lockee, Trust, & Bond, 2020), often manifest as some form of online learning. As tempting (and at times necessary) as it was to focus on the technologies that could deliver subject matter content to students, it was most important to put people first in this endeavor, ensuring that students' needs, pedagogical and otherwise, were met (Dennen, 2020). After all, one could develop the most sophisticated learning tools but the effort would be all for naught if people lacked the access, knowledge, disposition, and environment necessary to make productive use of the tools. As a scholar working directly in this area, I was asked to offer support and advice to many educators struggling to shift their classes online in response to the pandemic. I issued the reminder, "people first, content second, technology third," to help educators keep people at the forefront of their considerations, all while doing the necessary work of locating and/or developing digital course content and learning how to use distance learning technologies. I shared this message via multiple blog posts and reiterated it across various professional development webinars and workshops because of the tendency for individuals to focus first on technology when making a shift in teaching modality. The message resonated deeply with people, who were rapidly discovering what experienced online instructors know very well: that technology can unite instructors and learners across differences of time and space, but when technology takes center stage in these interactions, some learners may be left behind.

"People first, content second, technology third," is not only a mantra for education during difficult times, but represents a philosophy for approaching online learning at any time. *People* are the reason why the educational need or opportunity exists. Class success is often measured by whether people persist, learn, and feel that their needs have been met in the educational experience. Conversely, when people feel uncomfortable or have unmet needs, whether related to the course context or not, learning becomes more challenging. Learning institutions have recognized the importance of viewing learners – including online learners who may never visit a physical campus – through a holistic lens and, in response, offering not only learning supports but also fostering technological skills, wellness, and community (Babacan & Thurgood, 2021).

Whereas learners drive the need for ODDE and teachers support the endeavor, *content* is the raison d'être of a course. Learning content can be delivered to learners through a variety of media. Whether designed specifically for a class or adopted from a preexisting source, the content represents a pathway to attaining the course learning objectives. Although content may be largely unknown by learners at the beginning of a course, by the end of a class, successful learners "own" that course's content. In other words, when learners master the course learning objectives, the course content is theirs to apply in future settings of their choosing.

For any given course, content may remain stable across class sections, even as teachers, learners, and course technologies change. Content often brings consistency to educational settings. When it comes in the form of predesigned media, whether static (e.g., books, videos) or interactive (e.g., games and simulations), all stakeholders in the learning context can point to the media as a concrete example of what is to be learned. Still, sometimes content is not just interactive, but also dynamic, delivered by instructors or co-constructed among the members of a class. Regardless of the media and approach, content is inert until the people in a class do something with it.

Technology may come third in this people-first approach, but that does not mean that it is unimportant. Instead, technology should be considered foundational to the interactions among people and content. Much as we do not expect people to spend time marveling at the foundations of our buildings, but rather seamlessly enjoying the structures that sit atop them, educators should not strive to make technology the focal point of their classes. Rather, technology is the enabler for a class's online learning interactions and should be strong, simple, stable, and usable.

All three of these dimensions – people, content, and technology – are critically important to ODDE. Although each dimension can be explored independently, and individual studies in distance education often focus on just a single dimension, the three are fully interdependent in practice. Moreover, they are dynamic and context-dependent. No single system or approach has been shown to be best for all learning scenarios. Although guidance from theories, research, and policies at all levels should be consulted when designing specific distance and digital learning solutions, local knowledge of learners and context also should be reflected in design, facilitation, and assessment decisions.

An Overview of Chapters

The chapters in this section explore the experiences, needs, and competencies of people (learner and teachers) as they engage in ODDE; the media that hosts content; and the technology that supports both the people and media. These chapters contain references to theories and frameworks that are commonly associated with and researched in ODDE and in some cases addressed in earlier sections of the book, including transactional distance theory (Moore, 1993), cognitive load theory (Sweller, 1994), the Community of Inquiry framework (Garrison, Anderson, & Archer, 2000), self-determination theory (Deci & Ryan, 1980), and experiential learning theory (Kolb, 2014).

Learners are at the core of ODDE; they are the people being served by flexible digital learning opportunities. The flexibility of online courses has made them particularly attractive to certain population sectors. *Von Prümmer* shows how online learning has created new opportunities for women to earn postsecondary degrees and for women to work in higher education settings. She highlights many of the social, cultural, and personal forces that have led women to become distance learners and that make participation in any form of education a juggling act in already busy lives. Von Prümmer leaves no stone unturned in her exploration of women's roles and experiences in distance learning, considering gendered differences in fields of study, accessibility of technology, and forms of communication.

Lee looks at a different sector of the online learning population: doctoral students. Online doctoral students are typically different from campus doctoral students in terms of their demographic and goals. Many of the online doctoral programs that have been developed in recent years serve learners who seek to apply research knowledge in professional rather than academic settings. Again, flexibility and access are key attributes that make online doctoral education attractive to learners. Lee notes that these online doctoral learners may struggle due to feelings of isolation or anxiety related to technology and explores many of the advantages and disadvantages of online doctoral programs for varied populations.

ODDE clearly provides learners with increased options and opportunities for earning degrees and, at the postsecondary and professional development level, advancing in their careers. However, the existence of these options alone does not guarantee success. Various learner attributes and skills contribute to the success or failure of online learners, and several of the chapters in this section consider some of these skills and related behaviors.

Yalcin reviews learner attributes, such as technology access and socioeconomic status, that can have a profound influence on whether learners are able to effectively participate in ODDE. Further, he shows how macro-, meso-, and microlevel entities can all work to support learners and increase their success. Additionally, Yalcin gives an overview of the basic technology skills and related competences that allow people to be successful online learners. Through this chapter, Yalcin reminds us that although online learning improves access to education for many learners, it is not a global panacea, and some individuals are still at a disadvantage.

In a complementary chapter, *Martin and Castañeda* explore digital literacy skills, which are equally important for learners and teachers. Through a timeline, they show the development of thought surrounding the concept of digital literacy. Although digital literacy is considered important – online learners and teachers obviously need to be fluent in the tools and practices associated with the medium they have chosen – definitions of "digital literacy" are multifarious and poorly synthesized. Martin and Castañeda discuss several frameworks across different learning contexts and identify areas in which they overlap and diverge. Rather than problematize the existence of so many frameworks, they demonstrate the utility of these frameworks and provide insights into how each provides important considerations for online learning.

Ehlers focuses on Future Skills, a set of competencies that people need to be successful in the world. His chapter considers the needs of today's learners when they enter the workforce, including projections for children who are years from entering the workforce, and considers the role that educational institutions should play in ensuring students are well prepared. The digital literacies discussed by Martin and Castañeda are one component of the larger Future Skills framework, which also includes skill sets in areas such as decision-making and design thinking. From Ehlers' perspective, these are not merely skills to be checked off as each one is mastered. Instead, their mastery represents a holistic approach to becoming a full and valued participant in the workforce of tomorrow.

Although learners may need basic competencies, as outlined by Yalcin, and perhaps even more extensive digital literacy skills, as presented by Martin and Castañeda, in order to function in online learning spaces, motivation also plays a role in learner success. Motivation is important for keeping learners engaged for the duration of their learning experience. Motivation must be cultivated despite transactional distance, which can act as an opposing force. *Fryer, Shum, and Nakao* consider motivation in ODDE at the primary, secondary, and tertiary levels, showing how learners can be intrinsically motivated and propel themselves forward in an online class and also how they may be motivated by external factors such as teachers, media, and technology. *Fryer, Shum, and Nakao* explore the role of various learning strategies, such as gamification, and learning technologies, such as augmented and virtual reality, in motivating learners. They highlight the connection between online learning motivation and several motivational theories and look closely at how online learning technologies can incorporate principles of motivation.

Dennen and Jones discuss the role of the online instructor, focusing on instructors' responsibilities for shaping multiple dimensions of a course. For all of the competencies and digital literacy skills that online learners need, there are multiple correlating online instructor skills that are necessary. Pedagogy still rests at the forefront of the online instructor's responsibilities and required skill set, but pedagogy alone is not enough to ensure that learning takes place. Intersecting with topics from chapters written from the learner perspective, Dennen and Jones demonstrate how successful online instructors offer not only pedagogical activities, but also provide the necessary structure, motivation, technical support, and social environment to help learners succeed. They also encourage continuous consideration of various ethical issues that arise in online learning spaces and the role external networks may play in online learning.

Bong and Liu consider media usage behaviors, sharing various typologies for classifying online learners. Media usage behaviors provide insights into how learners access and use digital course content as well as how they interact with instructors and peers through learning communication technologies. These behaviors may or may not reflect learner competencies, and through this overview, Bong and Liu demonstrate how online learners can vary widely in terms of media usage. Learners' use of media can be examined in terms of its intensity, frequency, and purpose although, as Bong and Liu point out, this is an area of research that is currently under-theorized and not well synthesized across typologies. They provide directions for future researchers to consider, both in terms of newer or emerging technologies, in which learner use is not yet well understood, and familiar technologies that can be used to capture and analyze aspects of media usage behaviors.

Online learning tools can be used to help learners interact with instructors and peers in a distributed manner (asynchronously) or in real time (synchronously). In their respective chapters, *Davidson-Shivers and Rand* provide an overview of asynchronous tools used to support ODDE, and *Lowenthal* provides an overview of synchronous tools. In both chapters, the authors are clear that tools alone are limited and that what matters is how instructors use those tools.

Davidson-Shivers and Rand list a variety of specific tool categories that can be used to support asynchronous learning interactions, discussing the pros and cons of each. They also share specific strategies for promoting learner interaction via asynchronous tools, rooted in relevant educational theories. In addition to the many ideas that they offer to instructors seeking to foster asynchronous learner interactions, at the end they ask a provocative question about the necessity of learner interaction in ODDE.

Lowenthal is provocative in another way, exploring whether a distinction between synchronous and asynchronous tools is meaningful in this current moment, when tools are increasingly multifunctional and can be used for either or both synchronous and asynchronous learning depending on how a course is designed. The modality distinction is blurred because synchronous activities can be recorded and reviewed asynchronously and asynchronous tools can emulate synchronicity when learners access and communicate through them simultaneously. Whether differentiating between synchronous and asynchronous tools remains useful moving into the future remains to be seen, although the distinction between synchronous and asynchronous learning requirements surely will continue to be germane to both teachers and learners who seek to plan their learning experiences and may have varying levels of schedule flexibility.

Other chapters address tools that serve specific functions related to learning. For example, *Ifenthaler*, in his ▶ Chap. 61, "Automated Essay Scoring Systems," provides insights into technologies that can help reduce the labor associated with assessing online learners. Assessment historically has been one of the challenges that limits the scalability of online learning endeavors. Although objective style assessments have been automatically scored for years, written assignments have remained in the domain of student work that must be evaluated by a human. While machines can easily be trained to identify whether learners selected the correct answer or to match simple learner input (e.g., numbers and words) to model responses, training computers to assess writing is much more complicated. It requires comparing learner essays to complex rules governing both the content and form of a written document. The complex and nuanced nature of essay assignments poses a challenge, but as Ifenthaler shares in his chapter, the technology is rapidly developing and has the potential to allow more diverse forms of assessment to be used in large online classes, including MOOCs, without increasing labor needs.

Di Mitri, Schneider, and Drachsler consider a different form of automation as they review research on multimodal tutors. These tutors are an example of two technologies, Artificial intelligence (AI) and Learning analytics, working together to provide personalized learner experiences for learners. Whereas human instructors may have limited availability, AI-based tutors can be accessed and used as needed, expanding access to learning and learning possibilities.

Finally, *Prinsloo* explore the role that Learning analytics play in ODDE more generally. In this chapter, he wrestles with the role that theory has played in the development of learning analytics as a discipline, demonstrating that although the field is not united around a singular theory, it is also not atheoretical. Prinsloo makes important connections between analytics and the learner-teacher dynamic, showing how analytics can be used to support pedagogy but also should be implemented with careful consideration for ethics and privacy. In other words, Prinsloo connects technology back to the people who it is designed to help.

Synthesis Across Chapters

The chapters in this section are deeply rooted in the theories, research, and practices of ODDE as they explore the individual components that are united in the classroom. Although each chapter has a unique topic, three main themes can be identified across chapters. These themes connect to larger, ongoing issues being explored in ODDE research and practice.

Learners and instructors have many of the same needs in ODDE, which is evident in the chapters about learners (▶ Chaps. 55, "ODDE and Gender," by Von Prümmer and ▶ 65, "Online Doctoral Education," by Lee), instructors (▶ Chap. 62, "The Role of the Online Instructor," by Dennen and Jones), and the literacies and competencies that unite them (▶ Chap. 63, "Developing Digital Literacy for Teaching and Learning," by Martin and Castañeda; ▶ Chap. 53, "Learner Characteristics and Competencies," by Yalcin; ▶ Chap. 64, "Future Skills as New Currency for the World of Tomorrow," by Ehlers). Organizations such as the International Society for Technology in Education (ISTE; http://iste.org) and the International Board of Standards for Training, Performance and Instruction (ibstpi; http://ibstpi.org) have developed and continuously refine competency lists for both instructors and students at all levels of education. The work done by ISTE, ibstpi, and other organizations globally indicates both the critical importance of identifying and developing learner and instructor skill sets for digital learning success and of creating pathways for practitioners to foster skill development. However, learners and instructors both may be affected by needs unrelated to digital literacies and competencies that nonetheless inhibit their performance in class. For this reason, it is important to always widen the lens and look holistically at the people involved in ODDE.

At all levels, we have an ethical obligation to take a holistic look at learners and instructors, considering their backgrounds and needs. Across multiple chapters, the authors raise ethical issues related to the topics they explore (▶ Chap. 63, "Developing Digital Literacy for Teaching and Learning," by Martin and Castañeda; Chap. 52, "Introduction to Learners, Teachers, Media, and Technology in ODDE," by Dennen and Jones; ▶ Chap. 59, "Learning Analytics in Open, Distance, and Digital Education (ODDE)," by Prinsloo), and other authors demonstrate how open distance learning provides opportunities for populations whose needs may not be met via other modalities (▶ Chaps. 55, "ODDE and Gender," by Von Prümmer and ▶ 65, "Online Doctoral Education," by Lee). The thread that runs through these discussions of ethics and different learner groups may be summed up as follows: no component of online learning is value-neutral and people-first considerations are always relevant and important.

Finally, the chapters that explore media and technology highlight the tensions between technology and its users. The chapters that directly engage how technology is used in the hands of learners and teachers alternately consider what learners do (Bong and Liu) and how technology is used to connect instructors and learners (Davidson-Shivers and Rand and Lowenthal). There is overlap between learners' natural media usage and the synchronous and asynchronous technologies implemented for learning, although the tools that people use heavily in their everyday lives, such as social media, may not be as engaging as other, course-specific tools when used to support learning (Bond, Buntins, Bedenlier, Zawacki-Richter, & Kerres, 2020). As Fryer, Shum, and Nakao point out, tools are often developed without strong connections to motivational theory. However, the tools are here to stay and motivation and audience are important concerns when determining who should use the tools and how the tools should be used. Additionally, ongoing technological developments leave the field contemplating how automated technologies can be used to streamline instructional processes and offer new opportunities and insights in ODDE contexts (Ifenthaler; DiMitri, Schneider and Drachsler; Prinsloo).

The tension between humans and technologies as relates to interaction and automation is an important one to explore and extends the conversation begun in many of these chapters. Interaction has become a focal point of much distance learning research (Martin, Sun, & Westine, 2020), with deep roots reflected in Moore's early work focused on interaction and transactional distance (Moore, 1989, 1993); Anderson and Garrison's (1998) suggestion that communication in online classes should be reciprocal, consensual, and interactive. National regulations for online learning and accreditation bodies have reified these ideas. For example, the United States Department of Education has defined regular and substantive interaction in the Code of Federal Regulations for Education (34 CFR § 600.2), which has direct implications for federal online learning requirements. In other words, the government is regulating how and how frequently learners should be required to interact their online courses. Although many of the interaction options provided in this regulation involve learner-instructor or learner-learner interactions, provisions are made for interactions with automated systems, such as the multimodal tutor discussed by DiMitri, Schneider, and Drachsler.

Overall, advances in online learning automation could have implications for redefining the instructor role. Over the last two decades, the adoption of increasingly sophisticated learning management systems has relieved instructors of some of their earlier managerial and technological tasks, making recordkeeping simpler and providing a single, consistent learning platform that is typically supported institutionally. Automated grading systems are already in use for some types of assessments and, as Ifenthaler demonstrates, essay grading systems are increasingly becoming a reality. Analytics, as discussed by Prinsloo, can help promote student success, but we still need to figure out how to best implement learning analytic systems in ways that not only provide institutions with data, but also help instructors better support students. With increased use of technologies to teach, assess, and track students, some parts of the instructor's role will naturally shrink. However, change in the instructor role and learner use of technology will likely be uneven across learning contexts and population sectors, reflecting differences in technology access, values, learner characteristics, and learning needs.

Conclusion

The chapters in this section of the handbook explore characteristics, needs, competencies, and responsibilities of online learners and teachers along with the media and technologies that can support them in their learning and teaching endeavors. As noted previously, advances in these technologies are shifting learner needs and competencies and teacher roles and responsibilities. Since the beginning of my career in higher education, a repeated question has led to excited rumblings and nervous fears expressed across different educational stakeholders: Will human instructors be replaced by computers? Selwyn (2019) engages this question head on, noting that the question is not a matter of whether computers can replace human instructors, or whether they will (and he says that they certainly can if we let them), but rather if they *should*. In Selwyn's response, we can see the power and influence that people, both learners and teachers, have in this future. Looking across these chapters, and again considering the interrelationship between learners, teachers, media, and technology, my thoughts are that a "people-first" approach will continue to be valued even with ongoing technological advancements. It is incumbent on this generation and the next generation of researchers to not examine any one of these topics in isolation, but always attend to the larger systems. While changes in one area will necessitate corresponding adjustments in another, technological advancements can be used in ways that maximize learning gains. In practice, this means some tasks will be led or guided by the computer, with computerized feedback and monitoring, but humans will still be needed at various points and for specialized kinds of interaction, feedback, and monitoring. Learners and teachers, as well as other educational stakeholders (e.g., instructional designers, institutional and government leaders), will hopefully continue to recognize and exert their agency over the future of ODDE, celebrating people as the driving forces behind education, with media and technology leveraged as tools that help people reach their goals.

References

Anderson, T., & Garrison, D. R. (1998). Learning in a networked world: New roles and responsibilties. In C. C. Gibson (Ed.), *Distance learners in higher education: Institutional responses for quality outcomes* (pp. 97–112). Madison, WI: Atwood.

Babacan, A., & Thurgood, M. (2021). Learner support services in an online learning environment. In H. Huijser, M. Kek, & F. F. Padró (Eds.), *Student support services* (pp. 1–16). Singapore, Singapore: Springer Singapore.

Bond, M., Buntins, K., Bedenlier, S., Zawacki-Richter, O., & Kerres, M. (2020). Mapping research in student engagement and educational technology in higher education: A systematic evidence map. *International Journal of Educational Technology in Higher Education, 17*(1). https://doi.org/10.1186/s41239-019-0176-8.

Deci, E. L., & Ryan, R. M. (1980). Self-determination theory: When mind mediates behavior. *The Journal of Mind and Behavior, 1*(1), 33–43. Retrieved from http://www.jstor.org/stable/43852807

Dennen, V. P. (2013). Activity design and instruction in online learning. In M. G. Moore (Ed.), *Handbook of distance education* (pp. 282–298). New York, NY: Routledge.

Dennen, V. P. (2020). People first. Content second. Technology third. Retrieved from https://vanessadennen.com/2020/03/16/people-first-content-second-technology-third/

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education, 2*(2–3), 87–105. https://doi.org/10.1016/S1096-7516(00)00016-6.

Hillman, D. C. A., Willis, D. J., & Gunawardena, C. N. (1994). Learner-interface interaction in distance education: An extension of contemporary models and strategies for practitioners. *American Journal of Distance Education, 8*(2), 30–42. https://doi.org/10.1080/08923649409526853.

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). The difference between emergency remote teaching and online learning. *Educause Review, 27*, 1–12.

Kolb, D. A. (2014). *Experiential learning: Experience as the source of learning and development*. New Jersey: Pearson.

Martin, F., Sun, T., & Westine, C. D. (2020). A systematic review of research on online teaching and learning from 2009 to 2018. *Computers & Education, 159*, 104009. https://doi.org/10.1016/j.compedu.2020.104009.

Moore, M. G. (1989). Three types of interaction. *The American Journal of Distance Education, 3*(2), 1–6.

Moore, M. G. (1993). Theory of transactional distance. In D. Keegan (Ed.), *Theoretical principles of distance education* (pp. 22–38). New York, NY: Routledge.

Selwyn, N. (2019). *Should robots replace teachers?: AI and the future of education*. Medford, MA: Polity Press.

Sweller, J. (1994). Cognitive load theory, learning difficulty, and instructional design. *Learning and Instruction, 4*(4), 295–312. https://doi.org/10.1016/0959-4752(94)90003-5.

Learner Characteristics and Competencies

53

Yasin Yalçın

Contents

Abstract

The advances in technology and the demand for open, distance, and digital education redefined the characteristics and competencies of learners in these learning environments. Although technology ownership and access to an Internet connection are growing worldwide, there is still a significant number of learners in need of a computer and Internet access to benefit from the advantages offered by new learning environments. As a result, the obstacles in technology ownership and access put a group of learners from a low socioeconomic status and minorities in a disadvantaged position and prevent them from engaging in learning

Y. Yalçın (✉)
Recep Tayyip Erdoğan University, Rize, Turkey
e-mail: yasin.yalcin@erdogan.edu.tr

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_51

experiences. Indirectly, these learners also struggle to develop digital competencies due to their limited access to technology-rich environments. This chapter elaborates on the characteristics of learners in open, distance, and digital education environments with respect to their technology ownership and access, presents a number of competency frameworks, and discusses how the competencies included in the frameworks apply to open, distance, and digital education. The chapter opens with the role of technology in new learning environments and how technology ownership and access vary among certain demographics as well as developed, developing, and underdeveloped countries. The introduction is followed by learner characteristics with respect to varying technology access and ownership among demographics and the implications of technology ownership and access for open, distance, and digital education. Finally, a number of competency frameworks were presented and discussed in regard to their contributions to the development of a competency set for learners in open, distance, and digital education environments.

Keywords

Distance learning · Online learning · Digital education · Learner characteristics · Competencies

Introduction

The history of distance education informs us that the initial practices comprised mail correspondence that involved sharing printed learning materials with learners and enabling them to study at their own pace. However, advances in information and communication technologies shaped the interaction among learners, instructors, and institutions and allowed new methods to be implemented to deliver instruction to learners who needed to study at a distance for various reasons. These advances enabled education practitioners to take advantage of a variety of synchronous and asynchronous technologies such as radio, educational television, videoconferencing, and audio and video recordings to employ in the distance education process. While all these technologies affected the practice of distance education, it was the Internet that transformed the methods we adopted to deliver instruction to learners who were away from the brick and mortar institutions. The Internet also brought new terms into our lives such as online learning, e-learning, and digital education. Today, the majority of distance education practices rely on computer and Internet technologies as institutions use learning management systems (LMS), synchronous and asynchronous communication software, and various Web 2.0 tools for delivering courses. All these advances in technology and the resulting transformation of distance education practices redefined the characteristics and competencies of the learners in open, distance, and digital education environments.

Being a successful distance learner requires having access to certain technologies and possessing various competencies. Computer and Internet access are among the major technology requirements as learners need to complete coursework using a computer and use the Internet to retrieve learning material, submit assignments, and communicate and collaborate with the instructor and peers. Computer ownership and broadband Internet access rates are fairly high in developed nations. For example, Anderson (2015) reported that 73% of the adults in the United States owned a desktop or laptop computer in 2015. In another study, Perrin (2021) reported that 77% of the adults in the United States had access to a broadband Internet connection at home. While computer and Internet adoption and access rates are promising in the developed world, a different picture is present among adults in underdeveloped and developing countries as well as adults from a low socioeconomic status in developed nations. Anderson (2015) emphasized that desktop or laptop computer ownership greatly decreases among Black and Hispanic adults, adults with less than $30 K yearly income, and adults with an educational degree at or below high school level. Perrin's (2021) findings are in line with those of Anderson's (2015) as the researcher reported that home broadband Internet access rates decrease among non-White adults with a high school degree or less and a yearly income of less than $30 K. Penetration rates of computers and broadband Internet are not at a satisfying level in underdeveloped and developing countries either. Recent statistics show that, in 2016, the percentage of households with a personal computer was 13% in India, 47% in China, 53% in Iran, 56% in Turkey, 28% in South Africa, 52% in Brazil, and 38% in Mexico, while developed countries had higher rates of computer ownership such as 86% in Australia, 91% in Germany, 98% in the Netherlands, 91% in the United Kingdom, 88% in Canada, and 82% in the United States (Baller, Dutta, & Lanvin, 2016). Moreover, as of January 2022, while Western and Northern countries have high Internet penetration rates that are above 90%, the rates drop below 75% in certain regions of Asia and Central America and 30% in Eastern and Central Africa (We Are Social et al., 2022). Considering that computer ownership and Internet access are a must to pursue open, distance, and digital education, learning opportunities afforded by the availability of these technologies vary greatly across the globe.

Competencies to be successful in new learning environments are equally important as having access to a computer and a broadband Internet connection. Recent research informs us that students' technology ownership and technology experiences lead to greater perceived technology competencies (Yerdelen-Damar, Boz, & Aydın-Günbahar, 2017). Moreover, we have been informed that students' frequency of using technology is positively related to the change in their technology competence over a period of time (Hosein, Ramanau, & Jones, 2010). Technology competencies allow learners to successfully engage in learning experiences and carry out responsibilities in open, distance, and digital education environments. Research indicates that digital skills are related to students' engagement in learning with technologies, and students with higher digital skills engage in learning with technologies to a greater extent when compared to students with low digital skills (Bergdahl, Nouri, & Fors, 2020). Furthermore, students' digital competence affects their digital informal learning behaviors as well (He & Zhu, 2017; Heidari, Mehrvarz, Marzooghi, & Stoyanov, 2021). In other words, learners' technology ownership and experiences lead to improved technology competencies and technology competencies allow students to engage in learning experiences in formal and informal digital learning environments. Ownership of and access to technology emerge as an important prerequisite for developing technology competencies and engaging in learning in new learning environments. Furthermore, digital competencies are gateways to successful learning experiences in digital learning environments. In this chapter, issues related to learners' socioeconomic background and demographics and competencies to be possessed in open, distance, and digital education environments are explored.

Adoption of Open, Distance, and Digital Education

Learning in the New Century

Today, open, distance, and digital education practices predominantly rely on information and communication technologies. Most institutions deliver courses via an LMS (e.g., Horvat, Dobrota, Krsmanovic, & Cudanov, 2015), instructors use synchronous and asynchronous tools for learning activities (e.g., DeSantis, 2022; Ironsi, 2021), and students make use of a variety of communication and collaboration tools to engage in the learning process and carry out their responsibilities (e.g., Sullivan, 2021). In order to engage in a successful learning experience, at minimum, a learner must have access to a personal or shared computer, a stable Internet connection, and office and productivity software that will enable her to complete and submit coursework. Admittedly, the quality of the learning experience is in direct proportion to the learner's continuous access to the computer, the computer's computing power, and the speed and quality of the Internet connection. It is not unlikely for the learning experience to be disrupted due to the failure of any of these technologies. Especially, the presence of online synchronous meetings in the learning process increases the significance of the computing power and broadband Internet connection due to the need to process and transmit a significant amount of data per second. Aside from the costs associated with access to education, all these resources require significant expenses on learners' end, and as a result, the adoption of open, distance, and digital education is directly related to the adoption and use of information and communication technologies.

Technology Access, Socioeconomic Status, and Demographics

Ownership of and access to technology have been frequently discussed in relation to individuals' socioeconomic status. This proposition is supported by a number of research studies conducted to explore individuals' access to technology in relation to their demographics. A recent Pew Research Center study revealed that only 59% of adults with less than $30 K yearly household income in the United States owned a desktop or laptop computer while this number was 92% for adults with $100 K or more yearly household income (Vogels, 2021). Vogels (2021) further revealed that

29% of the adults with less than $30 K yearly household income relied on smartphones to connect to the Internet while only 6% of adults with $100 K or more yearly household income reported that they only had a smartphone but no broadband Internet connection. These findings are similar to those reported for the households of younger learners as well. According to a recent study, 35% of the school-age children who live in households with a yearly income of less than $30 K do not have a high-speed Internet connection at home while only 6% of children who live in households with a yearly income of $75 K or more reported that they do not have access to a high-speed Internet connection at home (Anderson & Perrin, 2018). Moreover, students also differed by income level in terms of the device they used to complete homework with a greater percentage of students from low-income households being smartphone-dependent to finish their homework compared to average- and high-income households, a phenomenon referred to as the "homework gap." While statistics clearly show that there is a difference in the percentage of learners from varying income levels in access to computers and the Internet, there is research suggesting that the quality of the ownership and access differs among low- and high-income individuals who have access to the Internet. Gonzales (2016) argued that low-income individuals frequently experience "dependable instability" which is the "normalization of frequent disruptions in Internet access" (p. 243). While certain portions of low-income individuals have access to technology, the quality of their experiences may not be equal to those of high-income individuals. Furthermore, Gonzales (2016) argued that today the problem is not the initial access to technology, but maintaining that access as "technology maintenance" requires a significant expense that low-income individuals may not be able to afford, and as a result, they may experience disruptions in access to technology due to their low economic power (e.g., having to use second-hand devices that require frequent maintenance). While technology access disruptions emerge as a significant issue, another negative effect of the financial burdens of technology maintenance may be low-income adopters' un-adoption of technology (Powell, Bryne, & Dailey, 2010).

While income level is one of the important factors determining individuals' ownership of and access to technology, education level has been found to be related to technology ownership and access as well. It has been reported that the percentage of computer ownership increases with education, and it is around 29% among adults with the education of less than high school compared to 90% with a college degree or more, a trend that is also present in mobile technology ownership such as tablet and e-reader (Anderson, 2015). Access to home broadband Internet varies substantially by education as well. According to Perrin (2021), while only 59% of the United States adults with a high school degree or less had home broadband Internet, 94% of adults with a college degree or more reported that they had broadband Internet at home. These statistics are in line with what has been reported in past research as Mossberger, Tolbert, and Gilbert (2006) found that individuals who lived in residential areas with lower educational attainment were statistically less likely to own a computer at home than the residents in zip codes with higher educational attainment. Moreover, a Tsetsi and Rains (2017) study found that the education level of multimodal users, users with a smartphone and an additional device that can connect to the Internet, was significantly higher than the education levels of users without access to the Internet and users who were smartphone-dependent. While open, distance, and digital education environments can provide an educational opportunity to individuals who are less educated, taking this opportunity still seems challenging for these learners due to the constraints relating to technology access.

Technology ownership, access, and use have been reported to vary among adults from different races and ethnicities. Recent statistics show that White adults have higher computer ownership compared to non-White adults while Hispanic adults have higher computer ownership than Black adults in the United States (Anderson, 2015). A similar trend is present in terms of home broadband Internet access as well. While White adults have the highest rate of broadband access at 80%, Black adults have higher home broadband Internet access than Hispanic adults (Perrin, 2021). Moreover, smartphone dependency among non-White adults is also an issue. According to Zickuhr and Smith (2012), Black and Hispanic adults access the Internet using their cell phones significantly more than White adults, and Perrin (2021) reported that one in six Black adults and one in four Hispanic adults are smartphone-dependent to access the Internet. These statistics have been supported by past research as Tsetsi and Rains (2017) reported that White users were significantly less likely to be smartphone-dependent in accessing the Internet than minority users. However, it is worth noting that it is not possible for learners to easily complete most coursework on a smartphone (Rowsell, Morrell, & Alvermann, 2017). Technology access in households was investigated among school-age children as well. Warschauer and Matuchniak (2010) reported that the mean ratio of home user to computer was highest for Hispanic families with nearly four family members per computer which was followed by African-American, Asian, and White families that had a home user to computer mean ratio of nearly one. Moreover, while computer and Internet access among minority learners is lower than that of non-minority learners, minority learners' technology-using behaviors might be different as well. Kuo (2018) stated that African-American university students used basic software more frequently than advanced software, a phenomenon that should be investigated further.

Disparities in technology access among learners from different demographics constrain disadvantaged learners to search for opportunities to use technology in public locations. However, ease of technology access may be different between learners who can access them at home and those who seek access in public locations (Beaunoyer, Dupéré, & Guitton, 2020). Among these locations, libraries, coffee shops, and community centers are the most commonly visited locations to obtain computer or Internet access. Socioeconomic status and race are among the common variables that differ between learners who access technology at home and those who access technology in public locations. Mossberger, Kaplan, and Gilbert (2008) stated that regular access to and use of technology is less frequent in low-income communities and individuals in low-income communities try to compensate for the lack of home or work technology access by visiting alternate locations. Anderson and Perrin (2018) reported that while 12% of teens in the United States at least sometimes have to use public Internet connection to complete homework, this problem is more common among Black teens and teens living in households with less than $30 K yearly income. Additionally, Banerjee (2020) reported that first-generation, low-income, and non-White college students checked out computers from school and used computers and the Internet in public locations significantly more than other students. While access to computers and the Internet is an issue to be resolved, Rubinstein-Avila and Sartori (2016) emphasized the importance of access to software as well. Computer software and tools allow learners to engage in learning activities and are usually required for completing coursework. While some basic software and tools can be accessed freely or via an institutional license, some institutions may not allocate a budget for learners to access other advanced software and tools. Moreover, while public locations such as libraries and community centers can provide learners computer and Internet access, learners may not be able to have access to a broad collection of software and tools due to the budget limitations of these locations. Therefore, the availability of software and tools remains one of the technology access issues in open, distance, and digital education, especially for learners who make use of resources in public locations.

Implications for Open, Distance, and Digital Education Environments

Learners' access to resources in the learning process must be an important consideration for education practitioners. Learners must be equipped with a number of technologies that can function properly and continuously in order to benefit from the opportunities and convenience provided by new learning environments. However, research to date shows that there are disparities among learners from different demographics in terms of their ownership of and access to technology such as computers and the Internet. Moreover, while learners may have initial access to technology, they may struggle to maintain their access throughout the learning process due to financial constraints. These conditions imply that education practitioners should be prepared and develop strategies to accommodate learners with limited resources in open, distance, and digital education environments. Major considerations and strategies to be adopted are presented in this section. Additionally, these considerations and strategies are summarized in Table 1.

Initial Access to Technology

The number of learners who indicate that they do not own or have access to some basic technology is significant. A significant portion of learners across the globe experience issues owning a personal computer and having access to an Internet connection that may prevent them from exploring new learning opportunities. In order to make the use of open, distance, and digital education more widespread, learners from low socioeconomic status and minority groups should be provided with opportunities to improve their technology repertoire. While these types of

Table 1 Major technology considerations and mitigation strategies

Consideration	Mitigation strategies	Who works in the process?			
		State/ government	Institution/ organization	Instructional designer/ developer	Instructor
Initial access to technology	Fund projects to increase learners' technology repertoire	✓			
Technology maintenance	Keep a record of the equipment owned by learners and identify learners with poor technology ownership		✓		
	Gather a collection of technology that can be checked out to learners		✓		
	Be aware of learners' technology shortcomings and have them involved in learning tasks accordingly				✓
Access location	Be aware of learners' conditions (e.g., participating synchronous meetings in shared spaces) and make appropriate adjustments to accommodate learners				✓
	Make sure that learning activities and assignments required of learners can be completed using basic hardware and software			✓	✓

(continued)

Table 1 (continued)

Consideration	Mitigation strategies	Who works in the process? State/ government	Institution/ organization	Instructional designer/ developer	Instructor
Mobile device dependency	Provide computers to learners with mobile device dependency		✓		
	Make sure that learning content is optimized to be mobile-friendly		✓	✓	✓
	Record online synchronous meetings and allow learners to download the video file				✓
Lack of supporting tools	Provide learners with free/ discounted software licenses used in courses		✓		
	Make sure learning tasks can be completed using free or open-source software			✓	✓
	Provide a list of free or open-source software tools to learners				✓
	Encourage learners to use free trials of paid-for software given that the trial period is sufficient for the task				✓

interventions may require support at the state or government level, there are examples of such large-scale projects undertaken (Trucano, 2013). The purpose of these large-scale projects is usually to equip learners with the required technology and improve technology skills in order for learners to have access to and make use of new learning opportunities. While providing laptop or tablet computers to learners is a relatively feasible project, furnishing every part of the residential areas with broadband Internet infrastructure may not be possible for every country. Satellite Internet, such as SpaceX's Starlink, may be a solution for the Internet access issues in especially rural areas. However, its adoption rate is still very much behind broadband Internet as recent statistics show a 6% adoption rate in overall Internet use in the United States (Statista, 2021).

Technology Maintenance

Similar to the initial access to technology, technology maintenance is also an issue for learners from low socioeconomic status and minority groups. While learners may report having access to technology prior to the beginning of a learning experience, maintaining this access throughout the learning experience may not be possible for every learner. Education practitioners should be aware of learners' possible intermittent access to technology due to failing hardware or Internet outages as these issues may limit learners' ability to be a part of the learning experience and keep up with tasks and responsibilities. There are several strategies that institutions and education practitioners can adopt in order to alleviate the impact of such issues on learners in open, distance, and digital education environments. First, it is a good practice for institutions to keep a record of the equipment owned by learners and identify learners who own technology that may cause issues during the learning process. Keeping such records will have the institution prepared for issues that may arise during the course of a learning experience and inform education practitioners accordingly. Second, institutions should have a collection of technology that can be checked out to learners in cases where learners experience issues due to a failed technology. These technologies such as computers can be provided to a learner for a limited time until the learner's technology issue is resolved. Finally, education practitioners such as instructors should be aware of learners' technology shortcomings and have them involved in learning tasks accordingly. For example, learners may have a limited data Internet subscription that may prevent them from downloading large files and watching videos in a high resolution. If a learner can use only a limited amount of data, it would not be possible for her to assume learning tasks that would entail downloading large files or watching high-resolution videos that will consume a significant amount of data.

Access Location

In line with technology maintenance and affected by similar factors, some learners may be forced to use the technology available in public locations such as libraries, coffee shops, and community centers. While these locations may provide learners with opportunities to engage in open, distance, and digital education experiences, learners may be severely limited in their ability to benefit from the learning experience. There are several points to consider for learners who participate in learning experiences from public locations. First, learners may be constrained to assume a more passive and quieter role during the learning experience, especially online synchronous meetings, in public locations due to the fact that these locations are shared by a group of individuals. In such cases, it is difficult for learners to express their opinions orally or engage in group activities that would require them to speak. While libraries have private study rooms, the number of these rooms is usually not sufficient to accommodate every learner. For the reasons mentioned above, education practitioners should be aware of learners' conditions and make appropriate adjustments to the learning activities to accommodate learners accessing technology in public locations. Second, access to technology in public locations also brings the struggle of being limited to basic software and hardware. For example, while libraries provide computer access, computers may lack advanced software that would be required for audiovisual design and development, and learners usually do not have the option of installing software on these devices without an administrator's permission. Requiring learners to engage in the design and development work with advanced software will put learners who access technology in these locations at a disadvantage. Education practitioners should make sure that learning activities and assignments required of learners can be completed using basic hardware and software that are available to all learners.

Mobile Device Dependency

The mobile device or smartphone dependency in open, distance, and digital education environments is a real phenomenon as a considerably large portion of learners try to complete learning tasks via tablet computers or smartphones. Recruiting a nationally representative sample of online learners, Magda and Aslanian (2018) found that 20% of learners complete all of their course-related activities on a mobile device while 47% of them complete at least some of their course-related activities using a mobile device. While mobile devices are extremely useful in having access to information on the go or as learning or performance takes place, they provide a limited experience due to their small screen size and relatively low computing power. Therefore, a mobile device's performance may be significantly inadequate compared to a personal computer's performance in a number of learning activities such as attending online synchronous meetings, retrieving learning content, and completing assignments. There are certain strategies that can be adopted by institutions and education practitioners to mitigate the effect of mobile device dependency on learners' performance. First, similar to the provision of technology to learners who struggle with technology maintenance, institutions may provide computers to learners with mobile device dependency that they can use for the duration of the learning experience. Second, mobile devices are inherently limited in their capabilities to display certain types of content due to their small screens and the types of applications they can run. In order for learners to view learning content on mobile devices conveniently, institutions and education practitioners should make sure that learning content is optimized to be mobile-friendly. Finally, mobile device dependency usually brings the issue of limited data Internet subscriptions together. Learners who are dependent on a mobile device to engage in learning activities may refrain from participating in learning experiences that may consume a significant amount of data such as attending online synchronous meetings. In the case of online synchronous meetings, it is a good practice for education practitioners to record these meetings in case learners miss a meeting due to insufficient data available. Furthermore, certain synchronous meeting tools only allow learners to view the recorded videos and prevent them from downloading the video files on learners' devices unless the owner of the session gives permission to learners for the video file to be downloaded. Allowing learners to download the video files is especially important as learners with mobile device dependency who also lack an unlimited data subscription prefer to download the recorded sessions on their devices using public networks and watch later to save data. The use of the downloaded content must comply with the institution's copyright policies, but it will not be discussed here as it is beyond the scope of this chapter.

Lack of Supporting Tools

Access to supporting tools such as computer software is critical for learners to carry out learning responsibilities and complete coursework in open, distance, and digital education. However, due to the economic burden of owning a license of some advanced software, learners with a low income may be at a disadvantage. The burden especially exacerbates in low GDP countries due to the weak currencies against USD and Euro, currencies with which most software are sold. There are several strategies that can be used to prevent learners from falling behind in their coursework due to the unavailability of advanced software. First, where possible, institutions should provide learners with free or at least discounted licenses for software that are most commonly used in courses. Having access to software through the institution will allow an equal learning opportunity for learners from different demographic backgrounds. Second, if it is not possible for the institution to provide a license, education practitioners should make sure that learning tasks that are assigned to learners can be completed using free or open-source software and to provide a list of the software to learners. There are a number of free and open-source software that can be used as alternatives to advanced paid-for software. However, as education practitioners encourage learners to use free or open-source software, they should also confirm that they are available for different platforms such as Windows, Macintosh, and Linux. Finally, in cases where an institutional license or open-source software is not available, learners may be encouraged to use free trials of paid-for software. However, trial periods usually range between 7 days and 2 months, and it is the education practitioner's responsibility to make sure that the trial period of a given software is sufficient to complete the learning task.

Competencies of the New Century

Competency is defined as knowledge, skills, or attitudes that enable individuals to accomplish certain activities to the expected standards (Richey, Fields, & Foxon, 2001). Competencies needed to be a successful citizen in various spheres of life have been debated by scholars for a very long time. The transformation of our lives and the reliance on information and communication technologies in the twenty-first century have impacted the competencies that we need to possess as well. Similar to every aspect of society, educational settings also have always required a set of knowledge, skills, and attitudes to succeed. However, it is more difficult now to define the knowledge, skills, and attitudes that should be possessed by learners due to the blurring lines between educational settings and other spheres of society and significant advances in technology. Technology stands out as the most influential phenomenon in shaping what learners of the new century should be able to do when it comes to learning. New learning environments require learners to possess technology competencies and engage in technology-enhanced learning to a significant extent in order to successfully complete learning offerings. The knowledge, skills, and attitudes expected of learners in open, distance, and digital education environments depend on the learning activities that learners take part throughout their learning experience. While the variety and quantity of the activities a learner is expected to involve for a successful learning experience depend on the specific learning context, they can be classified under four main categories:

1. Information activities: Activities that enable learners to search, retrieve, and evaluate information in digital environments.
2. Communication and collaboration activities: Activities that require learners to communicate and collaborate with instructors and peers regarding their coursework.
3. Design and development activities: Activities that require learners to create original works as part of their enrollment in learning offerings.
4. Administrative activities: Activities that enable learners to manage their learning experience such as developing procedures to follow the course schedule and submit assignments.

The aforementioned activities that learners take part in the learning process require learners to develop certain competencies to obtain the intended learning outcomes. There are a number of frameworks created to date that outline competencies to be possessed by individuals in the twenty-first century. While these frameworks were not specifically developed to address the competencies of learners in open, distance, and digital education environments, they include knowledge, skills, and attitudes that are applicable to these learning environments as well. One of the most prominent competency frameworks is developed by the Joint Research Center (JRC) of the European Commission. The Digital Competence Framework for Citizens, also known as DigComp, is currently in its third version, and it offers a tool to assess and improve individuals' digital competence (Carretero, Vuorikari, & Punie, 2017). The framework includes 21 competences in five competence areas along with eight proficiency levels for each competence described as learning outcomes based on Bloom's Taxonomy. The framework is developed to facilitate individuals' development of digital competence in their education and occupation which is illustrated by the inclusion of learning and employment scenarios. The competence areas and competences are presented in Table 2.

Table 2 Digital Competence Framework for Citizens: competence areas and competences (Carretero et al., 2017; p. 11)

Competence area	Competences
1. Information and data literacy	1.1. Browsing, searching, and filtering data, information, and digital content 1.2. Evaluating data, information, and digital content 1.3. Managing data, information, and digital content
2. Communication and collaboration	2.1. Interacting through digital technologies 2.2. Sharing through digital technologies 2.3. Engaging in citizenship through digital technologies 2.4. Collaborating through digital technologies 2.5. Netiquette 2.6. Managing digital identity
3. Digital content creation	3.1. Developing digital content 3.2. Integrating and re-elaborating digital content 3.3. Copyright and licenses 3.4. Programming
4. Safety	4.1. Protecting devices 4.2. Protecting personal data and privacy 4.3. Protecting health and well-being 4.4. Protecting the environment
5. Problem solving	5.1. Solving technical problems 5.2. Identifying needs and technological responses 5.3. Creatively using digital technologies 5.4. Identifying digital competence gaps

DigComp delineates the competences in five domains with an emphasis on information search, retrieval, and evaluation, interaction and collaboration through digital technologies, content creation, practice of safe technology use, and problem solving using digital technologies. In addition to DigComp developed by JRC, the European Commission developed another set of competences for lifelong learners. Key Competences for Lifelong Learning are general recommendations for citizens and key stakeholders to develop and update competences that enable individuals to succeed in various aspects of life including education, employment, and social relations (European Commission, 2019). While the framework has a broad application to a learner's life and is more comprehensive than DigComp, it includes critical competences such as digital and personal, social and learning to learn competences. Each key competence includes a description statement as well as details as to what it entails in terms of knowledge, skills, and attitudes. The key competences and a brief description of each competence are presented in Table 3.

Key Competences for Lifelong Learning address a broad range of competences citizens need in educational, professional, and social settings throughout their lives. The framework emphasizes the competences in communication in the native and other languages, science, technology, engineering, and mathematics fields, digital technologies, interpersonal relations and learning strategies, civic and social life,

Table 3 Key Competences for Lifelong Learning (European Commission, 2019)

Competence	Brief description
1. Literacy competence	Communicating effectively with others in oral and written forms using audiovisual and digital materials
2. Multilingual competence	Communicating and interacting with others in oral and written forms in languages other than the mother tongue
3. Mathematical competence and competence in science, technology, and engineering	Mathematical competence is the ability to solve real-world problems using mathematical thinking and insight while competences in science, technology, and engineering refer to explaining the natural world by observation and experimentation and applying knowledge to human needs
4. Digital competence	Use of and engagement with digital technologies for various reasons including learning, employment, and participation in society
5. Personal, social, and learning to learn competence	Knowledge, skills, and attitudes relating to time management, working with others, and self-regulated learning
6. Citizenship competence	Acting a responsible citizen and participating in civic and social life
7. Entrepreneurship competence	Using opportunities and ideas to create cultural, social, and financial value for others
8. Cultural awareness and expression competence	Understanding and respecting the expression and communication of ideas and meaning in different cultures

entrepreneurship, and cultural awareness. While both the Digital Competence Framework for Citizens and Key Competences for Lifelong Learning were developed predominantly with adult citizens in mind, another set of competencies was developed to address the knowledge, skills, and attitudes students should possess in learning environments in the digital age. The student standards developed by the International Society for Technology in Education (ISTE) address knowledge, skills, and attitudes for students to achieve excellence in learning (ISTE, 2019). The standards have a broad application area that ranges from K-12 to higher education settings and include critical skills that enable students to become successful learners in the new century in various learning environments including open, distance, and digital education. The standards emphasize skills such as using technology to manage learning goals, taking advantage of the opportunities the digital world provides, constructing knowledge via digital tools, using technology in the design process, using technological methods to understand and address problems, communicating clearly and creatively, and collaborating effectively with local and global partners. An analysis of the skills included in the framework reveals that the appropriate application of the standards covers the learning process and potential

Table 4 ISTE Student Standards (ISTE, 2019)

Standard	Brief description
1. Empowered learner	Taking advantage of technology to assume an active role in managing learning goals
2. Digital citizen	Recognizing and acting upon the opportunities and responsibilities in terms of living, learning, and working that the interconnected digital world provides
3. Knowledge constructor	Collecting resources using digital tools to construct knowledge, create artifacts, and engage in learning experiences
4. Innovative designer	Using technologies in a design process to address problems by innovative solutions
5. Computational thinker	Developing and using strategies to understand and address problems by making use of the technological methods
6. Creative communicator	Communicating clearly and creatively via the methods applicable to the identified goals
7. Global collaborator	Collaborating with local and global partners effectively to expand perspective and enhance learning

stakeholders entirely and offers a smooth learning experience for the learner. The domains of ISTE student standards and a brief description for each domain are provided in Table 4.

Competencies in Open, Distance, and Digital Education Environments

Competency frameworks developed by organizations to date inform us about the knowledge, skills, and attitudes today's citizens should possess in order to achieve success in educational, professional, and social aspects of their lives. These frameworks also include critical competencies that institutions and education practitioners can make use of to ensure learner success in open, distance, and digital education. The novelty of the experiences that new learning environments offer and the learning activities that learners are expected to engage necessitate learners to possess certain competencies to fulfill the requirements of these learning environments. In this section, deriving from the frameworks developed and the learning activities a learner is expected to engage in open, distance, and digital education environments, a collection of competencies applicable to these settings is presented.

Information Literacy

Learners in open, distance, and digital education settings are expected to engage in a significant amount of information searching and retrieving tasks especially due to the autonomy that these learning environments inherently impose. Searching and retrieving information includes a number of skills to employ in the process. Learners should be able to conduct a search on the Internet using relevant keywords to identify information sources, obtain a copy of the learning content by downloading it on their device, and locate and access the learning content when needed. Information literacy is usually considered to consist of skills to access and obtain learning content; however, as mentioned in DigComp 2.1, it also entails the evaluation and management of information and learning content. Therefore, learners should be able to evaluate the accuracy and reliability of information retrieved from various sources via critical thinking and manage retrieved learning content by practicing content management skills such as controlling permissions, keeping different versions, and content organization.

Communication and Collaboration

Communication and collaboration are a must for all learning environments as learning experiences entail the exchange of ideas among instructors and learners and work to be completed by the joint efforts of multiple partners. Due to the importance of both communication and collaboration, relevant competencies are included especially in DigComp 2.1 and the ISTE student standards. Communication and collaboration are especially important in open, distance, and digital education due to the physical and psychological distance between learners and the instructor and among learners themselves. In addition to being effective communicators and collaborators in one-on-one and team settings, learners should be able to identify and use a variety of digital tools to interact with the instructor and their peers at a distant location, share content via email and cloud technologies, schedule and conduct online synchronous meetings, collaborate on projects using digital tools that allow simultaneous work among collaborators, use digital project management tools to manage tasks and follow deadlines, and resolve issues that may arise in the process. Similar competencies in the communication and collaboration domains are included in DigComp 2.1, Key Competences for Lifelong Learning, and ISTE Student Standards as well.

Design and Development

A learning experience requires learners to create original work for assessment purposes as well as to practice the performance in learning objectives. A growing number of students are using digital tools to design and develop content as a part of their enrollment in learning offerings. Open, distance, and digital education settings also entail a significant amount of design and development work using various digital tools and technology. While the complexity of the design and development activities varies among disciplines, learners in open, distance, and digital education settings should possess fundamental design and development competencies. At a minimum, a learner should be able to identify and use a variety of digital tools to design and develop original content and revise and remix existing content based on learning needs. Additionally, learners should be able to identify the copyright of existing digital content, evaluate its use for a specific purpose, and choose and apply a copyright license to their creations based on the sharing needs they identified. These competencies to use digital design and development tools and identify and apply appropriate copyright licenses allow learners to engage in effective and ethical design and development activities. The importance of design and development competencies is also evident in the inclusion of related knowledge, skills, and attitudes in DigComp 2.1 and the ISTE student standards.

Administration

A learning experience requires a certain amount of administrative work to be assumed by instructors and learners. While instructors can assume a significant number of administrative tasks and facilitate learners' performance in face-to-face learning settings, learners are expected to take over more responsibilities and manage their learning processes in open, distance, and digital education environments. Administrative tasks allow learners to follow their projected learning experience and reach their learning goals. Learners should be able to set clear and attainable goals, identify personal learning needs, and use digital tools to create, update, and follow a learning schedule. Learners who successfully manage their learning process will show a better use of cognitive, motivational, and behavioral resources.

Concluding Remarks

Similar to many aspects of society, educational environments are also going through an everlasting transformation to meet the needs of citizens of the current age. While these transformations bring opportunities to society, unintended disparities also result among individuals from different backgrounds. Today, we are fortunate to have access to learning opportunities provided by renowned scholars in the field of our interest while sitting at a desk in our homes, but the reality is that a significant number of learners do not have the required resources to engage in these learning experiences. A closer look into these disparities shows us that socioeconomic status and minority status are the determining factors of individuals' access to education. Individuals of low income, minorities, and underdeveloped or developing countries struggle with access to new learning environments due to the difficulties associated with technology ownership and access. This situation indirectly tells us that high-income and highly educated learners have access to more learning opportunities while those who need them the most struggle to create learning opportunities for themselves. The lack of access to new learning environments also results in the deficiency of competencies needed to succeed in open, distance, and digital education. This chapter explored the characteristics of learners in open, distance, and digital education with respect to their technology ownership and access and discussed competencies that should be possessed by learners in these settings deriving input from a number of competency frameworks that were developed to date.

References

Anderson, M. (2015). *Technology device ownership: 2015.* Pew Research Center. http://www.pewinternet.org/2015/10/29/technology-device-ownership-2015.

Anderson, M., & Perrin, A. (2018). *Nearly one-in-five teens can't always finish their homework because of the digital divide.* Pew Research Center. https://www.pewresearch.org/fact-tank/2018/10/26/nearly-one-in-five-teens-cant-always-finish-their-homework-because-of-the-digital-divide.

Baller, S., Dutta, S., & Lanvin, B. (2016). *The global information technology report 2016: Innovation in the digital economy.* Geneva, Switzerland: World Economic Forum. https://www.weforum.org/reports/the-global-information-technology-report-2016.

Banerjee, M. (2020). An exploratory study of online equity: Differential levels of technological access and technological efficacy among underserved and underrepresented student populations in higher education. *Interdisciplinary Journal of e-Skills and Lifelong Learning, 16*, 93–121. https://doi.org/10.28945/4664.

Beaunoyer, E., Dupéré, S., & Guitton, M. J. (2020). COVID-19 and digital inequalities: Reciprocal impacts and mitigation strategies. *Computers in Human Behavior, 111*. https://doi.org/10.1016/j.chb.2020.106424.

Bergdahl, N., Nouri, J., & Fors, U. (2020). Disengagement, engagement and digital skills in technology-enhanced learning. *Education and Information Technologies, 25*, 957–983. https://doi.org/10.1007/s10639-019-09998-w.

Carretero, S., Vuorikari, R., & Punie, Y. (2017). *DigComp 2.1: The digital competence framework for citizens with eight proficiency levels and examples of use. Joint Research Center, European Commission*. Luxembourg: Publications Office of the European Union. https://doi.org/10.2760/836968.

DeSantis, J. (2022). Accelerating student engagement with asynchronous online debates. *College Teaching.* https://doi.org/10.1080/87567555.2022.2027857.

European Commission. (2019). *Key competences for lifelong learning.* Luxembourg: Publications Office of the European Union. https://doi.org/10.2766/569540.

Gonzales, A. (2016). The contemporary US digital divide: From initial access to technology maintenance. *Information, Communication & Society, 19*(2), 234–248. https://doi.org/10.1080/1369118X.2015.1050438.

He, T., & Zhu, C. (2017). Digital informal learning among Chinese university students: The effects of digital competence and personal factors. *International Journal of Educational Technology in Higher Education, 14*(44). https://doi.org/10.1186/s41239-017-0082-x.

Heidari, E., Mehrvarz, M., Marzooghi, R., & Stoyanov, S. (2021). The role of digital informal learning in the relationship between students' digital competence and academic engagement during the COVID-19 pandemic. *Journal of Computer Assisted Learning*, 1–13. https://doi.org/10.1111/jcal.12553.

Horvat, A., Dobrota, M., Krsmanovic, M., & Cudanov, M. (2015). Student perception of Moodle learning management system: A satisfaction and significance analysis. *Interactive Learning Environments, 23*(4), 515–527. https://doi.org/10.1080/10494820.2013.788033.

Hosein, A., Ramanau, R., & Jones, C. (2010). Learning and living technologies: A longitudinal study of first-year students' frequency and competence in the use of ICT. *Learning, Media and Technology, 35*(4), 403–418. https://doi.org/10.1080/17439884.2010.529913.

Ironsi, C. S. (2021). Google Meet as a synchronous language learning tool for emergency online distant learning during the COVID-19 pandemic: Perceptions of language instructors and preservice teachers. *Journal of Applied Research in Higher Education, 14*(2), 640–659. https://doi.org/10.1108/JARHE-04-2020-0085.

ISTE. (2019). ISTE Standards*.* International Society for Technology in Education. https://www.iste.org/standards/iste-standards-for-students.

Kuo, Y.-C. (2018). An exploratory study of minority students' technology usage and perceptions of technology: Nontraditional adult students in technology-based environments. *Journal of Research on Technology in Education, 50*(4), 350–364. https://doi.org/10.1080/15391523.2018.1522984.

Magda, A. J., & Aslanian, C. B. (2018). *Online college students 2018: Comprehensive data on demands and preferences*. Louisville, KY: The Learning House, Inc.

Mossberger, K., Kaplan, D., & Gilbert, M. A. (2008). Going online without easy access: A tale of three cities. *Journal of Urban Affairs, 30*(5), 469–488. https://doi.org/10.1111/j.1467-9906.2008.00414.x.

Mossberger, K., Tolbert, C. J., & Gilbert, M. (2006). Race, place, and information technology. *Urban Affairs Review, 41*(5), 583–620. https://doi.org/10.1177/1078087405283511.

Perrin, A. (2021). *Mobile technology and home broadband* 2021. Pew Research Center. https://www.pewresearch.org/internet/2021/06/03/mobile-technology-and-home-broadband-2021.

Powell, A., Bryne, A., & Dailey, D. (2010). The essential internet: Digital exclusion in low-income American communities. *Policy & Internet, 2*(2), 161–192. https://doi.org/10.2202/1944-2866.1058.

Richey, R. C., Fields, D. C., & Foxon, M. (2001). *Instructional design competencies: The standards* (3rd ed.). Syracuse, NY: ERIC Clearinghouse on Information and Technology.

Rowsell, J., Morrell, E., & Alvermann, D. E. (2017). Confronting the digital divide: Debunking brave new world discourses. *The Reading Teacher, 71*(2), 157–165. https://doi.org/10.1002/trtr.1603.

Rubinstein-Avila, E., & Sartori, A. (2016). Diversification and nuanced inequities in digital media use in the United States. In B. Guzzetti & M. Lesley (Eds.), *Handbook of research on the societal impact of digital media* (pp. 560–580). Hershey, PA: IGI Global. https://doi.org/10.4018/978-1-4666-8310-5.ch022.

Statista. (2021). How do you mainly access the internet at home? Statista. https://www.statista.com/forecasts/997163/internet-access-by-type-in-the-us

Sullivan, P. (2021). Leveraging the power of Google Apps to support active learning in a synchronous online environment. *International Journal of Mathematical Education in Science and Technology, 53*(3), 610–618.

Trucano, M. (2013). *Big educational laptop and tablet projects: Ten countries to learn from.* https://blogs.worldbank.org/edutech/big-educational-laptop-and-tablet-projects-ten-countries

Tsetsi, E., & Rains, S. A. (2017). Smartphone Internet access and use: Extending the digital divide and usage gap. *Mobile Media & Communication, 5*(3), 239–255. https://doi.org/10.1177/2050157917708329.

Vogels, E. A. (2021). *Digital divide persists even as Americans with lower incomes make gains in tech adoption.* Pew Research Center. https://www.pewresearch.org/fact-tank/2021/06/22/digital-divide-persists-even-as-americans-with-lower-incomes-make-gains-in-tech-adoption

Warschauer, M., & Matuchniak, T. (2010). New technology and digital worlds: Analyzing evidence of equity in access, use, and outcomes. *Review of Research in Education, 34*, 179–225. https://doi.org/10.3102/0091732X09349791.

We Are Social, Hootsuite, & DataReportal. (2022). *Global internet penetration rate as of January 2022, by region.* https://www.statista.com/statistics/269329/penetration-rate-of-the-internet-by-region/

Yerdelen-Damar, S., Boz, Y., & Aydın-Günbahar, S. (2017). Mediated effects of technology competencies and experiences on relations among attitudes towards technology use, technology ownership, and self efficacy about Technological Pedagogical Content Knowledge. *Journal of Science Education and Technology, 26*, 394–405. https://doi.org/10.1007/s10956-017-9687-z.

Zickuhr, K., & Smith, A. (2012). *Digital differences.* Pew Research Center. https://www.pewresearch.org/internet/2012/04/13/digital-differences/

54 Motivation to Learn in Open, Distance, and Digital Education

Luke K. Fryer, Alex Shum, and Kaori Nakao

Contents

Abstract

As research questions in the rapidly growing field of Open, Distance, and Digital Education shift from if to how these forums should be approached, a paramount

L. K. Fryer (✉) · A. Shum
Faculty of Science, The University of Hong Kong, Hong Kong, Hong Kong
e-mail: fryer@hku.hk; alexshum@hku.hk

K. Nakao
Seinan Gakuin University, Fukuoka, Japan
e-mail: k-nakao@seinan-gu.ac.jp

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_52

and complementary area of research is the accompanying motivation students' exhibit to learn in ODDE environments. This chapter critically examines the existing literature on student motivation in ODDE at each of the primary, secondary, and tertiary levels, and beyond. Much existing research involves one-off comparisons between students' motivation in using popular tools such as MOOCs, gamification of learning, interactive whiteboards, and AR/VR tools with not using them. While mixed effects have been observed, seldom are tools catered to theory and context in a manner that best supports students' learning. To see the field continue to mature, results from studies must be situated within robust theories of motivation in educational psychology. More program-level research built on more stringent standards in design, analysis, and replication is required. Future directions of research are discussed.

Keywords

Digital education · Distance education · Motivation · Elementary school · Secondary school, Tertiary education

Introduction

This chapter addresses the role of student motivation within ODDE environments and the implications of ODDE environments for student motivation. This reciprocal relationship between environment and individual differences is one that is still poorly understood, even in the long-researched context of face-to-face teaching and learning (for robust theoretical modelling of this relationship consider reciprocal framing by Bandura, 1997; Biggs, 1993; Skinner, 1995). Given that research in ODDE environments is a relatively nascent field, much of what will be presented will not have been replicated across contexts, making the review presented here a preliminary sketch much in need of color and shading. Additionally, many ODDE researchers often do not have a firm foundation in educational psychology, ODDE's intersections with student motivation can yield theoretically weak research outputs. This chapter highlights research which demonstrates the best theoretical and empirical rigor available. It begins by defining motivation, and then reviews ODDE in three main sections, addressing motivation to learn in each of primary, secondary, and tertiary/adult education contexts. These reviews are then summarized in the form of critical insights that inform theory and practice. The chapter concludes with future directions for researching ODDE motivation.

Motivation and Its Outcomes in ODDE Environments

Motivation Definition and Framework for Interpretation

This chapter is situated in the succinct and well-established definition presented by Brophy (2004) as a summary of Maehr and Meyer's (1997) seminal review of motivation research: "Motivation is a theoretical construct used to explain the initiation, direction, intensity, persistence, and quality of behaviour, especially goal-directed behaviour" (p. 3). This definition is broad, covering each of the mediated behaviors through which an individual's motivation impacts learning outcomes. It provides five specific, if overlapping, lenses for examining motivations in ODDE environments. This hopefully reminds researchers that motivation is not a nebulous source of locomotion for students, but that motivation instead has impact on at least five components of the learning process. This is particularly important for researchers focused just on one motivational theory and its implications for learning. It is very unlikely that one theory could address all five components (i.e., initiation, direction, intensity, persistence, and quality of behavior). It is also unlikely that any one theory addresses the needs of the wide array of ODDE environments effectively. A collage of robust theories is necessary to comprehensively address each component and offer any sensitivity to ODDE environments.

Motivation Theories Central to Understanding ODDE Experiences

As noted at the outset, there are a dizzying multitude of motivational theories for ODDE researchers and practitioners to draw upon. Both practical considerations and convenience play important roles when determining which theories to employ to investigate ODDE environments. For educational technology researchers, selecting a motivational theory is likely to be based on a combination of what is being used in target journals for their research and the relative convenience of available instruments. This means that motivational theories which got an early start in leading educational technology journals such as *Computers & Education* and *Internet and Higher Education*, including self-determination theory (Deci & Ryan, 1985) and self-regulation related models (e.g., Barnard, Lan, To, Paton, & Lai, 2009) have grown in prominence. Educational psychology orientated researchers in contrast often come to educational technology research with a preferred theory, looking to test and establish it in this new environment. Scant educational technology research puts the environment or learning related research questions at its heart. Even less research seeks to address the five aspects of the learning process that motivation in large part explains. It is more common for educational technology research to focus on technology and treat teaching and learning theory secondarily (Hew, Lan, Tang, Jia, & Lo, 2019).

This chapter reviews the wide variety of digital environments encompassed by ODDE and engages with educational contexts ranging from primary to tertiary and beyond. A large net was cast for the selection of the published research to include. However, this review seeks to connect this research to the five areas consistent with Brophy's (2004) definition and will return to this definition in its summary. Furthermore, an emphasis is given to research that matches context, questions, and theory in a way that provides robust direction for practitioners and a foundation for further replication and extension of research.

Motivation in Open, Digital and Distance Education

Primary Education

The focus of a considerable proportion of early ODDE research was on whether digital education was substantively useful to elementary school students. Research reviewing the benefits of ICT for elementary school students supported the inclusion of digital education, citing the potential for supporting student-student and teacher-student relationships in the classroom (Cooper & Brna, 2002; Wegerif & Scrimshaw, 1997). This research also suggested that the well-integrated use of ICT can enhance motivation and thereby support longer-term engagement with subject studies. Research tests of the efficacy of e-mail exchanges in elementary school were a strong example of how individual students and groups of students can be connected, and their communication skills be enhanced (van der Meij & Boersma, 2002).

As ICT became more prominent in elementary school contexts, a considerable proportion of ODDE research shifted to testing a broad range of digital tools' and applications' efficacy for supporting learning outcomes and motivations to learn. Many of these studies employed weak research designs and were under-theorized (i.e., cross-sectional correlative or simple quasi-experimental such as traditional teaching vs new e-learning) leading to Hawthorne effects and inability to even hint at causal implications. Results often failed to provide effect sizes, focusing only on "significant effects," therefore giving an inadequate sense of the impact of interventions.

Building on early research exploring e-mail as a connecting tool for digital education during elementary school, research during the past two decades has worked to integrate video conferencing into elementary school digital education. The benefits traverse the broad range of simply enabling communications in schools (e.g., Anastasiades et al., 2010) and motivating students to broaden their social connections, to supporting the learning of new languages (e.g., Whyte, 2011). During and since the COVID-19 pandemic, there has been an explosion of research in this area but mostly addressing the practical demands of its delivery methods, with only tangential interest in impact on students' motivation (e.g., Moorhouse & Beaumont, 2020).

Gamification is often seen as the best and maybe easiest possible way to motivate primary school students in ODDE environments. Some of the most direct research assesses the impact of adding gaming to specific subject study. Shin, Sutherland, Norris, and Soloway (2012) is an unusually strong example of a robust test, adding games to math studies, indicating that well-structured gamification can add to students' motivation, engagement, and learning outcomes. Results are strengthened by other simpler comparative studies (i.e., traditional classroom vs. online gamification; e.g., Tüzün, Yilmaz-Soylu, Karakuş, Inal, & Kizilkaya, 2009) pointing to the potentially untapped and misunderstood benefits of gamification for digital education in primary schools. The way forward is being forged by studies pairing gamification with other learning tactics (Chen, Liu, & Hwang, 2016), and testing the efficacy of specific online experiences' power to motivate students' through self-determination theory's intrinsic and extrinsic motivation framework (e.g., online escape rooms; Vidergor, 2021).

In primary school environments, motivational ODDE can also support opening new doorways through experiential learning affordances (e.g., AR, VR, or livestreaming; Radu et al., 2014). Ongoing research suggests the growing consensus that digital education has much to offer student motivation and that it will be a progressively critical gear in the educational engine for the coming decades.

Secondary School

In contrast to research on elementary school digital education, considerably less literature has focused on whether ICT is appropriate for classrooms. This has as much to do with the nature of secondary education (focused on specific knowledge development) as it does with students' increased knowledge of and access to ICT. While there are differences, there are also substantial overlaps between elementary and secondary research, with many studies covering both contexts (e.g., Taylor, Casto, & Walls, 2007) and major reviews generally lumping them together. Many of the same motivational questions are being asked, such as whether gamification is a solution to students' motivational malaise or whiteboards are worth the expense. At the same time, secondary schools are on the forefront of issues such as the full adoption of tablets and the use of mobile tools to enhance learning and collaboration at school (Courtois et al., 2014).

Gamification and Augmented and Virtual Reality (A/VR) (sometimes paired) have historically been the focus of a substantial body of digital education research in secondary schools (Perrotta, Featherstone, Aston, & Houghton, 2013). Much of the research centers on how these digital education approaches support motivation, as well as engagement and knowledge related learning outcomes. Early reviews of gamification within education have heralded its central role in stimulating and sustaining motivation (Shaffer, Squir, Halverson, & Gee, 2005). Shaffer et al., go so far as to proclaim that questions of *whether* to use gamification should be put aside, and that the only meaningful question going forward is *how* to use it. In contrast to this positive tone from gamification researchers, many stakeholders do not see games as valid parts of classroom learning and note that teachers are often not a good judge of a "good" game design (Williamson, 2007). Gamification research regularly yields no significant benefit for students' motivation, often citing technical issues (e.g., Huizenga, Admiraal, Akkerman, & ten Dam, 2019) or sense of disconnect (leading to lower educational value) from subject materials (Brom, Preuss, & Klement, 2011). Despite these types of issues, reviews such as McClarty et al. (2012) echo Shaffer et al. (2005). McClarty et al., argue that digital games afford unique and valuable combinations of "...motivation, engagement, adaptivity, simulation, collaboration..."(p. 22). In this spirit, researchers have started to begin to re-examine how digital gaming might fit into secondary education by learning more about students' habits and preferences (e.g., Beavis, Muspratt, & Thompson, 2015). Others have begun to situate digital gaming questions within well-defined motivational theories (e.g., Huizenga et al., 2019).

Despite more than a decade of increasingly intensive use, AR/VR are still emerging technologies for secondary education. Their support for secondary student motivation can be moderately positive (Allison, 2008; Gandolfi, 2018). AR/VR appear to be most powerful when used with specific teaching methods (i.e., narrative, Calvert & Abadia, 2020), for skills development (Papanastasiou, Drigas, Skianis, Lytras, & Papanastasiou, 2019) and for complexity visualization (Thompson et al., 2020). It is reasonable to suggest that when AR/VR use is aligned well with supporting pedagogical practices and knowledge to be acquired, that its motivating capacity is also maximized.

Tertiary and Lifelong Education

The abundance of ODDE motivation research in tertiary and lifelong education has yielded both benefits and weaknesses, which has led to a stream of more robust theory-driven research in this area. Concurrently, much of the ongoing quantity of research is of low quality, limited in validity and insight.

There is a considerable amount of higher education ODDE research comparing face-to-face and blended or entirely online learning experiences and resulting motivations to learn. Specific research comparing the use of online applications for these populations sometimes result in unusual findings (e.g., Pellas & Kazanidis, 2014) pointing to high self-efficacy and satisfaction in some online environments (relative to hybrid arrangements). More general tests of the student experience on and offline generally point to students being more motivated offline, although not necessarily perceiving themselves to be more self-efficacious (e.g., Mullen & Tallent-Runnels, 2006). However, comparisons of graduate and undergraduate students online suggest that graduate students engage more effectively online while procrastinating less, and that undergraduate students experience greater task value for online learning, expressing a stronger intention to enroll in future online courses (Artino & Stephens, 2009). Some of the more insightful research points to the positive (interesting) and negative (distracting) aspects of studying online (Sansone, Smith, Thoman, & MacNamara, 2012).

Drilling down on motivational issues in general digital education, a program of self-determination theory research with blended language students raised three issues worth noting. First, students who are autonomously motivated tend to stay that way, but those that are not have room and can improve and develop their motivation (Fryer, Nicholas Bovee, & Nakao, 2014). Second, classroom teachers can have a powerful impact on students' motivation for online learning (Fryer & Bovee, 2016), but have more difficulty beyond a certain threshold of actual student competence (Fryer & Bovee, 2018). Parallel research has highlighted the cost-value differences when studying online (e.g., workload for face-to-face vs. working in groups for online), and the role these trade-offs play in persistence (Vanslambrouck, Zhu, Lombaerts, Philipsen, & Tondeur, 2018).

The theme of collaboration is central to digital education research and motivation to learn online. Researchers range from creating and testing online tools (Antonaci et al., 2015), noting motivation derived from collaborative Wikis (Zou, Wang, &

Xing, 2016), to suggesting that more motivation might not necessarily be any more linked to collaborating online (Zhang, Pi, Li, & Hu, 2021).

Perhaps the most important kind of research seeking to navigate online students' motivation is the work that straddles tertiary and adult/lifelong learning. Research that seeks to explain how the modality of the online experience and its affordance/constraints motivates, engages, and results in learners' performance. McPartlan, Rutherford, Rodriguez, Shaffer, and Holton (2021) explain how strictly online tertiary students often differ from tertiary students in blended or face-to-face contexts; how online students are generally studying for very different reasons, have less time to reach their goals and on average fare worse.

Another popular area of motivational research that bridges tertiary and adult/lifelong ODDE are MOOCs. MOOCs are so reliant on student motivation (and resulting retention), that it is often the focus of research in this area (Zhu, Sari, & Lee, 2018). There is evidence to suggest that the autonomous nature of MOOCs can mean that students' motivation and goals shape how they understand MOOCs and their experience online (Littlejohn, Hood, Milligan, & Mustain, 2016). This finding should be cross-referenced with results suggesting that the impact of participation in and initial intrinsic motivation for a MOOC is at least partially mediated by the situational interest students experience across the MOOC course (de Barba, Kennedy, & Ainley, 2016).

Students have reported engaging in MOOCs for a handful of specific reasons (e.g., Hew & Cheung, 2014). However, different kinds of students completing MOOCs have very different orientations across the learning experience (Watted & Barak, 2018): university-affiliated students tend to seek knowledge and certificates, while general participants often work toward research and their own professional development. These pair of findings make understanding students' motivations for learning in MOOC environments (initial and across the experience) critical to solving retention issues.

Gamification is an active area of motivational research in digital tertiary environments. Unlike in some areas of tertiary ODDE research, higher quality research is not as prevalent. Results are still often simple comparisons of gamified vs traditional engagement and rely on self-reported data for independent and dependent variables (e.g., Putz, Hofbauer, & Treiblmaier, 2020). Some studies in this vein are, however, applying more rigorous motivational frameworks (e.g., Buil, Catalán, & Martínez, 2020). However, it is still common for studies, much like those in secondary and primary contexts, to find gamification failing to support student motivation and/or achievement, even weakening one or both (see Donnermann et al., 2021; Murillo-Zamorano, López Sánchez, Godoy-Caballero, & Bueno Muñoz, 2021).

Pedagogical agents for online learning materials can improve motivation, engagement, and knowledge development (e.g., Dinçer & Doğanay, 2017). Research seeking to refine pedagogical agents as a source of support for students has proliferated during the past decade (e.g., Lin, Atkinson, Christopherson, Joseph, & Harrison, 2013). Similarly, gesturing (embodied) pedagogical agents are a substantial improvement over static versions (Wang, Li, Mayer, & Liu, 2018). Early research findings with chatbots as language learning partners (Fryer & Carpenter, 2006) noted that some, especially weaker, students were more motivated to engage with a chatbot than a partner. Despite the growth of research in this area (Fryer et al., 2020; Wollny et al., 2021) and the broad recognition that, like pedagogical agents, chatbots can be motivating (Fryer, Nakao, & Thompson, 2019), there has not been enough refinement-orientated research (e.g., for an important exception Li, Wang, Mayer, & Liu, 2019).

Critical Insights from Researching Motivation in ODDE

General Insights

ODDE Has Matured

The field has matured, as questions shift from whether ICT is of any use to education, to how specific aspects should be employed within ODDE contexts. Gamification is a good example of this development. While gamification' s value as a support for ODDE is still often debated, many researchers have shifted to acknowledging that gamification is here to stay. Therefore, ongoing questions should focus on the kinds of contexts in which gamification should be used, and how individual differences can be accounted for.

Context and Individual Differences

Consistent with the example of gamification, motivational research in ODDE environments must move past the idea that any specific piece of hardware or software will be a silver bullet for student motivation. Furthermore, it is rare that a new tool is focused only on enhancing motivation; the hope is generally that it will also yield strong knowledge outcomes as well. Research thus far suggests that findings are likely to be localized; where motivational supports cross contextual boundaries, support for learning outcomes might not. As will be discussed in the conclusion to this chapter, one way the external validity of findings might be buttressed is by consistently employing robust motivational theory and clearly building on past research both in ODDE and parallel classroom contexts.

Specific to Primary Education

Questions regarding the value of gamification for supporting motivation in digital education abound are particularly acute in primary education. The variance around findings suggests gamification might not be easy to modulate for young learners. The clarification of modulation approaches would support researchers in investigating and supporting the development of student motivation.

In contrast, online tools that effectively increase and enhance social interaction are a relatively clear path to supporting primary school student motivation on and offline. Especially, in the aftermath of COVID-19, it is critical that positive findings showing how students can be brought together effectively be shared and collaboratively be built upon. Continued research in this vein should support classroom motivation as well as in blended environments.

The research on tools that bring digital education to classrooms such as whiteboards are broadly supported by research, teachers, and students alike. Given the substantial investment made by many schools, and the motivational implications hinted at by exploratory studies, researchers should begin to apply stricter theory and design, to begin testing specific practices, and ensure teachers and students maximize their use.

Particularly in primary school settings, several important factors moderate the motivating potential of digital education tools. The first is one that has been discussed extensively, teacher ICT proficiency (often packaged as TPAK; Koehler & Mishra, 2009). Researchers can further the field by clarifying the correspondences between specific teacher ICT proficiencies to their relevant digital education environments. Students' subject competence and their ICT proficiency are also critical moderators for enhancing digital education motivation. Both of these deserve greater attention, by programs of research, rather than once-off explorations.

Specific to Secondary Education

Some of the best AR and VR research has sought to support motivation and learning outcomes across specific, often challenging secondary school learning experiences. Due in part to carefully situated use of AR/VR, many modest but positive outcomes have been reported. Across this research a few findings have the potential for external validity, providing direction for future research. The first is the power of AR/VR to support learners across complex topics, such as visualizing intricate objects or processes. The second for VR in particular, is the opportunity for socialization. This socialization can amplify classroom experiences or expand on them. There is, as always, a need to match AR/VR use carefully with curricular aims and ensure teaching methods applied through this medium are appropriate, rather than relying on it or treating it as something completely different from classroom practice. Similar to AR/VR, secondary school is a hotbed for gamification. As noted earlier, gamification has progressed beyond *whether it should* be applied in secondary education. Its unreliable contribution to motivation and learning outcomes can be attributed partly to poor design and situation. Future programs of research in specific learning contexts found to be amenable to gamification are necessary for this approach to supporting motivation in ODDE to find its place.

Specific to Tertiary and Adult Education

While flipped learning has its roots in secondary education, tertiary education has quickly made it its own. The field is now substantial enough to yield several comprehensive reviews which point to this online support for classroom engagement as a consistent support for student motivation and positive attitudes, but not necessarily for learning outcomes. Research has long ago, and now more recently, noted that not all areas of learning are conducive to being effectively transferred to video. That said, separate from flipped learning specifically, recent reviews of recording of classes and class materials have demonstrated broad small to moderate benefits to students (Noetel et al., 2021). Flipped learning is one area of ostensibly online research where more classroom research, rather than online research, is needed. The benefit of moving more material online (and out of the class) is that more time in class can be devoted to engage students in meaningful learning. Figuring out how to use that time effectively is likely the gap between small to large benefits to students' motivation and knowledge outcomes.

Some of the best research bridging tertiary and adult lifelong learning has highlighted very different goals these populations have and the resulting motivations that support them in succeeding. More research is necessary to better understand and adapt tertiary offerings for adults to meet their specific lifestyle and motivational needs. MOOCs which serve both populations of students could benefit from this kind of research and adapt their offerings in a manner to support these diverse groups of learners more effectively.

Open Questions and Directions for Future Research

When Will Motivational Theory Be Stretched to Fit ODDE Experiences?

In the vast majority of cases, new motivational theory, specific to ODDE is not needed. Existing motivation theory needs to either be applied within its limits (see Fryer and colleagues applying self-determination theory) or, even better, carefully adapted and built upon to address ODDE specific questions (see Mayer and Colleagues work applying cognitive load theory to multimedia). Both approaches demand programmatic research and cutting-edge research design/analyses to be effective.

It is worth highlighting the contributions of educational psychology theory-driven research. In place of researching "motivation," which is more common in primary and secondary contexts, specific theories are increasingly drawn upon for research questions in tertiary contexts. From clear to more diffused, Skinner et al.'s (1995) self-theory has been drawn up to examine simulations (Buil et al., 2020); Self-Determination Theory (Deci & Ryan, 1985) is increasingly employed to explore student motivation online (e.g., Fryer & Bovee, 2018); various models of self-regulation are used to explore procrastination (Cheng & Xie, 2021); or, in some cases, a constellation of psychological constructs (and theories) is grouped to test ODDE questions. What these efforts often lack, however, is a connected program of sustained research or even any concerted effort at building on previous work in the same or parallel areas.

When Will Digital Education's Affordances Really Drive Life-Long Learning?

When will digital education really start to impact life-long learning? How is motivation for ODDE different for adult and life-long learning and how can it be supported best? These questions are not meaningfully addressed by MOOCs and tertiary education broadly. This is partly due to lack of robust theory being applied to programmatic research, and financial viability. The corporate sector, which has been investing in digital education for its employees' continuing professional development might be an area to learn from going forward.

When Will Gamification's Potential Contributions Be Clarified?

As has been noted across this chapter, gamification is here to stay. Programs of research are needed now at each level of education and in some cases in specific subject areas. These programs need to apply robust motivational theory, research design, and analysis to progressively test the affordances and constraints of gamification for the support of short and long-term motivation in ODDE environments. Furthermore, the propensity of gamification for supporting different facets of motivation as laid out by Maehr and Meyer (initiation, direction, intensity, persistence, and quality of behavior, especially goal-directed behavior; 1997) should be tested to clarify the strengths and weaknesses of gamification.

Doing More of What We Know Works

It is time for ODDE motivation-orientated researchers to realize that educational technology is a *sub*-applied science that relies on educational psychology, in the way that educational psychology relies on psychology. Both research and practice should direct its efforts toward applying educational technology toward education in a manner we know works, because it is already supported by theory and a sound empirical base. Educational technology researchers need go no further than recent meta-analyses and reviews (e.g., Dunlosky, Rawson, Marsh, Nathan, & Willingham, 2013; Hattie & Anderman, 2019; Richardson, Abraham, & Bond, 2012) for high impact theoretical constructs, and the learning and instructional practices they build upon. Examples of strong areas highlighted consistently are academic self-efficacy, feedback, meta-cognitive strategies, formative testing, summarization, practice tests, spaced learning, interleaved learning, and reciprocal teaching.

Implications for ODDE Practice that Arise from this Research

Robust Motivational Theories for the Road Ahead

Researchers might consider giving special attention to three motivational theories which have been conceptually and empirically validated both online and in classrooms. These theories are consistent with the five motivational behaviors reviewed and are relevant to the aims toward which educational technology is employed. First is self-determination theory (Deci & Ryan, 1985) and specifically its continuum of value from lacking regulation (amotivation), to external regulation (extrinsic motivation), and finally internal regulation (intrinsic motivation). This organization of value can explain variance in learning behaviors such as initiation, direction, and quality. It also spans learners avoiding (amotivation), being forced to (extrinsic), and seeking to (intrinsic) learn online. The second, is social cognitive theory (Bandura, 1993), specifically self-efficacy and its model of reciprocal determination. Self-efficacy is central to understanding learner persistence (Bandura, 1993) and the model of reciprocal determination is useful for understanding how the environment and learner behaviors affect future motivation. Finally, interest, specifically the Four Phase Model of interest (Hidi & Renninger, 2006), is one of just a few developmental models which can contribute explanatory power to the full gamut of learning behaviors (i.e., all five within Maher and Mayer's definition). This is dependent on the phase of interest (Stimulated, Maintained, Emerging, and Well developed Individual) the individual experiences for the material's (object) understudy.

ODDE Motivation Research Design and Analysis Must Improve to Be Substantive

The use of robust motivational theories is a necessary but not sufficient step toward substantively improving ODDE research and learning outcomes. Based on the present review of the recent ODDE motivation research literature three recommendations standout. First, interventions must stop comparing a new digital addition to traditional classroom teaching with traditional classroom teaching (i.e., doing nothing new). This sets up the very likely chance of a Hawthorne effect, making all findings from the prospective study suspect. At the very least, two separate additions to traditional teaching should be compared and if possible, the traditional classroom should be added as a second control (e.g., 2×2 experimental design; Donnermann et al., 2021). The second recommendation is the greater use of intensive longitudinal designs (Fryer, Ainley, Thompson, Gibson, & Sherlock, 2017; Fryer et al., 2019). One great benefit of researching ODDE is the relative ease with which data can be collected. The third and final recommendation is that observed outcomes be included in research designs and that effect sizes for all findings are presented in publications.

Stop Asking Whether and Start Asking for Whom and How

Echoing many prominent contributors to the field of ODDE, it is time for researchers and educators alike to stop asking whether digital education has a place in schools and begin recognizing that these tools are here to stay. Some tools like interactive whiteboards, demand considerable time on the part of both educators (teachers and curriculum developers) to integrate effectively into classes. Others like gamification, augmented and virtual reality need context specific development, testing, and refinement to estimate their compatibility. There is a third type of ODDE development that gets far less attention and that is development aimed at addressing educational issues raised by the research literature more broadly. For example, meta-analyses (e.g., Hattie & Anderman, 2019) and strategic reviews (e.g., Dunlosky et al., 2013) have consistently raised spaced learning and formative testing as powerful sources of support for teaching and learning, yet few ODDE developers, let alone researchers work in these areas. Another interesting area is interleaved learning, which although interesting and promising, presents challenges to research with traditional textbook approaches.

There is still much to do, with many avenues unexplored. ODDE has the potential to make substantial contributions to students' motivation to learn at every stage of their lives. Developers, educators, and researchers will need to work together to bring this future to our present.

References

Allison, J. (2008). History educators and the challenge of immersive pasts: A critical review of virtual reality "tools" and history pedagogy. *Learning, Media and Technology, 33*(4), 343–352. https://doi.org/10.1080/17439880802497099.

Anastasiades, P. S., Filippousis, G., Karvunis, L., Siakas, S., Tomazinakis, A., Giza, P., & Mastoraki, H. (2010). Interactive Videoconferencing for collaborative learning at a distance in the school of 21st century: A case study in elementary schools in Greece. *Computers and Education, 54*(2), 321–339. https://doi.org/10.1016/j.compedu.2009.08.016.

Antonaci, A., Dagnino, F. M., Ott, M., Bellotti, F., Berta, R., De Gloria, A., . . . Mayer, I. (2015). A gamified collaborative course in entrepreneurship: Focus on objectives and tools. *Computers in Human Behavior, 51*, 1276–1283. https://doi.org/10.1016/j.chb.2014.11.082.

Artino, A. R., & Stephens, J. M. (2009). Academic motivation and self-regulation: A comparative analysis of undergraduate and graduate students learning online. *Internet and Higher Education, 12*(3–4), 146–151. https://doi.org/10.1016/j.iheduc.2009.02.001.

Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. *Educational Psychologist, 28*(2), 117–148. https://doi.org/10.1207/s15326985ep2802_3.

Bandura, A. (1997). Self-efficacy: The exercise of control. New York: Freeman.

Barnard, L., Lan, W. Y., To, Y. M., Paton, V. O., & Lai, S. L. (2009). Measuring self-regulation in online and blended learning environments. *The Internet and Higher Education, 12*(1), 1–6. https://doi.org/10.1016/j.iheduc.2008.10.005.

Beavis, C., Muspratt, S., & Thompson, R. (2015). 'Computer games can get your brain working': student experience and perceptions of digital games in the classroom. *Learning, Media and Technology, 40*(1), 21–42. https://doi.org/10.1080/17439884.2014.904339.

Biggs, J. B. (1993). From theory to practice: A cognitive systems approach. *Higher Education Research and Development, 12*(1), 73–85. https://doi.org/10.1080/0729436930120107.

Brom, C., Preuss, M., & Klement, D. (2011). Are educational computer micro-games engaging and effective for knowledge acquisition at high-schools? A quasi-experimental study. *Computers and Education, 57*(3), 1971–1988. https://doi.org/10.1016/j.compedu.2011.04.007.

Brophy, J. (2004). *Motivating students to learn* (2nd ed.). Routledge. https://doi.org/10.4324/9781410610218.

Buil, I., Catalán, S., & Martínez, E. (2020). Engagement in business simulation games: A self-system model of motivational development. *British Journal of Educational Technology, 51*(1), 297–311. https://doi.org/10.1111/bjet.12762.

Calvert, J., & Abadia, R. (2020). Impact of immersing university and high school students in educational linear narratives using virtual reality technology. *Computers and Education, 159*. https://doi.org/10.1016/j.compedu.2020.104005.

Cheng, S. L., & Xie, K. (2021). Why college students procrastinate in online courses: A self-regulated learning perspective. *The Internet and Higher Education, 50*, 100807.

Chen, C. H., Liu, G. Z., & Hwang, G. J. (2016). Interaction between gaming and multistage guiding strategies on students' field trip mobile learning performance and motivation. *British Journal of Educational Technology, 47*(6), 1032–1050. https://doi.org/10.1111/bjet.12270.
Cooper, B., & Brna, P. (2002). Supporting high quality interaction and motivation in the classroom using ICT: The social and emotional learning and engagement in the NIMIS project. *Education, Communication & Information, 2*(2–3), 113–138. https://doi.org/10.1080/1463631021000025321.001.
Courtois, C., Montrieux, H., de Grove, F., Raes, A., de Marez, L., & Schellens, T. (2014). Student acceptance of tablet devices in secondary education: A three-wave longitudinal cross-lagged case study. *Computers in Human Behavior, 35*, 278–286. https://doi.org/10.1016/j.chb.2014.03.017.
de Barba, P. G., Kennedy, G. E., & Ainley, M. D. (2016). The role of students' motivation and participation in predicting performance in a MOOC. *Journal of Computer Assisted Learning, 32*(3), 218–231. https://doi.org/10.1111/jcal.12130.
Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York, NY: Plenum.
Dinçer, S., & Doğanay, A. (2017). The effects of multiple-pedagogical agents on learners' academic success, motivation, and cognitive load. *Computers & Education, 111*, 74–100. https://doi.org/10.1016/j.compedu.2017.04.005.
Donnermann, M., Lein, M., Messingschlager, T., Riedmann, A., Schaper, P., Steinhaeusser, S., & Lugrin, B. (2021). Social robots and gamification for technology supported learning: An empirical study on engagement and motivation. *Computers in Human Behavior, 121*. https://doi.org/10.1016/j.chb.2021.106792.
Dunlosky, J., Rawson, K. A., Marsh, E. J., Nathan, M. J., & Willingham, D. T. (2013). Improving students' learning with effective learning techniques: promising directions from cognitive and educational psychology. *Psychological Science in the Public Interest., 14*(1), 4–58. https://doi.org/10.1177/1529100612453266.
Fryer, L., & Carpenter, R. (2006). Bots as language learning tools. *Language Learning and Technology, 10*(3), 8–14. https://doi.org/10.1016/10125/44068.
Fryer, L. K., Ainley, M., Thompson, A., Gibson, A., & Sherlock, Z. (2017). Stimulating and sustaining interest in a language course: An experimental comparison of Chatbot and human task partners. *Computers in Human Behavior, 75*, 461–468. https://doi.org/10.1016/j.chb.2017.05.045.
Fryer, L. K., & Bovee, H. N. (2016). Supporting students' motivation for e-learning: Teachers matter on and offline. *Internet and Higher Education, 30*, 21–29. https://doi.org/10.1016/j.iheduc.2016.03.003.
Fryer, L. K., & Bovee, H. N. (2018). Staying motivated to e-learn: Person- and variable-centred perspectives on the longitudinal risks and support. *Computers and Education*. https://doi.org/10.1016/j.compedu.2018.01.006.
Fryer, L. K., Nakao, K., & Thompson, A. (2019). Chatbot learning partners: Connecting learning experiences, interest and competence. *Computers in Human Behavior, 93*, 279–289. https://doi.org/10.1016/j.chb.2018.12.023.
Fryer, L., Coniam, D., Carpenter, R., & Lăpușneanu, D. (2020). Bots for language learning now: Current and future directions. *Language Learning & Technology, 24*(2), 8–22.
Fryer, L. K., Nicholas Bovee, H., & Nakao, K. (2014). E-learning: Reasons students in language learning courses don't want to. *Computers and Education, 74*, 26–36. https://doi.org/10.1016/j.compedu.2014.01.008.
Gandolfi, E. (2018). Virtual reality and augmented reality. In *Handbook of research on K-12 online and blending learning* (pp. 545–561). Carnegie Mellon University: ETC Press, Pittsburgh, PA.
Hattie, J., & Anderman, E. M. (2019). *Visible learning guide to student achievement: Schools edition*. Routledge: New York.

Hew, K. F., & Cheung, W. S. (2014). Students' and instructors' use of massive open online courses (MOOCs): Motivations and challenges. *Educational Research Review, 12*, 45–58.

Hew, K. F., Lan, M., Tang, Y., Jia, C., & Lo, C. K. (2019). Where is the "theory" within the field of educational technology research? *British Journal of Educational Technology, 50*(3), 956–971. https://doi.org/10.1111/bjet.12770.

Hidi, S., & Renninger, K. (2006). The four-phase model of interest development. *Educational Psychologist, 41*, 111–127. https://doi.org/10.1207/s15326985ep4102_4.

Huizenga, J., Admiraal, W., Akkerman, S., & ten Dam, G. (2019). Mobile game-based learning in secondary education: Engagement, motivation and learning in a mobile city game: Original article. *Journal of Computer Assisted Learning, 25*(4), 332–344. https://doi.org/10.1111/j.1365-2729.2009.00316.x.

Koehler, M., & Mishra, P. (2009). What is technological pedagogical content knowledge (TPACK)? *Contemporary Issues in Technology and Teacher Education, 9*(1), 60–70.

Li, W., Wang, F., Mayer, R. E., & Liu, H. (2019). Getting the point: Which kinds of gestures by pedagogical agents improve multimedia learning? *Journal of Educational Psychology, 111*(8), 1382. https://psycnet.apa.org/doi/10.1037/edu0000352.

Lin, L., Atkinson, R. K., Christopherson, R. M., Joseph, S. S., & Harrison, C. J. (2013). Animated agents and learning: Does the type of verbal feedback they provide matter? *Computers and Education, 67*, 239–249. https://doi.org/10.1016/j.compedu.2013.04.017.

Littlejohn, A., Hood, N., Milligan, C., & Mustain, P. (2016). Learning in MOOCs: Motivations and self-regulated learning in MOOCs. *The Internet and Higher Education, 29*, 40–48. https://doi.org/10.1016/j.iheduc.2015.12.003.

Maehr, M. L., & Meyer, H. A. (1997). Understanding motivation and schooling: Where we've been, where we are, and where we need to go. *Educational Psychology Review, 9*(4), 371–409. https://doi.org/10.1023/A:1024750807365.

McClarty, K. L., Orr, A., Frey, P. M., Dolan, R. P., Vassileva, V., & McVay, A. (2012). A literature review of gaming in education. In *Gaming in education* (pp. 1–35). Pearson Research Report.

McPartlan, P., Rutherford, T., Rodriguez, F., Shaffer, J. F., & Holton, A. (2021). Modality motivation: Selection effects and motivational differences in students who choose to take courses online. *The Internet and Higher Education, 49*, 100793. https://doi.org/10.1016/j.iheduc.2021.100793.

Moorhouse, B. L., & Beaumont, A. M. (2020). Utilizing video conferencing software to teach young language learners in Hong Kong during the COVID-19 class suspensions. *TESOL Journal, 11*(3). https://doi.org/10.1002/tesj.545.

Mullen, G. E., & Tallent-Runnels, M. K. (2006). Student outcomes and perceptions of instructors' demands and support in online and traditional classrooms. *Internet and Higher Education, 9*(4), 257–266. https://doi.org/10.1016/j.iheduc.2006.08.005.

Murillo-Zamorano, L. R., López Sánchez, J. Á., Godoy-Caballero, A. L., & Bueno Muñoz, C. (2021). Gamification and active learning in higher education: is it possible to match digital society, academia and students' interests? *International Journal of Educational Technology in Higher Education, 18*(1). https://doi.org/10.1186/s41239-021-00249-y.

Noetel, M., Griffith, S., Delaney, O., Sanders, T., Parker, P., del Pozo Cruz, B., & Lonsdale, C. (2021). Video improves learning in higher education: A systematic review. *Review of Educational Research, 91*(2), 204–236. https://doi.org/10.3102/0034654321990713.

Papanastasiou, G., Drigas, A., Skianis, C., Lytras, M., & Papanastasiou, E. (2019). Virtual and augmented reality effects on K-12, higher and tertiary education students' twenty-first century skills. *Virtual Reality, 23*, 425–436. https://doi.org/10.1007/s10055-018-0363-2.

Pellas, N., & Kazanidis, I. (2014). Online and hybrid university-level courses with the utilization of Second Life: Investigating the factors that predict student choice in Second Life supported online and hybrid university-level courses. *Computers in Human Behavior, 40*, 31–43. https://doi.org/10.1016/j.chb.2014.07.047.

Perrotta, C., Featherstone, G., Aston, H., & Houghton, E. (2013). *Game-based learning: Latest evidence and future directions*. Slough, UK: National Foundation for Educational Research.
Putz, L. M., Hofbauer, F., & Treiblmaier, H. (2020). Can gamification help to improve education? Findings from a longitudinal study. *Computers in Human Behavior, 110*, 106392. https://doi.org/10.1016/j.chb.2020.106392.
Radu, I. (2014). Augmented reality in education: a meta-review and cross-media analysis. *Personal and ubiquitous computing, 18*(6), 1533–1543.
Richardson, M., Abraham, C., & Bond, R. (2012). Psychological correlates of university students' academic performance: A systematic review and meta-analysis. *Psychological Bulletin, 138*(2), 353. https://doi.org/10.1037/a0026838.
Sansone, C., Smith, J. L., Thoman, D. B., & MacNamara, A. (2012). Regulating interest when learning online: Potential motivation and performance trade-offs. *Internet and Higher Education, 15*(3), 141–149. https://doi.org/10.1016/j.iheduc.2011.10.004.
Shaffer, D. W., Squir, K. R., Halverson, R., & Gee, J. (2005). Video games and the future of learning. In *Phi Delta Kappan*. 87.
Shin, N., Sutherland, L. M., Norris, C. A., & Soloway, E. (2012). Effects of game technology on elementary student learning in mathematics. *British Journal of Educational Technology, 43*(4), 540–560. https://doi.org/10.1111/j.1467-8535.2011.01197.x.
Skinner, E. A. (1995). *Perceived control, motivation, & coping* (Vol. 8). Sage. https://doi.org/10.4135/9781483327198.
Taylor, L. M., Casto, D. J., & Walls, R. T. (2007). Learning with versus without technology in elementary and secondary school. *Computers in Human Behavior, 23*(1), 798–811. https://doi.org/10.1016/j.chb.2004.11.010.
Thompson, M. M., Wang, A., Bilgin, C. U., Anteneh, M., Roy, D., Tan, P., . . . Klopfer, E. (2020). Influence of virtual reality on high school students' conceptions of cells. *Journal of Universal Computer Science, 26*(8), 929–946.
Tüzün, H., Yilmaz-Soylu, M., Karakuş, T., Inal, Y., & Kizilkaya, G. (2009). The effects of computer games on primary school students' achievement and motivation in geography learning. *Computers and Education, 52*(1), 68–77. https://doi.org/10.1016/j.compedu.2008.06.008.
van der Meij, H., & Boersma, K. (2002). Email use in elementary school: An analysis of exchange patterns and content. *British Journal of Educational Technology, 33*(2), 189–200. https://doi.org/10.1111/1467-8535.00252.
Vanslambrouck, S., Zhu, C., Lombaerts, K., Philipsen, B., & Tondeur, J. (2018). Students' motivation and subjective task value of participating in online and blended learning environments. *Internet and Higher Education, 36*, 33–40. https://doi.org/10.1016/j.iheduc.2017.09.002.
Vidergor, H. E. (2021). Effects of digital escape room on gameful experience, collaboration, and motivation of elementary school students. *Computers and Education, 166*. https://doi.org/10.1016/j.compedu.2021.104156.
Wang, F., Li, W., Mayer, R. E., & Liu, H. (2018). Animated pedagogical agents as aids in multimedia learning: Effects on eye-fixations during learning and learning outcomes. *Journal of Educational Psychology, 110*(2), 250–268. https://doi.org/10.1037/edu0000221.
Watted, A., & Barak, M. (2018). Motivating factors of MOOC completers: Comparing between university-affiliated students and general participants. *The Internet and Higher Education, 37*, 11–20. https://doi.org/10.1016/j.iheduc.2017.12.001.
Wegerif, R., & Scrimshaw, P. (1997). *Computers and talk in the primary classroom*. Clevedon, UK: Multilingual Matters.
Whyte, S. (2011). Learning to teach with videoconferencing in primary foreign language classrooms. *ReCALL, 23*(3), 271–293. https://doi.org/10.1017/S0958344011000188.
Williamson, B. (2007). Viewpoints: Teaching and learning with games? *Learning, Media and Technology, 32*(1), 99–105. https://doi.org/10.1080/17439880601141492.

Wollny, S., Schneider, J., di Mitri, D., Weidlich, J., Rittberger, M., & Drachsler, H. (2021). Are we there yet? - A systematic literature review on Chatbots in education. *Frontiers in Artificial Intelligence, 4*. https://doi.org/10.3389/frai.2021.654924.

Zhang, X., Pi, Z., Li, C., & Hu, W. (2021). Intrinsic motivation enhances online group creativity via promoting members' effort, not interaction. *British Journal of Educational Technology, 52*(2), 606–618. https://doi.org/10.1111/bjet.13045.

Zhu, M., Sari, A., & Lee, M. M. (2018). A systematic review of research methods and topics of the empirical MOOC literature (2014–2016). *The Internet and Higher Education, 37*, 31–39. https://doi.org/10.1016/j.iheduc.2018.01.002.

Zou, B., Wang, D., & Xing, M. (2016). Collaborative tasks in Wiki-based environment in EFL learning. *Computer Assisted Language Learning, 29*(5), 1001–1018. https://doi.org/10.1080/09588221.2015.1121878.

ODDE and Gender

55

Christine von Prümmer

Contents

Abstract

Gender and the concern with gender issues is important for open and distance education (ODE) which is associated with the provision of educational opportunities for minority groups. In countries and cultures the world over, including Western industrialized societies, girls and women are educationally disadvantaged compared to their male counterparts. This educational discrimination is especially prevalent in social minorities. Since 1982, with the start of the Women's International Network WIN within the International Council for Open and Distance Education ICDE, women working in ODE have brought a feminist and gender perspective to their own situation and to that of women distance students. A manifestation of this was the proliferation of women's/gender studies

C. von Prümmer (✉)
Consultant on Gender Issues in ODL and e-learning, Darmstadt, Germany
e-mail: evaluation@vonpruemmer.de

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_53

into ODE curricula. With the goal of equal access and conditions for women to succeed, women working in ODE researched and analyzed the cultural and social factors underlying the inequalities and identified ways for redressing gender imbalances. The chapter discusses four areas of inequality and points out ways for the empowerment of women: (1) gender roles and the social division of labor, (2) learning environments, (3) access equity, and (4) course content and choice of subject. A focus on gendered access and use of technology highlights factors affecting women's participation in e-learning and the way in which they use electronic communication for overcoming isolation, for networking, and for empowerment.

Keywords

Educational opportunities for girls and women · Empowerment of women · Feminist and gender perspectives · Gendered access and use of technology · Gender issues in distance education · Second chance education · Women in distance education · Women's/gender studies and distance education

Introduction

This chapter addresses the issue of gender in open, distance, and digital education (ODDE), which came to the fore in the 1980s and has been an ongoing concern since then. The increasing digitalization of the field led to a focus on online learning and virtual learning environments (von Prümmer, 2004b).

The concept of open and distance education (DE) has always been associated with the ideal of providing educational opportunities for minority groups and those who cannot access the educational system in the regular way. The establishment of single-mode distance teaching universities (DTUs) such as the Open University in Britain (OUUK) and the FernUniversität (FeU) in West Germany was an outcome of the political will in the 1970s to provide working-class people and other educationally disadvantaged groups with a "second chance" to access tertiary education and to obtain an academic degree (Boothroyd, 1994; McIntosh, 1977). In fact, research at the German FeU has shown that DE does serve as a second chance for women from a working-class background to achieve an academic degree previously denied them (von Prümmer, 1997, 2000).

Why is gender an issue in ODDE? Without a gender perspective differences between men and women were traditionally explained in terms of a deficit model, which saw women as lacking the qualities needed to be successful distance students. A case in point is gendered learning styles. The German FeU with its predominantly male student population propagated the ideal typical distance student as the "autonomous, independent" learner who neither needed nor wanted extensive support. If women wanted "support and connectedness" (Kirkup & von Prümmer, 1990), they clearly lacked the necessary autonomy and independence. Similarly, if women chose to study a limited range of subjects, it was basically their problem. And if women didn't manage to organize their lives and give priority to their studies, maybe they were not suited for this type of education and didn't deserve the opportunities offered.

Introducing the concept of gender into the picture brings a different perspective. It means looking at all aspects of the provision of DE and the situation of the students. It identifies gender factors and ways to turn gender differences into assets rather than disadvantages. For instance, in terms of this paradigm the need of women for personal contact with tutorial staff or support networks is not seen as psychological dependence but as bringing to DE valuable communication and affiliation skills (Kirkup, 1995: 11). In the same way, the observed gender differences in course choice lead to a reevaluation of the androcentric way in which the subject matter is presented.

As DE has moved from its traditional forms toward ODDE and virtual learning environments, there is even more need for concern regarding the effects of gender and the equitable participation of women in online education. Gender is an issue simply because – no matter how "virtual" they are – these environments are part of the "real" world and therefore gendered. Learner support, in particular, has to acknowledge gender as a category, which shapes the provision of online education and which affects students and their ability to participate fully in it. With regard to ODDE students who must work with information and communication technologies (ICTs), evaluation studies show persistent gender differences in three areas: (1) access to, and control over ICTs, available resources, and the gendered division of labor; (2) know-how and computer literacy, confidence, language and writing skills; and (3) learning styles, communication preferences, and usage of ICTs.

Gender Issues in Distance Education: Historical Context

The Situation of Women in Open and Distance Learning (ODL)

The 1970s saw the rise of tertiary distance education (DE) and its transformation into open and distance learning (ODL). Single-mode Open Universities (OUs) and Distance Teaching Universities (DTUs) were established around the globe to provide opportunities for "second chance" academic qualification for mature students already settled into jobs and family life.

If women were expressly mentioned as target groups for this type of education, they were often typecast as "housewives" for whom DE was ideally suited (McIntosh, 1977: 78). While house-bound and unable to attend face-to-face classes, housewives, especially mothers of small children, were supposed to be flexible in their time-management and therefore able to pursue their educational aspirations through home study. The fact that in many ODL courses female students were the majority was seen as proof of the success of opening these educational opportunities to women. Yet this unreflected view of the life circumstances of women contributed to a disregard of the needs of women distance students. Increasingly, teachers and institutional researchers were concerned with gender differences in DE, not only in access and participation but also in course choice, drop-out rates, and study success.

By 1982 the situation of women in DE had become a focus of feminist educators and researchers who started to connect globally in the *Women's International Network WIN* within the *International Council for Open and Distance Education ICDE*. The insights gained by cross-cultural discourse and research were not simply additive but created added value for the understanding of the role of gender in DE. This was first manifested in Karlene Faith's (1988) pioneering collection *Toward New Horizons for Women in Distance Education: International Perspectives***.** This book is commonly referred to as the *WIN-Book* since it originated in the *WIN* movement and not only the editor and her team but all contributors were active *WIN* members, distance educators, and researchers. Its continued relevance is evidenced by the fact that the book was republished in 2017, both as hard copy and eBook (Faith, 2017).

Women Working in ODL

The concern with gender in DE first emerged as a global issue four decades ago at *the 12th ICDE World Conference in Vancouver* because the organization glaringly ignored the presence of women working and studying in the field. Even though 25% of the conference delegates were women they felt marginalized because of the gender-exclusive language and the male-dominated production and transmission of knowledge (Burge, 1988: x). This reflected the androcentrism in universities and schools, including DE institutions. Women were underrepresented in the higher ranks of academic and administrative positions and overrepresented in lower-level office and technical jobs and insecure positions.

Yet undeniably the learning experience of women distance students is shaped by the visibility – or invisibility – of women working in their DE institution (von Prümmer, 2000: 15). A preponderance of men in the higher levels of the academic hierarchy not only affects teaching but also research opportunities and activities and the publication of findings. A literature review of five prominent DE journals between 2000 and 2008 shows gender differences in research areas and research methods. Exploring the associations between gender, collaboration, and research the study found that women, whether as single authors or co-authors, were more likely to report on qualitative methods and on topics related to learners, their characteristics, support or interaction, and to communication in learning communities. Men, on the other hand, are stereotypically more concerned with technology and management (Zawacki-Richter & von Prümmer, 2010: 95).

The gender-differentiated academic hierarchies are widely reflected in research that typically requires funding, which also is more accessible to men than to women researchers. Looking into the productivity and impact of papers authored by men and women, a 2015 study showed a distinct underrepresentation of women in the most productive group of researchers. This is associated with gender differences in age, authorship position, and academic rank (van den Besselaar & Sandström, 2017 p. 1).

Women Distance Students

Gill Kirkup, an institutional researcher at the OUUK, points out that one of the important points to arise from the *WIN-Book* is the refutal of the view that ODL is a type of education particularly suited to women. This assumption was based on the well-known facts that compared to men adult women have many more restrictions on their time and mobility, and at the same time have less access to disposable income. Yet implicitly it presumed that there is no difference between men and women with regard to their study motivations, their intellectual styles, and their domestic circumstances (Kirkup, 1996:154).

In this context Gill Kirkup refers to the first internationally comparative research project in 1986–1988, conducted from a feminist perspective and explicitly directed toward the gendered circumstances of DE students. It was a large-scale parallel survey of women and men studying at the German FeU and the British OUUK. Addressing a wide range of themes, the research provided information on the composition of the student body and student characteristics, class background and social mobility, family and work commitments, study motivation and learning styles, communication and student support, subject preferences and prior educational attainment, the economic situation and access to resources, domestic division of labor; and control over one's study time and space (von Prümmer, 2000). The data yielded gender differences in all of these areas and acted as starting point for further analysis and investigation.

The data analysis of the FeU study concentrated in the first instance on students' choice of major subject and degree program, testing the assumption that the under-representation of women was due to a predominance of "male" subject areas (von Prümmer & Rossié, 1988). The starting point of the comparative analysis of FeU and OUUK data was focused on students' private situation and their use of support services (Kirkup & von Prümmer, 1990). It showed that women leaned toward a connected style of learning, which tended to conflict with the distance teaching mode as practiced by FeU at the time (von Prümmer, 2004b:180).

The research confirmed the existence of gendered life circumstances. At the same time it refuted another presumption often used to explain gender inequality in DE, namely, a deficit model of women students who were seen to be less suited for independent study in ODL than their male colleagues (Kirkup, 1996: 155). Feminist theories and debates confirm that women are different, not deficient, and that DTUs must take these differences into account if they want to serve their women students (Kirkup, 1995: 11, von Prümmer, 2004b: 180–181).

Feminist Perspectives and ODL

The emergence of women, bringing with it feminist perspectives and the concern not only with the representation of women in the field but more broadly with gender issues, challenged the androcentrism of the DE world. Although, as Karlene Faith notes in the *WIN-Book*, not every contributor to this book would identify as a feminist, they all describe radical alternatives to the educational status quo (Faith, 1988:13).

To accept that gender is an overriding concept in ODL is to open a Pandora's box, which will affect all facets of teaching and learning at a distance such as content and language, curriculum design, course delivery and technologies, student support and communication, cost and resources, as well as institutional and other research, policy decisions, staff development, and administration.

Women's/Gender Studies (WGS) and Distance Education

An obvious deviation from androcentric content and curriculum are courses and degree programs in Women's/Gender Studies (WGS), which often are explicitly founded in feminism and the women's movement (AU Athabasca University, 2021). Due to their very nature as both a learning exercise and a consciousness-raising experience, WGS represent special challenges to teaching and learning at a distance as described by Edith Smith and Valerie S. Norlen in their account of *"Tele-Distance Education in Women's Studies"* (1994). This confirms the findings Elizabeth Burge and Helen Lenksyj collected during their first graduate course in women's studies at the *Ontario Institute for Studies in Education (OISE)*. They conclude that promoting distance mode women's studies courses is a challenge in itself. It also presents implications for women-centered teaching in all other DE programs regardless of their possible explicitly feminist orientation. Gender analysis of all content and acknowledgment of the specific life circumstances and experiences of women students need to be integrated into teaching and learning processes across the board (Burge & Lensksyj, 1990).

Today Women's/Gender Studies (WGS) programs look back on a long tradition and are nearly universally offered at a distance, as undergraduate and graduate degree programs as well as for personal development. Nearly four decades ago the OUUK offered its first Women's Studies (WS) course (Kirkup, 1983), and 30 years later looked back on it as a success story. Gill Kirkup and Liz Whitelegg (2013) described the program as influential nationally and internationally for many feminists and WGS teachers and scholars who either enrolled at the OUUK or at other institutions, which had bought the materials. It is not as clear whether the WS course was successful in spreading gender analysis to the Open University's other subjects and degree programs.

On the opposite side of the world the Indian Indira Gandhi National Open University (IGNOU) started its *M.A in Women's and Gender Studies* program in 2013 aiming to enable students to apply gender perspectives to the complex power hierarchies and relationships of society (IGNOU, 2021). The WGS program thus stands in the feminist tradition of encouraging and equipping women to challenge the given power relationships even if they study at a distance and may not be supported by a local women's group. Looking at DE from a perspective of women's studies Natasha Patterson (2012) identifies three main issues for feminist pedagogy: it must (1) include the virtual classroom with its gender, race, and class inequalities; (2) provide strategies and frameworks for addressing the special needs of women in diverse circumstances; and (3) focus on the female adult learners who use the technologies in their online studies and contribute valid insights concerning their implementation and use. She concludes that teaching women's studies at a distance offers broader insights and challenges about the teaching and learning of feminism.

Worldwide there are many *WGS* courses and degree programs on all levels of DE, as the most cursory internet search will testify. Googling *"Women's Studies Programs Worldwide,"* for instance, leads to a University of Maryland, Baltimore County (UMBC) website on *"Women's/Gender Studies Programs & Research Centers"* claiming to provide links to more than 900 women's/gender/feminist studies programs, departments, and research centers around the world that have web sites (UMBC, 2021). These programs are by no means uniform in their focus and pedagogy. But WGS on the whole have provided an important platform for the exploration and development of feminist, or at least women-friendly, content and distance learning environments. Gender is an all-pervasive issue, which must be addressed across the board to overcome long-established patterns of androcentrism, even sexism, and male dominance.

Feminist Pedagogy and New Horizons for Women

Feminist pedagogy plays an important role in DE beyond the confines of Women's/Gender Studies (WGS). The perspectives it brings to ODL have become even more relevant since the emergence of Information and Communication Technologies (ICTs), which have first supplemented the traditional forms of delivery and later replaced them to a large extent. In the 1980s and 1990s ODL evolved from mainly written and printed materials delivered through postal services and augmented by video and audio and by face-to-face meetings. The beginning of the twenty-first century saw a rapid expansion of the use of ICTs in all areas of teaching, studying, communication, delivery, and administration. As DE continued to evolve in further stages and different directions it was variously called e-learning, online education, studying at the virtual university, and eventually Open, Distance and Digital Education (ODDE).

Addressing ODDE and gender, this chapter deals with general issues affecting women in DE and their opportunities for equitable participation in this path to gaining vocational and professional qualifications or personal development. More specifically, it also deals with the various interrelations of gender and technology, which can act as a hindrance to equal participation or as an instrument of empowerment.

Issues of Equity and Empowerment

From the beginning, the world of DE has been closely associated with issues of equal access to education. Originally meant to provide education for people in remote areas, DE also became a means of extending educational opportunities to anybody who could not attend classes in person. Apart from geographical distance, reasons that prevent children or adults from attending traditional educational institutions may lie in social, cultural, or personal factors. Social class, for instance, may be a distancing factor, as people from a lower, minority, or working-class background cannot afford better schooling for their children or traditionally do not value advanced education. Cultural factors may prevent people of certain religious or ethnic backgrounds from providing their children, especially their daughters, with higher education. Or the mainstream culture may deny minority groups access to educational opportunities. Personal factors may be at work when a potential student is disabled, has to take care of children or other family members, works full time at a job, or is imprisoned or institutionalized.

This shift in focus was accompanied by a corresponding shift away from the original concept of "teaching at a distance" to "open learning," which corresponded to a twofold commitment: an emphasis on open access and on the learning process and the needs of learners. These developments are often thought to open educational opportunities automatically to women, especially to those with multiple factors working against them. Research and experience has shown that it takes deliberate action and policies to mitigate the adverse effects of androcentric pedagogy and content and to ensure equity of access and study success for women.

A recent literature survey by Suzan Koseoglu and colleagues, covering 30 years of literature, focused on gender inequality in post-secondary and higher DE contexts and confirmed that gender inequality remains a pressing issue on a global scale (Koseoglu, Öztürk, Ucar, Karahan, & Bozkurt, 2020). Yet according to their analysis the majority of publications does not address gender issues but ignores both the causes of gender inequality (patriarchy and androcentrism) and their effects (women having less access to educational resources and formal learning opportunities). The authors conclude that better access to educational opportunities alone does not ensure gender equity. Rather, curriculum design should be informed by gender perspectives and centered on empowerment and agency in order to challenge existing cultural and traditional assumptions and political systems. In joining critical pedagogy in general and feminist pedagogy in particular to achieve these ends, Koseoglu and colleagues close the circle to the earlier demand of Elizabeth Burge and Helen Lenksyj (1990) to integrate gender analysis into all content, whether it be explicitly feminist or not.

The following sections deal with four areas of inequality and point out ways for the empowerment of women: (1) Gender roles and the social division of labor, (2) Learning environments, (3) Access equity, and (4) course content and choice of subject.

Gender Roles and the Social Division of Labor

A Woman's Work Is Never Done

The gendered division of labor, which exists in most societies means that women are responsible for taking care of children and the household. Since many women DE students also work full-time or part-time outside the home, they have multiple commitments even before enrolling as distance students. Their courses are then an additional workload – a "third shift" (Kramarae, 2001) – which has to be fitted around their other roles. Recently, Covid-19 and pandemic-induced "work-from-home" (WFH)" has brought forth an impressive amount of research testifying to its gender-differentiated impact, both in the private sphere and in work-related areas, which reinforces the traditional division of labor and gender roles.

There exists a myth of flexibility and self-determination with regard to the domestic and family responsibilities of women. It is often assumed that DE is especially suited for "housebound mothers of small children" believed to enjoy flexible schedules and the freedom to organize their own days. In fact, the demands of home-making and childcare provide a fragmented workday over which the women have little control, making it difficult to free up time for studying, especially for the uninterrupted or lengthy periods necessary for in-depth reading or exam preparation.

Making Time for Her Studies

Despite these adverse circumstances women DE students do manage their course loads and exams by reorganizing their lives and negotiating the domestic division of labor with their partners and children. One of the most difficult tasks is the changing of priorities so housework and mothering no longer take precedence and outside help is accepted with childcare, cleaning, etc. (grandparents, daycare, cleaning service, take-away food).

To succeed in this, women must realize, at the beginning of their studies, how great the workload will be, how much time and concentrated effort has to be invested, that it is their right to study, even if they don't aim for a degree, and that they need not feel guilty for "neglecting" their families. DE universities can and must assist this process by providing new students with information about likely difficulties so they can make allowances and prevent counterproductive behavior patterns to set in. Institutional support can help women to develop coping strategies, encourage students to share their experiences, and assist with setting up support networks and communication channels for the exchange between students.

Learning Environments

Home Study

Easily the most obvious difference between distance and campus-based education is the physical learning environment in which students and staff are situated. DE and e-learning in effect means the privatization of the learning environment (Evans & Grace, 1995), which has become the concern of the individual student. This means (1) The learning environment is no longer provided on a campus and in buildings supplied by the university; (2) Factors outside the university determine the learning setup to at least the same extent as do the university's study rules and regulations; (3) The student rather than the university takes responsibility for the conditions in which studying takes place; and (4) The student's personal life, resources, and access to technologies become increasingly important for her/his study success (based on data from FeU research; see von Prümmer, 2004a).

Privatized Learning Environments

The privatization of the learning environment brings with it both advantages and disadvantages, which affect women and men in different ways. The advantages in the case of "home study" are mostly savings in cost and time. Students do not have to fit in with schedules and locations set by the university and their learning activities are more compatible with other commitments. Many students, especially women, cannot pursue their education face-to-face at a traditional university. Through DE they can communicate with other students, tutors, and lecturers either live or through asynchronous channels. Thus working in groups and co-operating with others can be done via electronic channels, the telephone or even "snail mail" and does not cost as much time and money as traveling to meetings and classes would.

The disadvantages of such a privatized learning environment result from the fact that the students themselves are responsible for setting up their own learning environment and supplying the necessary equipment. *"Electronic communication and online studying require expensive hardware, software and online-access but not all (potential) students have the necessary resources and financial means"* (von Prümmer, 2004a:24). Women, who often have less or no income of their own, are more likely to find it hard to afford studying via the internet.

In this context it is worth noting that the domestic study situation of women and men depends to a large extent on their family status. While women and men are equally able to set up an undisturbed learning environment as long as they have no children, data shows that it is fundamentally different for parents: *Fathers* show similar patterns to men who live with a partner but without children. *Mothers*, by contrast, are much less likely to have their own undisturbed study space or private computer work place (von Prümmer, 2004a).

Taking Control of the Learning Environment

Research conducted with DE students who were (mostly single) mothers of small children taking vocational courses has shown that women can and do overcome these difficulties and take control of their learning environment if they (a) are aware of the problems caused by an inadequate learning environment, (b) set or change their priorities to make time and space for their studying, and (c) are sufficiently self-confident to claim their own space. This is very difficult to achieve in isolation but is possible if this isolation can be overcome. The women taking part in this project overcame the disadvantages of low income, inadequate housing, and lack of support by pooling their resources, co-operating in domestic chores, such as cooking, trading childcare and homework supervision, and by mutual support through discussion and self-help groups. In this way they were able to claim their own space, even in the face of opposition, and to make the most of limited resources to improve their domestic learning environment (von Prümmer, 2000: 75–78).

Access Equity

Factors Affecting Access to Education

Gendered access to education may be attributed to material factors and to cultural or religious factors regarding the role of women and men in society, and often these reasons overlap. On the material level it may be argued that a family lacks the money to send all children to school or that the family income needs to be supplemented through putting children to work. Where limited financial resources make it necessary to prioritize which child should get an education or attend secondary school and university, boys tend to be systematically preferred over girls regardless of intellectual ability and individual wishes. On the level of cultural and religious factors, it may be argued that a woman's place is in the home and that she does not need higher education or vocational training to fulfill *her* "natural duties" as housewife and mother. Conversely, as future "head of household" and "breadwinner," a boy is expected to get an education, possibly complete a degree, to obtain employment and start a career and take *his* "proper place" in the public sphere.

Looking at DE as a second chance for people previously excluded from (higher) education, it is easy to see that girls and women on the whole are more in need of such additional educational opportunities. This is especially true where gender discrimination meets discrimination based on class, race, or other factors affecting equal access. Women are also more likely to live in situations that make it difficult to impossible to attend face-to-face classes and/or to afford the direct (tuition fees, books) and indirect (child care, transport) costs associated with attending classroom-based educational programs.

Opening Educational Opportunities

The example of women from a working-class background (von Prümmer, 2000: 138–165) shows how they utilize DE for overcoming educational and career disadvantages such as the lack of opportunities for secondary and tertiary schooling combined with the fact that job – instead of career – choices are often based on practical considerations rather than aptitude and inclination. As a result they entered the workforce and started earning "their own money" at a young age, even if earnings were low and it was a dead-end, traditionally female job. The role of DE for these women was to provide a second chance through access to higher degrees and formal qualifications while continuing their paid work and earning a living. It also allowed them to enter nontraditional fields and test new or advanced subject areas without existential risk.

In addition to work-related and career interests, women from a working-class background also used DE to overcome other disadvantages such as a cultural environment not geared to intellectual pursuits, a pronounced gendering of social and family roles, and fewer opportunities to explore their own interests coupled with more pressures to be "practical." In this context the role of DE was to widen their horizons and gain a "liberal arts" education, study nontraditional subject areas and pursue intellectual interests without pressure, build up self-assurance and a more positive self-image – in short, women from a working-class background use DE for personal as well as professional development.

Gendered Course Content and Choice of Subject

One source of educational discrimination is the traditionally gendered nature of subject areas where girls and women are encouraged to make different choices from boys and men. A 1983 comparison of students at the Canadian Athabasca University

(AU) and the German FeU showed a marked divergence: while nearly two thirds of AU students were women, nearly four fifth of FeU students were men. At the time this could be attributed to a large extent to the different subject areas and degree requirements of the two universities (von Prümmer, 1983). Subsequent research showed persistent gender differences in students' choice of degree programs (von Prümmer & Rossié, 1988). At FeU for example, even in 2021, while the overall proportion of women students has risen to 46%, the distribution across the five academic departments shows familiar gender patterns: Seventy-one percent of students in the Psychology Department and 59% in the Cultural and Social Sciences Department are women while, at the other end of the spectrum, 78% of FeU students in the Mathematics and Computer Science Department are men (FeU, 2021).

Students' choice of subject is directly related to the courses and degree programs offered by their preferred school or university. Traditionally, women are more likely to enroll in subject areas such as social sciences and cultural studies, education, psychology, or nursing while men tend to choose STEM (Science, Technology, Engineering, and Mathematics) subjects and business. The increasing use of ICTs favors the enrollment of men who show more affinity to computers and technology. Unfortunately, in spite of numerous initiatives in countries around the world to attract more women into STEM fields, such gender differences in subject choice are the rule rather than the exception. Simply googling *"women into stem subjects"* yields dozens of items. It provides a Wikipedia (2021) entry and a number of websites with information, data, and publications from different countries. The links are too numerous to list or review here but should be easy to find.

Gendered course content manifests itself not only in the subject area itself but also in the androcentric presentation and language within the subject matter. In all kinds of subject areas, course material that is not gender-inclusive not only fails to engage women students, it may be off-putting or even offensive. Course authors and teachers without a gender perspective do not even realize the extent to which the language and images they employ marginalizes and alienates women and makes them all but invisible. In order to achieve equal study conditions and equal chances for successful studying, affirmative action and gender mainstreaming measures are needed to provide all teaching with gender awareness and training. The similarities and differences in the experiences, interests, expectations, attitudes, and behavior of women and men must be taken into account, and the causes and consequences of gender inequality identified in order to achieve equity (AQU Catalunya, 2018, p 13).

Feminist Perspectives on Women and Technology

Coinciding with the rise of Second-Wave feminism in the 1970s there was increasing concern with women and technology, both with the potential impact IT has on women's jobs and with the advent of home computers and PCs, which initially functioned as the proverbial "toys for the boys" and men (Kirkup, 1992: 270–273). An early collection by Joan Rothschild (1983), entitled *Machina ex Dea: Feminist Perspectives on Technology,* sparked off research and theorizing in this new field, bringing together a variety of scholarly articles without imposing specific approaches either to feminism or to technology. The only shared premise was that a male bias exists in most technology research and analysis, and that that bias must be confronted and changed (Rothschild, 1983: 213).

In 1992 the OUUK started its revised women's studies course, which featured four volumes of readings on the topics covered in the course. The volume entitled *Inventing Women: Science, Technology and Gender* was an introduction to acquaint students of women's studies with some of the most important areas of debate of women's studies scholars in the fields of science and technology (Kirkup & Keller, 1992: 1–2).

Fifteen years later Judy Wajcman's (2007) article *From Women and Technology to Gendered Technoscience* situated current discussions of women's positions in ICTs in the wider context of feminist debates on gender and technology and provided an overview of the various approaches to conceptualizing the link between gender and technology, both past and present (Wajcman, 2007: 287–288). Paralleling the increasing use of media and technology in DE, issues of equitable access to, and usage of, ICTs became more important, especially to potential students from disadvantaged backgrounds.

Availability of ICTs in ODE

DE and e-learning settings rely almost exclusively on media, including printed materials as well as audio- and video materials, and ICTs with few elements of face-to-face and classroom interactions. Distance students are usually responsible for providing their own learning environment and equipment. The divergent life circumstances of men and women impact differently on their ability to study. The gendered division of labor affects the financial resources available to students and on their (in)ability to participate fully in the electronic campus.

With regard to technology, "access" denotes more than the physical availability of technical devices and connection to the internet. In order to make full use of ICTs for studying, students must have a degree of control over their equipment so they can set it up to fit the requirements of their studies (Kirkup, 1999). In this respect women are still faced with persistent gender differences, which are detrimental to the successful pursuit of a course of studies at a distance or via e-learning.

Superficially it may seem that the gender gap has narrowed, yet underneath the surface there remain crucial differences between male and female distance students. For one thing, more men own their equipment while women often rely on sharing someone else's. This affects the extent to which men and women can freely access the equipment and the control they have over their technology-related learning environments. Even when women are the main users, the equipment is often set up to suit the needs and interests of other family members (von Prümmer, 2004b: 185). Also, women are less likely to have computer and internet access at work, partly because of a lower participation rate in paid work, partly because the jobs women hold often don't allow them to utilize company equipment for private purposes, or the equipment isn't suitable for study needs. Women therefore must rely slightly more on the provision of the technology in study centers and other external sources (von Prümmer, 2011: 122).

Acceptance of Technology

Students may be prevented from utilizing ICTs not only because they literally have no access to the necessary technologies and electronic devices but also because of feelings of alienation and lack of confidence.

Factors Affecting Women's Participation in E-Learning

Research into gender issues in ODL environments has yielded divergent results concerning the participation of women in e-learning. On the one hand, gender differences in the use of ICTs seem to have all but disappeared with women and men having equal access to the new media and internet (Remmele & Holthaus, 2013). On the other hand, women are seen to have less access and less inclination to utilize ICTs, or they use them for different purposes than their more technology-oriented male peers. The latter findings are often summed up in the catch-phrase "toys for the boys, tools for the girls" (Dolch, 2020), which signals a different attitude with consequences for the equitable design and delivery of e-learning elements (Kelan, 2007; Kirkup, 1992: 270). In addition, women are still underrepresented in STEM subject areas (Hill, Corbett, & St Rose, 2010), which in turn are associated with computers and technology.

Traditionally, technology and science are male domains all but inaccessible to women, especially as developers (Kramarae, 2001: 5). Technology is often associated with masculinity and the underrepresentation or invisibility of women explained in terms of a biological determinism (Mawson, 2015: 40) or a masculine culture (Laigo, 2020). Girls and young women engaging in STEM subjects and ICTs used to be the exception rather than the rule. Though they may no longer be disbarred from entering scientific and technological fields, women are still discouraged from pursuing masculine subject areas and predominantly male fields. If they do, they are not only the minority of students and workers but are also faced with an inhospitable environment and women-unfriendly working conditions as, for instance, a study by Ruth Carter and Gill Kirkup (1990) showed for the field of engineering.

This results in the underrepresentation of women in these subject areas and occupational fields which were, and to a large extent still are, considered male domains. At the same time, it is these fields which are most likely to develop and utilize technologies, thus reinforcing their androcentric image. One example of transforming the character of a "male dominated field" is the work of Cecile Crutzen of the Dutch Open Universiteit (OUNL) (1994). As a feminist and female scientist she designed the OUNL's introductory informatics courses. In her paper *The Influence of Feminist Theory on Informatics Course Design* Cecile Crutzen describes the process and how both the relation between feminist theories on objectivity in the sciences and Informatics and the dynamic concept of emancipation in education were her guidelines for choosing the contents, the examples, the subjects, and their sequence (1994: Abstract). Referring to Nelly Oudshoorn's contribution to the *Win-Book* she addresses (1) The relation between objectivity and masculinity, (2) The focus of scientific thinking on mastery and control, (3) The impact of female experiences on scientific thinking, and (4) The existing dichotomies (1994: Sect. 4).

Women Using Technology for Communication

Continual research in the field of ODDE has confirmed the importance of communication for the successful studying of women distance students as reported by Kirkup and von Prümmer in 1990. Communication technologies can help women to assess their own situation through comparison with others in similar circumstances. It shows where difficulties and "failure" might be due to structural factors rather than to individual inadequacies. It shows potential ways to improve their situation through learning about solutions used by other students and is a means of breaking out of the isolation associated with distance and virtual learning (von Prümmer, 2000: 131–137).

In this context and thinking about conferencing technologies for learning Elizabeth Burge (1995) suggests that the metaphor of the internet as a weaving loom may be more appropriate for women than the often used metaphor of the electronic highway. Allowing asynchronous as well as synchronous contacts, exchanges and collaboration ODDE offers opportunities for co-operation and connectedness without forcing women to travel and be present at a specified time in a specified place outside the home. During the Covid-19 lock-downs and enforced working-from-home, with round-the-clock childcare and home-schooling, for many women the internet was the only means of communication with co-workers and friends, and a veritable life-line.

Internet Communication and Empowerment

Although it is sometimes assumed that the internet provides an ungendered environment, there is evidence that discussions and intercourse in "anonymous" mixed virtual meetings often silence and alienate women participants. Conversely, provision for women-only communication, off limits to men, offers networking opportunities in nonthreatening environments. Excluding men from conversations and social media groups may seem threatening to a gender used to dominating interactions in academic discourse and to defining the content. A "Women‘s Room" and women-only chat-groups can provide an opportunity for open and unguarded exchange not possible in mixed groups. By exchanging personal experiences women can recognize similarities in their circumstances and patterns of discrimination and oppression. They can then identify the need for action and develop strategies.

Just how can internet communication contribute to the empowerment of women? From a feminist perspective, the internet embodies the two elements "power" and "communication," which are extremely relevant for the success and empowerment of women – incidentally, staff as well as students. The following section draws on the keynote presentation "*Perspectives from Global Research for Women in E-learning"* to the first *IFWE* conference in Phoeniy, Arizona (von Prümmer, 2004a).

Looking at the role of internet communication for women, Dale Spender's, 1995 book *Nattering on the Net* comes to mind. The title of the book does not conjure up the usual images of the information superhighway. Rather, *Nattering on the Net* refers to chats with friends, "Kaffee-klatsch"-type gossiping sessions or an exchange of everyday information. Dictionaries define *"nattering"* as a "friendly conversation without any particular purpose" which is aimless, if not pointless, and dismiss it as "talking much about little." What, if anything, does this have to do with power and the empowerment of women?

Dale Spender, the author of *Nattering on the Net*, is a pioneer of feminist linguistics and research into the power relationships of male-female discourse. It is not surprising that she dispels the notion of the internet as a place for informal gatherings and chats: The subtitle of her book makes the connection between "*Women, Power and Cyberspace.*" Together, the title and subtitle of Dale Spender‘s book spell out the connection between communication – even informal communication – and power. In order to achieve empowerment, women must discover common ground with other women and forge bonds, which are strong enough for joint action. Communication is a precondition of creating a strong and powerful community and organizing political action. One of the fundamental slogans of the women‘s movement in the 1970s, *"Sisterhood is powerful,"* applies also to DE and e-learning.

Over 30 years of institutional ODDE research have shown that women are under more pressure from family and work-related commitments, that they have to fit their studies around these commitments, and that they tend not to be relieved of their burdens when they take up studying. According to a widespread cliché DE is especially suited for family women who are stuck at home but assumed to be flexible in their schedules. Consequently, each individual student who fits this cliché tends to feel guilty if she has problems combining her course of studies with her family duties and employment. In reality, any such "failure" is not due to individual shortcomings but to patterns related to the gendered organization of society and the socialization of girls and boys. Through communication with other students, the women can recognize this and develop solutions and strategies for dealing with their situation. The isolation experienced by many students in ODDE tends to be more of a problem for women than men. Offering channels for asynchronous as well as synchronous contacts and exchanges the internet and social media provide a real chance for communication and networking, the basis for empowerment.

The second fundamental slogan of the women‘s movement, *"The personal is political,"* also applies to virtual and e-learning environments. The internet offers possibilities for networking on all levels from local to global, from small groups to large organizations. In order to make the internet work for women, though, its development must not be left to others – be it men, international corporations, or interest groups. Where women take possession of the virtual space they can discover or create structures, which offer them the best possibilities for their own development and the widest scope for action on their own behalf. In the spirit of the two feminist slogans, *"The personal is political"* and *"Sisterhood is powerful,"* internet communication is political and has the potential for empowering women. It challenges both the obvious male dominance and the latent androcentrism of ODDE and e-Learning environments.

Closing Remarks

Contributing a short chapter on *"ODDE and Gender"* for a comprehensive *Handbook of Open, Distance, and Digital Education* is an exercise equally exciting and frustrating. There is no way this chapter can address the full spectrum of *"ODDE and Gender"* but it points out some of the relevant gender issues that must concern everyone in the field. Most importantly it must be noted that *"Gender"* is not an isolated topic but is all-pervasive and a lens for looking at all aspects of Open, Distance, and Digital Education.

Looking at ODDE from a gender perspective brings with it challenges, chances, and changes not only for women in distance education but for everyone engaged in online and distance teaching and e-learning. This is as true today as it was 20 years ago when the first monograph on "Women and distance education" was published, focusing on the present and future "challenges and opportunities" of this non-traditional form of education (von Prümmer, 2000).

In ODDE there is a tendency to assume that more and better equipment, more sophisticated computer programs, more powerful data transmission, and increased communication technologies equate higher quality education. Yet "better servers" in the university do not automatically mean "better service" for the students, especially with regard to gender-specific patterns in access and study conditions. ODDE must no longer ignore the social and political implications of its educational provision as this adversely affects gender equity. For instance, a focus on the technologies at the expense of the human element leads to undesirable results: Seemingly endless amounts of money are spent on hardware, and little or no money on hiring and training the staff who will have to work with this technology, or on making sure all students and staff are computer-literate. (This section draws on von Prümmer, 2004b).

There is also a tendency of funding bodies and decision-makers to focus on subject areas, which have an obvious affinity to technology such as the male-dominated fields of Computer Science and Electrical Engineering, and to be less open to developments in "non-technical" subject areas such as philosophy and literature, which are more popular with women students. To the extent that ICTs replace the traditional media and access to advanced technologies becomes an essential prerequisite for studying in the virtual university, there is an increasing danger that women will be disproportionately disbarred from entering and enjoying the virtual learning environment – unless gender issues are taken into account and the definition and construction of the virtual university is no longer left to the existing male-dominated, androcentric academic and political decision-making processes or to "market forces."

In addition to these issues, which have emerged with the advent of ODDE, we still have to contend with the unresolved gender issues of traditional open and distance education. If anything, the gendered effects of students' home also being their place of study are more pronounced in the "virtual "or" electronic" university. Not only must women students find the space and time for undisturbed studying, they now need unrestricted access to sophisticated computer equipment and fast Internet connections. They also need the know-how to operate the equipment and the inclination to work online. A gender perspective will mitigate the gender differences, which still exist and threaten the equitable participation of women in ODDE. It is necessary to recognize the danger of women being inadvertently excluded from equal access to the new online learning environments and to employ measures for ensuring equality for all.

References

AQU Catalunya. (2018). *General framework for incorporating the gender perspective in higher education teaching*. The Catalan University Quality Assurance Agency. https://www.aqu.cat/doc/doc_21331700_1.pdf Accessed 13 Dec 2021.

AU Athabasca University. (2021). *Thinking from women's lives: An introduction to women's studies*. https://www.athabascau.ca/syllabi/wgst/wgst266.html. Accessed 25 Oct 2021

Boothroyd, B. (1994). Foreword. In P. W. Lunneborg (Ed.), *OU women. Undoing educational obstacles*. New York, NY: Cassell.

Burge, E. J. (1995). Electronic Highway or weaving loom? Thinking about conferencing technologies for learning. In F. Lockwood (Ed.), *Open and distance learning today* (pp. 151–163). London, UK: Routledge.

Burge, E. J. (1988). Foreword. Light a candle, don't curse the dark. In K. Faith (Ed.), *Toward new horizons for women in distance education* (pp. vii–xiv). London, UK: Routledge.

Burge, E. J., & Lensksyj, H. (1990). Women studying in distance education: Issues and principles. *JDE, 5*(1), 20–37.

Carter, R., & Kirkup, G. (1990). *Women in Engineering*. London, UK: Palgrave.

Crutzen, C. K. (1994). *The influence of feminist theory on informatics course design*. Department of Technical Sciences, Open University of the Netherlands. http://www.cecile-crutzen.de/Downloads/1994-Influence-Feminist-Theory-on-Informatics-Course-Design.pdf. Accessed 18 Oct 2021.

Dolch, C. (2020). Toys for the boys, tools for the girls? Gender and media usage patterns in higher education. *TOJDE, 21*(3), 94–111.

Evans, T., & Grace, M. (1995). Distance education as the gendered privatization of learning. *Journal of Curriculum Studies, 27*(3), 299–315.

Faith, K. (Ed.). (1988). *Toward new horizons for women in distance education: International perspectives*. London, UK: Routledge.

Faith, K. (Ed.). (2017). *Toward new horizons for women in distance education: International perspectives* (2nd ed.). London, UK: Routledge. https://doi.org/10.4324/9781315174822.

FeU FernUniversität in Hagen. (2021). *University profile: Facts and figures*. University staff. https://www.fernuni-hagen.de/english/university/profile/facts-and-figures.shtml. Accessed 18 Oct 2021.

Hill, C., Corbett, C., & St Rose, A. (2010). *Why so few? Women in science, technology, engineering, and mathematics*. Washington, DC: American Association of University Women. https://files.eric.ed.gov/fulltext/ED509653.pdf . Accessed 20 Oct 2021.

IGNOU Indira Gandhi National Open University. (2021). *Master of arts in women's and gender studies*. School of Gender and Development Studies (SOGDS). http://www.ignou.ac.in/ignou/aboutignou/school/sogds/programmes/detail/617/2. Accessed 20 Oct 2021

Kelan, E. K. (2007). Tools and toys: Communicating gendered positions towards technology. *ICS, 10*(3), 357–382.

Kirkup, G. (1983). Women's studies 'at a distance': The new open university course. *Women's Studies International Forum, 6*(3), 273–282.

Kirkup, G. (1992). The social construction of computers: Hammers or harpsichords? In G. Kirkup & L. S. Keller (Eds.), *Inventing women: Science, technology and gender* (pp. 267–281). Cambridge, UK: Polity Press.

Kirkup, G. (1995). *The importance of gender as a category in open and distance learning*. Keynote to the Cambridge International Conference on Open and Distance Learning, Cambridge.

Kirkup, G. (1996) The importance of gender. In R. W. Mills, A. Tait (Eds.) *Supporting the learner in open and distance learning*. London, UK, Pitman, p 146–164.

Kirkup, G. (1999). A computer of one's own (with an internet connection). *Adults Learning (England), 10*(8), 23–25.

Kirkup, G., & Keller, L. S. (Eds.). (1992). *Inventing women: Science, technology and gender*. Cambridge, UK: Polity Press.

Kirkup, G., & von Prümmer, C. (1990). Support and connectedness: The needs of women distance education students. *Journal of Distance Education, 5*(2), 9–31.

Kirkup, G., & Whitelegg, E. (2013). The legacy and impact of Open University women's/gender studies: 30 years on. *Gender and Education, 25*(1), 6–22. https://doi.org/10.1080/09540253.2012.728569.

Koseoglu, S., Öztürk, H. T., Ucar, H., Karahan, E., & Bozkurt, A. (2020). 30 years of gender inequality and implications on curriculum design in open and distance learning. *JIME 2020, 1*, 5. https://doi.org/10.5334/jime.553.

Kramarae, C. (2001). *The third shift: Women learning online*. Washington, DC: American Association of University Women Educational Foundation.

Laigo, K. (2020). *Masculine vs. feminine culture: Another layer of culture*. Women in Technology International WITI. https://witi.com/articles/1824/Masculine-vs.-Feminine-Culture:-Another-Layer-of-Culture/. Accessed 20 Oct 2021

Mawson, B. (2015). *Technology: flogging a dead horse or beating the odds? University of Auckland Research Repository*. https://researchspace.auckland.ac.nz/bitstream/handle/2292/25038/ACE_Paper_3_Issue_2.pdf?sequence=1. Accessed 20 Oct 2021

McIntosh, N. E. (1977). *A degree of difference: The Open University of the United Kingdom. With Calder JA, Swift B*. New York, NY: Praeger Publishers.

Patterson, N. (2012). Distance education: A perspective from women's studies. *WOJDE, 1*(2).

Remmele, B., & Holthaus, M. (2013). De-gendering in the use of e-learning. *IRRODL, 14*(3), 27–42.

Rothschild, J. (Ed.). (1983). *Machina Ex Dea: Feminist perspectives on technology*. Elmsford, NY: NY, Pergamon Press.

Smith, E., & Norlen, V. S. (1994). Tele-distance education in women's studies: Issues for feminist pedagogy. *CJSAE, 8*(2), 29–44.

Spender, D. (1995). *Nattering on the net. Women and power in cyberspace*. Melbourne, VIC: Spinifex Press.

UMBC University of Maryland, Baltimore County. (2021). *Women's/Gender Studies Programs & Research Centers*. https://userpages.umbc.edu/~korenman/wmst/programs.html. Accessed 20 Oct 2021

van den Besselaar, P., & Sandström, U. (2017). Vicious circles of gender bias, lower positions, and lower performance: Gender differences in scholarly productivity and impact. *PLoS One, 12*(8), 1–16. https://doi.org/10.1371/journal.pone.0183301.

von Prümmer C. (1983). *Report on a study leave spent at Athabasca University, Edmonton, Canada*. Internal Paper: FernUniversität in Hagen

von Prümmer, C. (1997). *Frauen im Fernstudium. Bildungsaufstieg für Töchter aus Arbeiterfamilien. (Women in distance education. Upward mobility for working class women.)*. Frankfurt, Germany/New York, NY, Campus.

von Prümmer, C. (2000). *Women and distance education: Challenges and opportunities*. London, UK: Routledge.

von Prümmer C. (2004a). *Perspectives from global research for women in E-learning*. Keynote presented to the 1st International Forum for Women in E-Learning Conference "Dancing on the Glass Ceiling", IFWE, Phoenix, Arizona, 13–15 September 2004

von Prümmer, C. (2004b). Gender issues and learning online. Learner support in open, distance and online learning environments. In J. E. Brindley, C. Walti, & O. Zawacki-Richter (Eds.), *Learner support in open, distance and online learning environments* (pp. 179–192). Oldenburg, Germany: BIS.

von Prümmer, C. (2011). Distance education. In B. J. Bank (Ed.), *Gender and higher education* (pp. 117–124). Baltimore, MD: JHP.

von Prümmer, C., & Rossié, U. (1988). Gender-related patterns in choice of major subject or degree course at FernUniversität (West Germany). In K. Faith (Ed.), *Toward new horizons for women in distance education* (pp. 39–66). London, UK: Routledge.

Wajcman, J. (2007). From women and technology to gendered technoscience. *ICS, 10*(3), 287–298.

Wikipedia. (2021). *Women in STEM fields*. https://en.wikipedia.org/wiki/Women_in_STEM_fields. Accessed 20 Oct 2021

Zawacki-Richter, O., & von Prümmer, C. (2010). Gender and collaboration patterns in distance education research. *Open Learning, 25*(2), 95–114.

Media Usage Behaviors of Learners in ODDE 56

Ji Yae Bong and Zhichun Liu

Contents

Abstract

In the digital era and with the prevalence of media usage in open, distance, and digital education, learners increasingly use media to facilitate their learning in various ways. Media usage in today's learning environment ranges from watching a video or listening to a podcast to annotating a digital book collaboratively or sharing thoughts on Twitter. Learners demonstrate diverse media usage behaviors under different settings for different purposes. The goal of this chapter is to provide a comprehensive overview of learners' media usage in open, distance, and digital education settings. In this chapter, the authors first review the development of media usage in open, distance, and digital education, as well as learner media usage behavior as a research-agenda shift from a contemporary research

J. Y. Bong (✉)
Concordia University, Montreal, Canada
e-mail: jiyae.bong@concordia.ca

Z. Liu
University of Massachusetts Dartmouth, Dartmouth, MA, USA

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_54

and practice perspective. Next, the diverse learner typologies regarding media usage behaviors, as well as research on learner media usage and its implications, are discussed. The chapter concludes with an outlook on media usage in open, distance, and digital education and research directions in the near future. Understanding learners' media usage will guide research on how to promote learning with the facilitation of media and provide insights into the design and development of future open, distance, and digital education.

Keywords

Media usage · Instructional media · Social media · Learner behavior · Open education · Distance education · Digital education

Introduction

Open, distance, and digital education platforms are often purported to promote equity by extending education to a larger population and to empower learners by focusing on learners' agency (Bozkurt, 2019). In the digital era, this mission is closely related to the adoption of various forms of media. Media are used "to present course content and to facilitate interaction and collaboration (Dolch et al., 2021: p. 32)." As media become an increasingly important mediator between learners and open, distance, and digital education, the attendant research focus has shifted from designing or implementing instructional media to promote learning to a student-centered research agenda of investigating how learners can use media to support their own learning.

Although media and technologies are not new to learning, which relies on communication (Bateson, 1972: p. 279), the development of media has led to a wide range of media-related learning activities. In the past, distance learning relied heavily on one-way communication such as radio or instructional television (Saettler, 1990). Today, learners can actively use multimedia and social media to immerse themselves in a much more interactive, collaborative, and networked open and distance learning experience. The goal of this chapter is to review the development of media and learners' media usage, discuss the research on learners' media usage behaviors in open, distance, and digital education, and finally, provide insights to inform future research on how to understand and support learning in open, distance, and digital education settings.

Media Evolution in Open, Distance, and Digital Education: A Historical View

Open education and distance education have very long histories and cover a wide range of activities facilitated by various forms of media. The idea of open education dates back to as early as the middle ages when universities grew out of cathedral schools under the name of *stadium generale* (Peter & Deimann, 2013), which aimed at spreading knowledge within the entire Christendom regardless of nationality or boundaries (Riddle, 1993). Although media usage was minimal at that time, in the mid-eighteenth century, media started to facilitate learning via correspondence education (an early form of distance education) due to the advancement of print media. For example, in 1840 Issac Pitman offered shorthand instruction to the public via letters delivered by England's penny post (Simonson et al., 2019). Later, the development of media at the beginning of the twentieth century (e.g., motion pictures and public radio) made open and distance learning much more accessible (Saettler, 1990). As various media continued to develop, early open and distance education evolved from using print-based learning materials to multimedia and mass communication technologies (Sumner, 2000). For example, instructional television and satellite technologies helped open and distance education reach a broad population (e.g., Open University in UK and TI-IN Network in USA).

Open and distance education started to spread even more widely when it becomes digital with the onset of personal computers and Internet technologies. Although interest in computer-assisted learning garnered minimal attention before the 1980s, experimentation with this format began much earlier (Reiser, 2007). For example, IBM researchers developed the first computer-assisted instruction author language and brought it to public schools as early as the 1960s (Atkinson & Hansen, 1966). As computers and the Internet become increasingly accessible, learning options took on new forms, such as self-paced modalized learning content, interactive learning environment, real-time two-way video conferencing, and so on (Sumner, 2000).

From Learning from Media to Learning with Media

In the early stages of media development, educators and researchers focused mostly on how to design media to deliver instructional content. Proponents of different media technologies were enthusiastic about the "revolutionary change" each medium would bring to education. For example, in the 1930s, the National Education Association predicted radio in education would be as common as books, but the passion was short-lived (Reiser, 2007). Similar stories are associated with other media, such as instructional television, satellite technologies, personal computers, and more recently, MOOC. This view was described by Jonassen (1996) as learning *from* technology, because the medium is considered as nothing more than a delivery tool. Under this view, education is centered around the designers and developers of instructions and learning. For example, teachers are responsible for deciding what media technologies (e.g., print-based media, multimedia, or video conferencing) are best for delivering the instruction. However, when the content and the learning facilitated by media are ignored, these discussions are often limited (Clark, 1983).

In contrast to learning *from* media, Jonassen (1996) proposed learning *with* media. Under this view, a medium is a tool that facilitates learning. Open, distance, and digital learning today are no longer one-way communications from teachers to learners. These learning formats are now considered socially constructed activities and as networked, distributed, and collaborative activities. In this type of learning, learners take the initiative for their learning and construct their own personal learning networks. Instead of serving merely as a delivery tool, media mediate between learners and their learning. As a result, research has emerged emphasizing learners' agency and media usage behaviors. It is increasingly important to understand learners' media usage preferences and patterns so that researchers can best support their learning.

This view shift surrounding media-based learning did not happen out of thin air. Rather, it has been in concert with the development of media throughout the twenty-first century. Due to the popularity of personal devices and social media, agency surrounding educational media began to shift to the learners' side. Researchers began to notice the power of self-initiated learning from networks and communities (i.e., networked learning). For example, the American Society for Training and Development (2009) reported that 67% of the employees in business and industry were using online communities of practice to support their performance in 2008.

In a twenty-first-century context, media usage encompasses a wide range of different technologies and applications, and learners use media for different purposes. Learners now are equipped with more and more choices. Zawacki-Richter et al. (2015) surveyed 2339 students from full-time, part-time, face-to-face, and distance programs in German universities on their media preferences for learning. Across all students, the highest-rated media tools included search engines, email, printed texts, and word processing tools, while social media tools including podcasts, blogs, microblogging, and social bookmarking were not well-liked by all students. Nontraditional students (e.g., students enrolled in distance programs or part-time) reported significantly higher acceptance of many of the aforementioned e-learning tools. Thompson (2013) identified nine uses for media among college students, who often get labeled as "digital natives": (a) rapid communication technology, (b) multimedia creation, (c) active web reading and writing, (d) gaming, (e) web resource use, (f) collaborative web tool use, (g) productivity tool use, (h) microblogging, and (i) nondigital book reading. These different purposes for using media can lead to a diverse range of learning behaviors and opportunities (see Table 1). Among the nine uses, students' positive view of using rapid communication (e.g., texting) and microblogging (e.g., tweeting) for learning is mostly correlated with students seeing themselves as more "digital" in terms of claims being made about the digital generation. With the transition from traditional learning to digital, open, and distance learning, learning today is becoming very different from learning in the past.

Learning today is becoming increasingly democratized and often happens in diverse learning environments. Internet technologies and personal devices make information communication accessible at almost all times. Many families now own multiple devices. For example, more than half of US households own more than five digital devices, such as smartphones, desktops, laptops, tablets, or streaming devices (Pew Research Center, 2017). Learning today occurs in many different and informal settings (e.g., viewing a YouTube tutorial). Such types of learning opportunities are typically voluntary and embedded in real-world contexts.

Table 1 Media usage factors and potential learning opportunities and behaviors in the twenty-first century

Media factors (Thompson, 2013)	Learning opportunity/behavior examples
Rapid communication technology	Learners can use rapid communication technologies to facilitate community building and collaboration in their learning (e.g., Sotillo, 2006)
Multimedia creation	Learners can create multimedia content to reflect their learning outcomes, which engages a wide range of skills and encourages sharing within communities (e.g., Hernández-Ramos & De La Paz, 2009)
Active web reading and writing	Learners can consume and produce resources beyond print media, which can be more flexible, ubiquitous, and interactive (e.g., Behjat et al., 2012)
Gaming	Learners can construct their knowledge and acquire skills through simulated and highly interactive environments (e.g., Shute et al., 2020)
Web resource use	Learners are equipped with more accessible resources from various sources and in diverse formats (e.g., Afreen, 2014)
Collaborative web tool use	Learners can use collaborative web tools to facilitate collaboration (Chen & Chen, 2014)
Productivity tool use	Learners are equipped with productivity tools (e.g., word processing tools, spreadsheets, databases, presentation tools) to produce content in various forms.
Microblogging	Learners can share, collect, broker, negotiate, and construct knowledge through a social network linked by microblogging tools (e.g., Dennen, 2019)
Nondigital book reading	Learners can consume resources in print media

As the context of learning is becoming more diverse, learning interactions are now often mediated by social tools and rely on user-generated content. Learners can form and join communities of practice and construct knowledge collaboratively with the help of social media. Although research on the effect of incorporating social media into learning is ongoing, research has shown promising results on how social media can facilitate learning in various settings. For example, Schroeder and Greenbowe (2009) introduced Facebook as a course communication tool in an introductory chemistry course. Students enrolled in the Facebook group generated nearly four times the number of posts compared to the posts generated by students who used the learning management system.

Learners' Media Usage Behaviors

Media provide learners a range of opportunities for supporting learning practices, as discussed in the previous section. This section focuses on learners' behaviors regarding media usage. With abundant learning options, learners behave differently in diverse media-integrated learning spaces. Additionally, diverse learners do not behave in the same manner even in the same media-enhanced learning space. It is important to map the typologies of learners and understand learners' media usage behaviors in order to support their learning accordingly. Researchers have identified different typologies (i.e., types of usage patterns) due to varying areas of focus, such as different users, media, and contexts. As an effort to provide a comprehensive set of typologies, the authors intentionally chose nine media usage typologies to describe in this section. In this section, the authors describe each typology or media usage pattern and explain how the researcher(s) built it by examining its context (e.g., users, media, and learning contexts) and the set of dimensions chosen and used by the researcher(s) to distinguish usage behaviors. At the end of this section, the authors provide a list of dimensions that can be considered to identify new media usage behaviors for future studies and discuss the implications of media usage typology research.

Media Usage Typologies: Media in General

Media user typology categorizes users into distinct user types that describe the various ways individuals use different media, considering a set of dimensions such as frequency of use and variety of use (Brandtzaeg, 2010). Brandtzaeg (2010) reviewed 22 studies on media usage typologies from 2000 to 2009 and suggested the Media-User Typology (MUT), consisting of eight types of media users: (a) nonusers, (b) sporadics, (c) debaters, (d) entertainment users, (e) socializers, (f) lurkers, (g) instrumental users, and (h) advanced users (see Table 2 for definitions of each type of media user). Each type of media user demonstrates distinctive media behaviors that are explained by a set of dimensions such as frequency of use, variety of use, typical activity, and typical media platform used. This well-known typology has provided a comprehensive classification of general media usage. However, Brandtzaeg's typology did not emphasize learners and educationally relevant usage patterns, as he reviewed studies targeting different populations and involving general activities including those unrelated to learning, such as online shopping and gaming (Dolch et al., 2021).

More recently, researchers have targeted learners and identified their media usage typologies. Zawacki-Richter et al. (2015) investigated media usage patterns of traditional and nontraditional students at German universities. The researchers considered dimensions such as frequency of use, digital learning formats/tools (e.g., virtual seminars, lecture recordings, etc.), and activities (e.g., recreational use and use for learning) and identified four types or profiles of media usage patterns pertaining to students: (a) entertainment users, (b) peripheral users, (c) advanced users, and (d) instrumental users. The researchers also found that, unlike with traditional students, the proportion of instrumental users was high among non-traditional students.

Table 2 Media usage typologies: Media in general

Study subjects and authors	User types or usage behaviors
Diverse groups of users (Brandtzaeg, 2010)	Media-user typology (MUT) (a) Nonusers: Do not use any media (b) Sporadics: Use any kind of media to do nonparticular activities with low frequency and low variety of use (c) Debaters: Use media such as blogs and social networking sites (SNS) at a medium level of frequency for discussion and information acquisition and exchange (d) Entertainment users: Use new media in general at a medium level of frequency for entertainment purposes such as gaming, passively watching videos, and shopping (e) Socializers: Use SNS at a medium level of frequency to socialize, connect with friends and family, and make new acquaintances (f) Lurkers: Spend passive time using SNSs, user-generated sites, shopping, and other media in general at a medium level of use and with low variety of use (g) Instrumental users: Choose media content for information with specific intentions, such as comparing brands and promotional offers when shopping. They use media in general at a medium level and medium variety of use (h) Advanced users: Engage in diverse activities, including the activities mentioned earlier, at a high level of frequency
German higher-education students (traditional and nontraditional) (Zawacki-Richter et al., 2015)	(a) Entertainment users: Frequently use internet/online media (e.g., chats, music download/streaming, search engines, social networks, etc.) for entertainment purposes or subjective benefits (b) Peripheral users: Show low application and acceptance of all media, tools, and services (c) Advanced users: Use e-learning tools, social networks for learning, and online media for entertaining purposes (d) Instrumental users: Frequently use office software (e.g., text processing, spreadsheets, etc.)
German higher-education students (Dolch et al., 2021)	(a) Entertainment users: Use the internet, especially social media, often for leisure purposes (b) Intensive users: Use the internet, social networks, and e-learning tools for learning and use the internet for leisure. (c) Peripheral users: Comparatively show the lowest use and acceptance of media. (d) Utilitarian users: Use office software and e-learning tools often – The use of social media for learning and use of the internet for leisure were less important to the utilitarian users

Dolch et al. (2021) conducted a longitudinal study exploring changing media usage patterns of German higher education students over time (in 2012, 2015, and 2018). The identified media usage types were (a) entertainment users, (b) intensive users, (c) peripheral users, and (d) utilitarian users. The researchers considered dimensions such as frequency of use, variety of use, digital learning formats/tools, and activities to identify these four types. Approximately half of the students were entertainment users all three years, and these students used the Internet – especially social media – frequently for leisure purposes. The type of users that increased considerably over time were intensive users, who used the internet, social networks, and e-learning tools for their learning, as well as the internet for leisure. The other two types of users, peripheral users and utilitarian users, decreased slightly in 2018. The researchers assumed that their findings reflected a media trend in the use of e-learning tools. They also suggested that educators and instructional designers should improve the use of e-learning tools, SNS, and recreational tools for teaching and learning in higher education.

Media Usage Typologies: Learning-Related Usage Behaviors and Media Trends

Researchers have also explored learners' media usage patterns in more granular ways by focusing on specific usage behaviors or considering media trends such as social media and open learning platforms. First, there have been typologies or frameworks focusing on the acts of knowledge building or sharing. Dennen (2019) suggested the Networked Knowledge Activities (NKA) framework, articulating six discrete knowledge-related media user behaviors in networked learning contexts such as social media, online classrooms, or virtual communities of practice. These six behaviors are (a) collect, (b) curate, (c) share, (d) broker, (e) negotiate, and (f) construct (see Table 3 for definitions of each behavior/knowledge activity). The NKAs tend to co-occur and to flow from one to another during the learning process. Dennen et al. (2020) examined learning-related social media usage behaviors while applying the NKA framework to the archival data from six major SNS: Facebook, Twitter, Instagram, LinkedIn, Pinterest, and YouTube. The observed NKAs were discussed considering the technological affordances of the SNS. While Dennen et al.' (2020) study shows one way to capture learners' learning-related activities in informal learning contexts, it also illustrates the potential for context collapse, since SNS can be used as both learning and nonlearning spaces.

Given the prevalence of social media, researchers have examined its usage in general. Özlü and Kalyoncuoglu (2017) identified six types of higher-education student users of social media platforms in Turkey. The dimension their typology considered was cognitive use (passive and active). The types identified were (a) movers and shakers, (b) game lovers, (c) abstainers, (d) followers, (e) sharers, and (f) socializers. Breines et al. (2020) specifically targeted international distance education students and explored their nonuse of social media and developed a typology of social media nonuse. Their typology has four themes: (a) exclusion owing to access issues or the social environment on social media; (b) distrust due to

Table 3 Media usage typologies: Specific media and usage behaviors

Study subjects and authors	User types or usage behaviors
Archival data from six major SNS: Facebook, Twitter, Instagram, LinkedIn, Pinterest, and YouTube (Dennen et al., 2020)	Networked knowledge activities (NKA) framework (a) Collect: Collect items or information they find (b) Curate: Purposefully create organized or annotated collections of online items or artifacts (c) Share: Share their collected or curated items online (d) Broker: Connect online and offline groups or networks via knowledge transmission (e) Negotiate; engage in a collaborative and discursive process in which learners work together to agree upon meaning (f) Construct: Construct knowledge and create a product that can be shared with others by making something new or combining existing things in a new manner.
Higher-education student users of social media platforms in Turkey (Özlü & Kalyoncuoglu, 2017)	(a) Movers and shakers: Actively create original content and multimedia content (b) Game lovers (c) Abstainers: Use and consume content at the low level (d) Followers: Actively consume and share content as a twitter user (e) Sharers: Consume content and intensively criticize or share the content (f) Socializers: Intensively interact with content, play games, and use twitter actively, but do not create original content
International distance education students (Breines et al., 2020)	Typology of nonuse of social media (themes) (a) Exclusion owing to access issues or the social environment on social media (b) Distrust due to issues of authenticity, security, privacy, and noncollaboration (c) Distraction due to overwhelming or irrelevant information, interactions, or communication (d) Online discrimination
MOOC learners (Kizilcec et al., 2013)	(a) Completing: Completed the majority of the assessments (b) Auditing: Watched video lectures but completed assessments infrequently if at all. Also, followed the course for the majority of its duration (c) Disengaging: Completed assessments at the beginning of the course but then either disappeared from the course entirely or participated sparsely (d) Sampling: Watched video lectures for only one or two assessment periods

(continued)

Table 3 (continued)

Study subjects and authors	User types or usage behaviors
MOOC learners (Ferguson & Clow, 2015)	(a) Samplers: Watched some course videos (b) Strong starters: Completed the first assessment of the course, but then dropped out (c) Returners: Completed the assessment in the first week, returned in the next week, and then dropped out (d) Mid-way dropouts: Completed three or four assessments, but then dropped out about halfway through the course (e) Nearly there: Consistently completed assessments but then dropped out before the end of the course (f) Late completers: Completed most of the assessments, but were either late or missed out (g) Keen completers: Engaged actively and completed the course
MOOC learners (Poellhuber & Bouchoucha, 2019)	(a) Ghost: Engaged in no or almost no activity during the second and third weeks of the course (b) Browser: Viewed some videos or other resources. Their activity level was very low (c) Self-assessor: Completed most of the quizzes and tests (d) Serious reader: Actively viewed and read course materials (e) Active-independent: Actively engaged with all of the learning components/activities at least once (f) Active social: Engaged with everything that was expected in the MOOC

issues of authenticity, security, privacy, and noncollaboration; (c) distraction due to overwhelming or irrelevant information, interactions, or communication; and (d) online discrimination.

Open learning platforms, including MOOCs, have also become increasingly available to the public. Due to some of their main features such as openness and scalability, more diverse user profiles or media usage behaviors have been identified compared with those in formal learning management systems (LMS). Kizilcec et al. (2013) identified four types of behaviors: (a) completing, (b) auditing, (c) disengaging, and (d) sampling. Ferguson and Clow (2015) provided a typology that included seven profiles: (a) samplers, (b) strong starters, (c) returners, (d) mid-way dropouts, (e) nearly there, (f) late completers, and (g) keen completers. Poellhuber and Bouchoucha (2019) examined open learners' engagement quantitatively and qualitatively and identified six different MOOC user profiles. They are (a) ghost (no-shows), (b) browser, (c) self-assessor, (d) serious reader, (e) active-independent, and (f) active social. To identify MOOC learner typologies, scholars have commonly considered variables such as engagement level, type and quantity of activities/items students completed, and students' individually chosen timelines for their learning.

Dimensions in Media Usage Typologies

The studies discussed above reported different types of usage patterns because they had varying focuses, such as different users (e.g., general users, higher-education learners, workers, or open learners), different media (e.g., media in general, social media), and/or different contexts (e.g., daily life, formal, or informal learning contexts). The researchers also considered different sets of dimensions to build these typologies and media usage patterns. Many extant typologies share some common dimensions, but also contain unique dimensions or criteria. The dimensions used in previous research are summarized in Table 4. This list of dimensions is useful for researchers who want to identify new media usage typologies in their specific study contexts. The vast amount of potential media usage patterns or typologies can be captured by identifying new sets of dimensions based on those given in the summary (Table 4), as well as having different levels or categories for each dimension.

Educators and practitioners can also consider the work summarized in this chapter to assist themselves in understanding the vast diversity of learners' media usage. Additionally, these media usage behaviors or typologies can help educators and instructional designers capture both major and minor media-adoption groups of learners and their needs when designing, developing, and facilitating media-enhanced learning. Learners can also consult the summarized typologies to reflect on their media usage behaviors for learning and find different and better ways to use media to maximize their learning experiences. Typologies assist scholars engaging in research on learners' media usage behaviors. For example, researchers have made predictions regarding how diverse user types respond to different media usage patterns (Brandtzaeg, 2010). Policymakers and administrators can also consider the typologies and develop digitalization strategies (Dolch et al., 2021). Due to the increasingly complex media landscape and its diverse uses, it is challenging to characterize the nature of media usage behaviors and distinctive user profiles/types. It is also widely acknowledged that the "design" aspect of media-enhanced learning spaces plays a key role in the way learners use media. Well-designed media-enhanced learning supports learners' behaviors concerning knowledge management, creation, communication, and collaboration.

Research in Learners' Media Usage Behaviors

Researchers have studied media, technologies available for learning, and learners' media usage behaviors in diverse learning contexts. Three themes of research have expanded the media usage typology research: (a) the potential learning consequences associated with media usage, (b) factors impacting media usage behaviors

Table 4 Summary of dimensions used to identify learners' media usage behaviors or typologies

Dimensions	Levels or categories of each dimension	References
General usage		
Use or nonuse	Yes or no	Zawacki-Richter et al. (2015)
Frequency of use	• [level] very often, . . ., never • [level] several times daily, ..., never • [level] almost every day, a few times a week, between once a week and once a month, less than once a month, never	Dolch et al. (2021) and Zawacki-Richter et al. (2015)
Variety of use	• Utility oriented (often work-related). • Entertainment/hedonic usage (e.g., gaming). • Socializing. • Multiple activities.	Özlü and Kalyoncuoglu (2017) and Zawacki-Richter et al. (2015)
Media		
Media, tools, programs	• All/different media including internet in general, e-learning tools, and office software. • Social media. • Open learning platforms (e.g., MOOCs).	All studies reviewed
Digital formats/functions	• Online-media: Chats, music download/streaming, social networks, wikis, search engines, etc. • Digital learning formats: Virtual seminars, web-based trainings, e-portfolios, virtual labs, lecture recordings, online-tests, podcast, etc.	Dolch et al. (2021) and Zawacki-Richter et al. (2015)
Perceived acceptance	• [level] very useful, . . ., not useful at all • [level) very important, . . ., not important at all	Dolch et al. (2021) and Zawacki-Richter et al. (2015)
Learning activity preferences		
Cognitive use	• [passive use] accessing content/information acquisition/consuming content (e.g., news) • [active use] creating and sharing content.	Özlü and Kalyoncuoglu (2017)
Knowledge management	• Collecting content/items. • Curating content/items.	Dennen (2019) and Dennen et al. (2020)
Communication	• Forming study groups, etc. • Sharing collected or curated items online. • Connecting groups of people or networks via knowledge transmission (broker). • Engaging in collaborative and discursive processes in which learners work together to agree upon meaning (negotiate).	Dennen (2019); Dennen et al. (2020) and Dolch et al. (2021)

(continued)

Table 4 (continued)

Dimensions	Levels or categories of each dimension	References
	• Constructing knowledge and creating a product that can be shared with other learners.	
Learning activity preferences in specific online learning platforms (e.g., MOOCs)		
Quantity of activities	• (level) none, low (one or two), medium, high (the majority of resources/activities)	Ferguson & Clow (2015); Kizilcec et al. (2013) and Poellhuber & Bouchoucha (2019)
Variety of use (activities)	• Reading/watching/browsing/auditing content. • Social activities. • Discussions. • Assessment items (e.g., quizzes, tests).	
Individually chosen timeline for learning	• Engaged at the beginning of the course (e.g., the first and second weeks). • Engaged halfway through the course. • Engaged in the majority of the course's duration. • Engaged but late.	

in learning, and (c) challenges of media usage. First, the research has examined the associations between the use of different or multiple media (e.g., e-learning tools, web 2.0 applications, and/or social media) for specific learning purposes (versus in general) and its positive consequences such as attention, engagement (behavioral, cognitive, and emotional), motivation, creativity, critical thinking, collaboration, interaction, positive learning attitudes, academic performance (knowledge, skills, and GPA), and access to professional communities (Barton et al., 2021; Carpenter & Harvey, 2020; Greenhow et al., 2020). These researchers have argued that learners' knowledge activities (e.g., exchanging knowledge, discussion, interaction, and networking) are the main mediators in the relationship between media use and positive learning effects (Gulzar et al., 2021). A handful of researchers also specified the relationship between media usage and positive consequences by adding new factors (e.g., facility conditions, performance expectancy, effort expectancy) or rearranging the constructs to find predictors or moderators (Barton et al., 2021; Rahman et al., 2021). By classifying learners' behaviors, purposes, and consequences, researchers have been capturing the nuances and inferring what could be beneficial to learning from learners' media usage.

Researchers have further discussed the critical factors influencing media-enhanced learning and learners' different behavior patterns. Personal factors include digital literacy, social media competencies, perceived usefulness of digital media, and digital media self-efficacy (Pumptow & Brahm, 2020; Zawacki-Richter, 2009). Situational or cultural factors include countries or regional areas that have poor technical infrastructures or a lack of adequate Internet provision. To overcome this challenge, some countries use mobile or smart devices rather than computers and make online materials or open educational resources (OER) available (Conole, 2014). Relatedly, Breines et al. (2020) have pointed out that research on social media use typologies has predominately been led by scholars who conduct empirical studies in western countries from western imperatives. Breines et al. (2020) highlighted that researchers should focus more attention on developing countries and to the social media nonuse phenomenon. There are also studies targeting specific groups of learners, such as educators and first-generation college students. For example, Deng et al. (2021) identified the constructs shaping first-generation college students' social media use (social, cognitive, and hedonic) and their academic experiences (academic support, emotional support, and distractions impeding work). Their findings revealed that first-generation students differed from their peers in social media use and perceptions.

Although media technologies hold many promises, learners may not always engage in the best practices. Researchers have also examined the challenges of media use for learning purposes, as well as learners' inappropriate uses of media and the negative outcomes. For example, challenges in using social media for learning purposes include content quality issues and learning resources at the low level of cognitive demands (Carpenter & Harvey, 2020). The open nature of social or other media can also cause "context collapse" risks (Marwick & Boyd, 2011), such as reaching almost infinite and unintended audiences and the possibility of being misinterpreted by audiences (Carpenter & Harvey, 2020).

Future of Learners' Media Usage

Future Directions of Research in Learners' Media Usage

Though the literature on learners' media usage is growing, learner media usage continues to evolve as technologies progress. More empirical research identifying learners' usage behaviors in new media and exploring the association among existing and new factors, as reported by a number of researchers, is necessary (Pumptow & Brahm, 2020). Additionally, many extant studies were conducted in higher education or informal learning contexts. There has been a lack of research on educational or knowledge activities occurring within and around social media and their connections to K-12 teaching and learning practices (Greenhow et al., 2020). Research on creating and testing educational programs or other interventions in promoting new media use for learning would be another helpful addition to the current discussion in this area. More research focusing on nondesired media usage behaviors, such as nonuse or the low-level of cognitive activities in media-enhanced learning contexts, and more research targeting developing countries and minority groups of learners should also be conducted.

More importantly, future studies should focus on well-designed media-enhanced learning experiences, grounded in robust media or learning theories. This area represents a current weakness of the field. Only a few studies in the field have used theories or theoretical frameworks, such as Uses and Gratification (U&G) theory (Katz et al., 1973), the 4C framework (Milligan et al., 2014), the Technology Acceptance Model, or Expectancy-Value theory (Palmgreen & Rayburn, 1985). These theories have been used to explain learners' media usage. With the understanding of why and how learners use media to facilitate learning, researchers should focus on building empirical evidence for how to design better learning experiences with media.

Another direction for future research is better measurement of media usage through analytic technologies. So far, many researchers have relied solely on self-report to measure quantities and forms of media use. Parry et al. (2021) assessed the alignment between self-reported and log-based measures to test the validity of self-reports using pre-registered meta-analysis. They reported that self-reports on media use did not accurately reflect the logged media use. Their findings are consistent with ongoing criticisms of self-reported measures in human behavior (Kuncel et al., 2005). This raises concerns about the validity of studies on self-reported media use, and researchers should carefully design their measures to address this issue. With modern analytic technologies, researchers can track, analyze, and predict learners' media usage behaviors at a much finer grain and with much higher precision. For example, recently, Wu (2021) has analyzed Facebook group messages through natural language processing to represent learners' cognitive engagement and predict academic performance.

Future of Media Development

As new forms of media emerge, the field should change to reflect the new learning possibilities that these new media bring. In the past few decades, multimedia technologies have expanded the channels of learning and Internet technologies have widened the borders of learning. Opportunities, contexts, and methods for learning have never been so diverse. Similar to the ways learning has evolved through these developments in media technologies, new technologies will bring impacts, changes, and challenges to learning in the future. Three themes for the near future of the evolution of distance, open, and digital learning are predicted:

First, future digital learning experiences will become increasingly immersive and interactive with the help of extended reality (XR) technologies. XR refers to a collection of media technologies that aim at combining virtual and real environments (e.g., virtual reality, augmented reality, mixed reality). Previous media (e.g., multimedia and Internet technologies) are primarily accessed through a digital device with a screen interface. This setup separates learners from real-world settings and draws them into a virtual world, which has caused many problems, including a lack of social presence. The goal of XR technologies is to bring an immersed learning experience to learners by either simulating real-world settings or merging the virtual world and real world (Kang et al., 2021). With XR, learners may demonstrate more complex media usage behaviors. Additionally, media behavior will no longer only refer to the usage of one or more specific tools. Instead, it will be immersed with real-world interactions and embedded in authentic settings.

Second, due to the advancement of artificial intelligence technologies, digital learning experiences will be more personalized and adaptive in the future. Although artificial intelligence technologies per se are not necessarily a medium, they constitute an important component of future media by mediating learners and their learning. The research endeavors in this field help to (a) better capture learners' complex media usage behaviors and their relationships to learning and (b) design and deliver a more personalized learning experience. Matching the most appropriate learning module or support to learners relies on an accurate estimation of students' cognitive and affective states (Liu et al., 2020). With machine learning and deep learning technologies, learning systems can model and understand the complexities in learner behaviors and then make personalized learning experiences possible.

Third, learning in the future will become even more accessible, connected, and equitable with networked technologies. Networked technologies have been developing at a very high speed over the past two decades. The ubiquity of the media (e.g., Internet of Things) will make learning no longer reliant on one or limited devices or places – it can happen virtually anywhere and anytime. Further, learners worldwide will no longer be isolated in their own local communities. Online communities interconnect with offline communities, and the distance between learners is going to be increasingly closer. This should lead to a more equitable and open future of learning. Technologies like blockchain will further help to break the boundaries between local institutes. For example, learning certificates will be stored distributedly around the world and be able to be recognized by everyone (Gräther et al., 2018). New media and technologies will provide both opportunities and challenges for learners. Researchers should identify the new media usage patterns and guide educators and practitioners to understand learners' behaviors and needs when designing and facilitating learning with new media in diverse contexts.

Conclusion

As a wide range of different media, technologies, and applications have become available to twenty-first-century learners, views on the roles of media and instruction have also shifted. A perspective that once upheld teacher-centered practices and considered media almost solely as a tool for content delivery is now being supplanted by the concept of learning with media as people begin to support learner-initiated practices.

Learners use media for different purposes in diverse learning contexts. Therefore, it is increasingly important to understand learners' media usage preferences, behaviors, and patterns so that educators, researchers, and other stakeholders can provide appropriate, relevant support. This chapter described the media evolution in open, distance, and digital education and discussed diverse typologies and media usage behaviors, as well as the current research on learner media usage and future directions for research.

The diversity of typologies and media usage behaviors were identified, due to the different focuses of extant studies, such as the specific media, groups of users, contexts, and/or knowledge-related activities under study. Typologies and media usage patterns have also been developed based on combinations of the selected dimensions or criteria by researchers applying these combinations to their study contexts. The summary of the dimensions provided in this chapter can be useful to gaining insight into the vast amount of different media usage patterns that could be captured in different settings.

Today, media technologies are more prevalent than ever, and as a result, learning should be more accessible than ever. Nevertheless, challenges in learning with media persist. Therefore, understanding learners' media usage will be instrumental to research seeking to promote learning with the facilitation of media and will provide insights into the design and development of future and better open, distance, and digital education.

References

Afreen, R. (2014). Bring your own device (BYOD) in higher education: Opportunities and challenges. *International Journal of Emerging Trends & Technology in Computer Science, 3*(1), 233–236.

American Society for Training & Development. (2009). *2009 State of the industry report*. Alexandia, VA

Atkinson, R. C., & Hansen, D. N. (1966). Computer assisted instruction in initial reading: The Stanford project. *Reading Research Quarterly, 2*, 5–25.

Barton, B. A., Adams, K. S., Browne, B. L., & Arrastia-Chisholm, M. C. (2021). The effects of social media usage on attention, motivation, and academic performance. *Active Learning in Higher Education, 22*(1), 11–22. https://doi.org/10.1177/1469787418782817.

Bateson, G. (1972). *Steps to an ecology of mind: Collected essays in anthropology, psychiatry, evolution, and epistemology*. Chicago, IL: Chicago University Press.

Behjat, F., Yamini, M., & Bagheri, M. S. (2012). Blended learning: A ubiquitous learning environment for reading comprehension. *International Journal of English Linguistics, 2*(1), 97–106. https://doi.org/10.5539/ijel.v2n1p97.

Bozkurt, A. (2019). From distance education to open and distance learning: A holistic evaluation of history, definitions, and theories. In *Handbook of research on learning in the age of transhumanism* (pp. 252–273). IGI Global.

Brandtzaeg, P. B. (2010). Towards a unified media-user typology (MUT): A meta-analysis and review of the research literature on media-user typologies. *Computers in Human Behavior, 26*(5), 940–956. https://doi.org/10.1016/j.chb.2010.02.008.

Breines, M. R., Madge, C., & Dalu, M. T. B. (2020). Social media among African students: Recentring typologies of non-use. *Digital Geography and Society, 1*. https://doi.org/10.1016/j.diggeo.2020.100006.

Carpenter, J. P., & Harvey, S. (2020). Chapter 2: Perceived benefits and challenges of physical educators' use of social media for professional development and learning. *Journal of Teaching in Physical Education, 39*(4), 434–444. https://doi.org/10.1123/jtpe.2020-0002.

Chen, C. M., & Chen, F. Y. (2014). Enhancing digital reading performance with a collaborative reading annotation system. *Computers & Education, 77*, 67–81. https://doi.org/10.1016/j.compedu.2014.04.010.

Clark, R. E. (1983). Reconsidering research on learning from media. *Review of Educational Research, 53*(4), 445–459.

Conole, G. (2014). The use of technology in distance education. In *Online distance education: Towards a research agenda* (pp. 217–236). AU Press, Athabasca University.

Deng, X., Fernández, Y., & Zhao, M. (2021). Social media use by first-generation college students and two forms of social capital: A revealed causal mapping approach. *Information Technology & People*. https://doi.org/10.1108/ITP-01-2018-0002.

Dennen, V. P. (2019). Activity interactions in online courses. In M. G. Moore & W. Diehl (Eds.), *Handbook of distance education*. New York, NY: Routledge.

Dennen, V. P., Word, K., Adolfson, D., Arechavaleta, V., He, D., Hsu, C. W., Hur, J., Jung, D., Kent, H., Russell, A., & Toth, K. (2020). Using the networked knowledge activities framework to examine learning on social networking sites. In *Proceedings of the international conference on Web-based Communities and Social Media* (pp. 165–172).

Dolch, C., Zawacki-Richter, O., Bond, M., & Marin, V. I. (2021). Higher education students' media usage: A longitudinal analysis. *Asian Journal of Distance Education, 16*(1), 31–53. https://doi.org/10.5281/zenodo.4585372.

Ferguson, R., & Clow, D. (2015). Consistent commitment: Patterns of engagement across time in Massive Open Online Courses (MOOCs). *Journal of Learning Analysis*, 2(3), 55–80. http://doi.org/10.18608/jla.2015.23.5

Gräther, W., Kolvenbach, S., Ruland, R., Schütte, J., Torres, C., & Wendland, F. (2018). Blockchain for education: Lifelong learning passport. In *Proceedings of 1st ERCIM Blockchain Workshop 2018. European Society for Socially Embedded Technologies* (EUSSET).

Greenhow, C., Galvin, S. M., Brandon, D. L., & Askari, E. (2020). A decade of research on K-12 teaching and teacher learning with social media: Insights on the state of the field. *Teachers College Record., 122*(6).

Gulzar, M. A., Ahmad, M., Hassan, M., & Rasheed, M. I. (2021). How social media use is related to student engagement and creativity: Investigating through the lends of intrinsic motivation. *Behaviour & Information Technology*. https://doi.org/10.1080/0144929X.2021.1917660.

Hernández-Ramos, P., & De La Paz, S. (2009). Learning history in middle school by designing multimedia in a project-based learning experience. *Journal of Research on Technology in Education, 42*(2), 151–173. https://doi.org/10.1080/15391523.2009.10782545.

Jonassen, D. H. (1996). *Computers in the classroom: Mindtools for critical thinking*. Columbus, OH: Merrill/Prentice Hall.

Kang, J., Diederich, M., Lindgren, R., & Junokas, M. (2021). Gesture patterns and learning in an embodied XR science simulation. *Educational Technology & Society, 24*(2), 77–92.

Katz, E., Haas, H., & Gurevitch, M. (1973). On the use of the mass media for important things. *American Sociological Review, 38*(2), 164–181.

Kizilcec, R. F., Piech, C., & Schneider, E. (2013, April). Deconstructing disengagement: Analyzing learner subpopulations in massive open online courses. In *Proceedings of the Third International Conference on Learning Analytics and Knowledge* (pp. 170–179). https://doi.org/10.1145/2460296.2460330

Kuncel, N. R., Credé, M., & Thomas, L. L. (2005). The validity of self-reported grade point averages, class ranks, and test scores: A meta-analysis and review of the literature. *Review of Educational Research, 75*(1), 63–82.

Liu, Z., Moon, J., Kim, B., & Dai, C. P. (2020). Integrating adaptivity in educational games: A combined bibliometric analysis and meta-analysis review. *Educational Technology*

Research and Development, 68(4), 1931–1959. https://doi.org/10.1007/s11423-020-09791-4.
Marwick, A. E., & Boyd, D. (2011). I tweet honestly, I tweet passionately: Twitter users, context collapse, and the imagined audience. *New Media & Society, 13*(1), 114–133. https://doi.org/10.1177/1461444810365313.
Milligan, C., Littlejohn, A., & Anoush, M. (2014). Workplace learning in informal networks. *Journal of Interactive Media in Education, 1*(6). https://doi.org/10.5334/2014-06.
Özlü, M., & Kalyoncuoglu, S. (2017). Grouping university students according to their social media usage behaviours. *İnternet Uygulamaları ve Yönetimi Dergisi, 8*(2), 5–29. https://doi.org/10.5505/iuyd.2017.97269.
Palmgreen, P., & Rayburn, J. D. (1985). A comparison of gratification models of media satisfaction. *Communications Monographs, 52*(4), 334–346.
Parry, D. A., Davidson, B. I., Sewall, C. J. R., Fisher, J. T., Mieczkowski, H., & Quintana, D. (2021). A systematic review and meta-analysis of discrepancies between logged and self-reported digital media use. *Nature Human Behaviour*, 1–13.
Peter, S., & Deimann, M. (2013). On the role of openness in education: A historical reconstruction. *Open Praxis, 5*(1), 7–14. https://doi.org/10.5944/openpraxis.5.1.23.
Pew Research Center. (2017). *A third of Americans live in a household with three or more smartphones*. https://www.pewresearch.org/fact-tank/2017/05/25/a-third-of-americans-live-in-a-household-with-three-or-more-smartphones/
Poellhuber, B., Roy, N., & Bouchoucha, I. (2019). Understanding participant's behaviour in massively open online courses. *International Review of Research in Open and Distributed Learning, 20*(1). https://doi.org/10.7202/1057981ar.
Pumptow, M., & Brahm, T. (2020). Students' digital media self-efficacy and its importance for higher education institutions: Development and validation of a survey instrument. *Technology, Knowledge, and Learning, 1–21*. https://doi.org/10.1007/s10758-020-09463-5.
Rahman, T., Kim, Y. S., Noh, M., & Lee, C. K. (2021). A study on the determinants of social media based learning in higher education. *Educational Technology Research and Development*, 69, 1325–1351. https://doi.org/10.1007/s11423-021-09987-2
Reiser, R. A. (2007). A history of instructional design and technology. In *Trends and issues in instructional design and technology* (3rd ed.). Boston, MA: Pearson.
Riddle, P. (1993). Political authority and university formation in Europe, 1200–1800. *Sociological Perspectives, 36*(1), 45–62.
Saettler, P. (1990). *The evolution of American educational technology*. Englewood, CO: Libraries Unlimited.
Schroeder, J., & Greenbowe, T. J. (2009). The chemistry of Facebook: Using social networking to create an online community for the organic chemistry laboratory. *Innovate: Journal of Online Education, 5*(4), 3.
Shute, V. J., Smith, G., Kuba, R., Dai, C. P., Rahimi, S., Liu, Z., & Almond, R. (2020). The design, development, and testing of learning supports for the physics playground game. *International Journal of Artificial Intelligence in Education, 1–23*. https://doi.org/10.1007/s40593-020-00196-1.
Simonson, M., Zvacek, S. M., & Smaldino, S. (2019). *Teaching and learning at a distance: Foundations of distance education* (7th ed.). Charlotte, NC: Information Age Publishing, Inc.
Sotillo, S. M. (2006). Using instant messaging for collaborative learning: A case study. *Innovate: Journal of Online Education, 2*(3).
Sumner, J. (2000). Serving the system: A critical history of distance education. *Open Learning: The Journal of Open, Distance and e-Learning, 15*(3), 267–285. https://doi.org/10.1080/713688409.

Thompson, P. (2013). The digital natives as learners: Technology use patterns and approaches to learning. *Computers & Education, 65*, 12–33. https://doi.org/10.1016/j.compedu.2012.12.022.

Wu, J. Y. (2021). Learning analytics on structured and unstructured heterogeneous data sources: Perspectives from procrastination, help-seeking, and machine-learning defined cognitive engagement. *Computers & Education, 163*, 104066. https://doi.org/10.1016/j.compedu.2020.104066.

Zawacki-Richter, O. (2009). Research areas in distance education: A Delphi study. *International Review of Research in Open and Distributed Learning, 10*(3). https://doi.org/10.19173/irrodl.v10i3.674.

Zawacki-Richter, O., Müskens, W., Krause, U., Alturki, U., & Aldraiweesh, A. (2015). Student media usage patterns and non-traditional learning in higher education. *The International Review of Research in Open and Distance Learning, 16*(2), 136–170. https://doi.org/10.19173/irrodl.v16i2.1979.

57 Synchronous Tools for Interaction and Collaboration

Patrick R. Lowenthal

Contents

Abstract

The history of distance education in many ways is a history about the evolution of synchronous and asynchronous communication technologies. Distance education, and online learning in particular, has primarily relied on asynchronous communication technologies over the years. However, COVID-19 has sparked a new interest in using synchronous tools for interaction and collaboration in open, distance, and digital education. Given this it is incumbent upon educators and researchers alike to be familiar not only with the current iteration of synchronous communication technologies but also with how they have developed and evolved over time, the affordances and constraints of synchronous communication, interaction, and collaboration, some of the different types, and the overall implications for future research and practice.

P. R. Lowenthal (✉)
Boise State University, Boise, ID, USA
e-mail: patricklowenthal@boisestate.edu

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_55

Keywords

Synchronous communication · Asynchronous communication · Real-time communication · Chat · Audioconferencing · Video conferencing · Web conferencing

Introduction

Open, distance, and digital education have evolved almost overnight with the demands of the COVID-19 pandemic. To be clear, open, distance, and digital education are not new. Distance education in the form of correspondence education dates back to the 1800s (Wedemeyer, 1981); open education, in the form of open universities, has been around since the 1960s (Tait, 2008); and digital education in its various forms (e.g., radio, television, online) has evolved throughout the last 100 years (Casey, 2008; Saba, 2011; Saettler, 2004). However, even with college enrollments in online learning consistently growing, and recently outpacing traditional in-person enrollments, before COVID-19, only about a third of students took online courses, and fewer instructors taught online (see Jaschik & Lederman, 2016; Seaman, Allen, & Seaman, 2018). This all changed with COVID-19. Within a couple of months, nearly every teacher and student on the planet gained some experience with distance and digital education (Stewart, 2021). However, as others have pointed out, the actual implementation of distance and digital education during COVID-19 has been more often than not an ad hoc version of distance and digital education (Hodges, Moore, Lockee, Trust, & Bond, 2020). Most colleges and universities found themselves with little time and resources and often little if any prior experience with distance education. Confronted with the need to continue teaching traditional in-person face-to-face courses at a distance, many faculty chose to simply hold classes online in live synchronous web meetings using web conferencing tools like Zoom, Google Meet, Microsoft Teams, or Webex (Dias, Lopes, & Teles, 2020; Lederman, 2020a, b). Web conferencing tools like these have enabled instructors and students to meet at the same time as their normally scheduled class but from a distance during COVID-19. These tools have also enabled administrators, faculty, and staff to work successfully from a distance during the pandemic (Lowenthal, West, Archambault, Borup, & Belt, 2021). Despite some of the challenges that arose with using these tools, many people suspect that communication technologies like these will continue and increasingly be used in both inside and outside of the classroom in various capacities in higher education when this pandemic is over (Dias et al., 2020; Lowenthal et al., 2021). Therefore, it is incumbent upon educators and researchers alike to be familiar not only with the current iteration of synchronous communication technologies but also with how they have developed and evolved over time, the affordances and constraints of synchronous communication, interaction, and collaboration, some of the different types, and the overall implications for future research and practice.

Evolution of Synchronous Communication in Distance Education

Synchronous communication is communication that happens at the same time or what some describe as in real-time (e.g., communicating in-person face-to-face, talking over the phone, meeting in a web conference). Synchronous communication is usually compared and differentiated from asynchronous communication in which communication does not happen at the same time or in real-time (e.g., when sending a letter or an email). The history of distance education in many ways is a history about the evolution of synchronous and asynchronous communication technologies. As new technologies, and specifically communication technologies, were developed, educators have experimented with how they could be used for teaching and learning (Garrison & Anderson, 2003). Over the years, as new forms of communication technology have become more mainstream, forms of distance education using that new technology have increased in popularity as educators gained more familiarity and expertise with using it (Garrison & Anderson, 2003; Harasim, 2000).

Most people trace the history of distance education back to early forms of correspondence study in the 1800s (McIsaac & Gunawardena, 1996). This early form of distance education relied on asynchronous communication via the postal service; students would receive lessons in the mail and then mail the completed lessons back to a tutor to correct them (Bower & Hardy, 2004). This early form of distance education enabled learners to be able to learn essentially from any place and at any time–an ideal and defining characteristic of distance education (see Garrison, 2009). However, due to the reliance on the postal service, there was little interaction between a student and a tutor.

During the 1920s, educators began experimenting with using radio and then later television to broadcast lessons for people to learn at a distance (Casey, 2008; Saba, 2011). This new form of broadcasting distance education enabled educators to communicate with a larger audience while still being able to learn from anywhere that had access to the broadcast. Despite these advantages, it strayed away from the ideal that one could learn at any time. It also did not provide a way for learners to interact with their instructor or peers and therefore did not enable back and forth synchronous communication and interaction (McIsaac & Gunawardena, 1996). This type of distance education continues to persist, even today, but it still has never arguably become mainstream, likely because of issues like this as well as issues of the cost, infrastructure, and planning required to deliver this type of distance education. Thus, broadcasting forms of distance education were never able to fully replace earlier forms of correspondence study (Garrison & Anderson, 2003; McIsaac & Gunawardena, 1996). Instead, advances in recording technology enabled educators the ability to supplement correspondence study print materials with audio and video cassettes, thus preserving the benefits of being able to learn from anywhere, at any time (Gunawardena & McIsaac, 2004; McIsaac & Gunawardena, 1996).

This all began to change during the 1980s. Educators were interested in finding better ways to not only share instructional materials but also to communicate and interact with students from a distance. As the rise of the Internet and personal computers grew during the 1980s, educators began to experiment with using computer-mediated communication to communicate and interact with groups of learners from a distance (Harasim, 1986, 2000; Moore, 1989). For instance, Linda Harasim (1986) is often attributed with offering the first for-credit online course in 1986 in which she had a group of learners posting in text-based asynchronous discussion forums over the course of a semester. While it took some time to catch on and grow, online learning became the most prevalent form of distance education during the 1990s and 2000s (Rovai, 2009). These early iterations of online learning largely relied on asynchronous text-based communication (i.e., email and discussion boards) to interact, communicate, and collaborate with one another.

Online learning has continued to grow over the years. However, even long before COVID-19, many argued that there was not one type of online learning (Lowenthal, Wilson, & Parrish, 2009; Moore, Dickson-Deane, & Galyen, 2011). Rather, online learning has manifested itself in different ways based not only on its use of technology but also other situational factors (e.g., for credit vs. not for credit; synchronous vs. asynchronous; self-paced vs. group paced). Academics have tried to develop taxonomies to help differentiate and make sense of these differences (Garrison & Anderson, 2003). With that said, early on and in many ways still to this day, one of the most common ways to differentiate online learning is by how instructors and students meet, interact, and communicate with each other. Thus, educators have often simply differentiated between in-person face-to-face, blended/ hybrid, and online courses–and more specifically, between synchronous or asynchronous online courses. As helpful as it can be to describe and differentiate online courses in this manner, it fails to recognize that few courses have ever truly been 100% synchronous or asynchronous. For instance, even courses that primarily used and relied on synchronous communication (e.g., instant messaging, web conferencing) also used other forms of asynchronous communication (e.g., email, a discussion forum, or a grade book in a learning management system); just as courses that relied heavily on asynchronous communication might use synchronous forms of communication to some degree (e.g., initial kickoff meetings on campus, phone calls, proctored exams or office hours on campus). As web conferencing technology has advanced and become more reliable during the last decade, educators have increasingly experimented with intentionally using both synchronous and asynchronous communication in online courses; some have described this practice as "blended online learning" (Fadde & Vu, 2014; Power, 2008) while others have more recently described it as bichronous learning (Martin, Polly, & Ritzhaupt, 2020). Around the same time, others began experimenting with providing even more flexibility by blending all possible course formats into what has been referred to as multi-access (Irvine, 2009; Irvine, Code, & Richards, 2013) and hybrid-flexible course design or HyFlex (Beatty, 2007, 2019). These types of courses have attempted to be what Smith, Reed, and Jones (2008) referred to as mode neutral, enabling students to choose to attend courses in person or online–whether synchronously or asynchronously–each week.

A few things are clear. Distance education has continued to evolve over the years. This evolution has been influenced in part by advances in technology as well as a desire to balance the ideals of anytime anywhere learning with regular interaction and collaboration. Early adopters have been eager over the years to experiment with new technologies; however, ultimately it is the pedagogy and perceived affordances and not simply the technology that influences which new iterations persist and grow (Garrison & Anderson, 2003; Irvine, 2020; Lowenthal & Mulder, 2017). Putting issues of labeling and semantics aside, boundaries between in-person face-to-face and online learning are disappearing with the help of COVID-19; most courses in higher education in the coming years will likely entail a blend of synchronous and asynchronous communication. But questions remain on which types of tools one should use and why.

Affordances and Constraints of Synchronous Communication

Online learning, from the first online course during the 1980s until today, has relied mostly on asynchronous text-based communication (Peterson et al., 2018). As mentioned earlier, this has enabled instructors and students to interact, collaborate, and ultimately learn from any time and from any place. However, despite affordances like these, people have been skeptical and even overtly critical of online learning, largely because of the perceived drawbacks of text-based asynchronous communication (Lowenthal & Dunlap, 2020; Oztok et al., 2013). Education is a social process that relies on social interaction and communication. Text-based asynchronous communication, though, has been criticized over the years for being inherently task-based and inadequate with relational and social communication (Lowenthal, 2010). More specifically, people have pointed out how text-based asynchronous communication lacks visual cues, takes time for conversations to develop, and can lead to misunderstanding or in educational settings it can feel like busywork (Gao et al., 2013; Fadde & Vu, 2014; Murphy & Coleman, 2004).

Research suggests, though, that synchronous communication might be able to address many of the challenges of text-based asynchronous communication (Johnson, 2006; Watts, 2016). For instance, synchronous communication, whether text-based (e.g., chat), audio-based (e.g., conference call), or video-based (e.g., web conferencing), happens in real-time. Communicating in real-time makes communication more efficient; it can help solve problems and clarify meaning by enabling one to pick up on one's tone and to ask follow-up questions, which in turn can help improve not only overall communication but ultimately the ability to collaborate (Lowenthal et al., 2017; McDaniels et al., 2016). In addition to the affordances of real-time communication, video-based synchronous communication enables people the ability to look others in the eyes, see their body language, and improve affective communication by establishing immediacy and social presence (Belt & Lowenthal, under review; Hrastinski, 2008; Park & Bonk, 2007; Parker & Martin, 2010). Web conferencing applications, in particular, enable participants the ability to share and view, discuss, and create materials in real-time–and even record meetings for later (asynchronous) viewing (Snyder & Garner, 2020).

However, despite the affordances of synchronous communication, it is not a panacea; there are a number of notable constraints with synchronous communication. Perhaps most notable is that synchronous communication requires participants to meet in real-time, at the same time. It can be challenging, and sometimes even impossible, to find a time that works for everyone to meet–especially, when students might live across the world or simply have busy lives or nontraditional work schedules (Liu & Alexander, 2017; Lowenthal et al., 2020; Themelis, 2014). People also regularly face technical difficulties when using web conferencing applications, such as poor audio or video quality, often due to poor broadband connectivity (Lowenthal et al., 2021). Broadband issues, coupled with practices to require students to turn on their webcam, can also highlight inequities and aspects of students' lives that they could keep private in text-based asynchronous discussions (Bali & Meier, 2014). At the same time, affordances are lost when all or most students keep their webcam off or when the enrollment is so high that it makes it difficult to make eye contact, view one's body language, or even see all students webcam (see Day & Verbiest, 2021; Dennen, Word, & Arslan, 2021; Lowenthal et al., 2021). This is not to mention how class sessions held in web conferencing applications can turn into long lectures, which can encourage disengagement, distraction, and multitasking and result in students feeling frustrated and even exhausted (Lowenthal et al., 2020; Schulman, 2020).

Overview of Synchronous Tools

Educators have used a variety of synchronous tools over the years to improve interaction, communication, and collaboration in open, distance, and digital education. In the following section, some of the main types of synchronous tools used by educators, how they have been used and are currently used, and some relatively newer and emerging synchronous tools will be discussed.

Audio-based Tools: Telephone and Audio Teleconferencing

The telephone was the first widespread tool used in distance education for real time two way communication (Barron, 2004). Educators began experimenting with using the telephone for real time communication in the 1930s and 1940s but it did not become more commonplace until the 1970s and 1980s with audio teleconferencing (Garrison, 1985). There were four main ways that educators used the telephone as an instructional aid during the 1970s (i.e., teleteaching, telelecturing, dial-access, tele-tutoring; Flinck, 1975). Then, during the 1980s, universities even began offering "audio courses" for college credit (Olgren, 1997). This all became possible because as Garrison (1985) explains,

> audio teleconferencing built upon the foundation of correspondence study by enhancing the quality of the interactive process among students and teacher. The ability of the student to receive immediate feedback from the teacher as well as fellow students without a corresponding loss of independence is a significant development in distance education. (p. 237)

Advances in telecommunications soon enabled educators to supplement audio teleconferencing with images or data transmissions (i.e., audiographic conferencing) and then video (Wolcott, 1994). But when people talk about audio-based synchronous tools in distance education, they are usually focusing on what Garrison (1985) referred to as the second generation of distance education and differentiating it from video or web conferencing (which will be discussed later). The telephone–whether that be with traditional landlines, cell phones, or VOIP (e.g., Skype)–is still used today to supplement distance education, however, it is often used more for one-to-one communication between an instructor and a student (Dunlap & Lowenthal, 2010). And while this is not scalable in many ways, Garrison (1985) pointed out that "the use of the telephone by a teacher for instructional purposes is perhaps the most personalized use of telecommunications in distance education" (p. 237).

While a telephone or audio teleconferencing can add two-way real-time communication to distance education and online learning, it still (for the most part) lacks a visual channel and therefore as Wolcot early on pointed out "the abilities to both convey messages and to relate interpersonally is strained when the participants cannot see one another" (p. 141).

Text-based Tools: Chat and Messaging

Another common type of synchronous tools used in open, distance, and digital education are text-based chat and messaging tools. Text-based chat dates back to the early days of the Internet (Chatterjee, Abhichandani, Li, TuIu, & Byun, 2005). While the technology and features have changed over the years (e.g., Many chat applications today also enable video and/or asynchronous features), even in the early day's text-based chat was defined by short, rapid, text-based conversations happening in real time (Preece, Maloney-Krichmar, & Abras, 2003). These chat and messaging tools essentially could be used one-on-one in a private text-based chat or in a many-to-many group chat format (e.g., in chat rooms).

Internet relay chat, in particular, was created in the late 1980s (Chatterjee et al., 2005); though chat and messaging arguably did not become mainstream until the late 1990s with the development of applications like AOL Instant Messenger. But by the mid-1990s, educators were already experimenting with using chat and instant messaging in distance education courses (Duin & Archee, 1996; Kimbrough, Hochgurtel, & Smith, 1998). The use of text-based synchronous chat increased even more once learning management systems (LMS) began including their own chat tools. For instance, Kirby (1999) used chat rooms in WebCT to have online debates; students were apprehensive at first but after the second debate Kirby stated "were overwhelmingly positive about the synchronous learner-learner interaction and the activity as a learning experience" (p. 204). Early on researchers found that while text-based asynchronous discussions might be better for deep reflection, synchronous chats were sometimes more effective with simulating a real conversation, building a sense of immediacy and community, and establishing social and teaching presence which in turn can decrease feelings of loneliness (Motteram, 2001;

Stein et al., 2007; Wang & Chen, 2007). However, researchers quickly identified some drawbacks to chat and messaging tools. They found that they could favor fast typers, fast thinkers, and native speakers of a language, and lead to out-of-sync contributions and confusion, while also presenting accessibility issues (Bober & Dennen, 2001; Calvo, Arbiol, & Iglesias, 2014; Stein et al., 2007). Given this, researchers like Cox et al. (2004) concluded that chats should be supplemented with other forms of communication (e.g., text-based discussions). Thus, while chat and instant messaging tools continue to be used in open, distance, and online learning, they are often used in conjunction with other communication technologies. Further, increasingly chat and messaging apps today tend to have synchronous and asynchronous capabilities leading some to describe things like chat as almost being semi-synchronous because while you can see when someone is online and chat in real time, you can also send a message to be read and replied to sometime in the future when the other person is not online or not available to chat at that time.

Video-based Tools: Video and Web Conferencing

Video-based tools – sometimes called videotelephoney, video conferencing, or web conferencing – are the most used synchronous communication tools today. Video conferencing dates back to the 1960s (Correia, Liu, & Xu, 2020); however, for the first few decades, special equipment was needed to essentially connect two or more locations – such as two different classrooms. Video conferencing, though, arguably did not really begin to catch on until the early 2000s with the development of applications such as Webex and Macromedia Breeze and the increase of high speed broadband Internet.

These new web conferencing applications eliminated the need for special equipment and for the first time allowed teachers and students to log on and join a web conference from anywhere with a stable high-speed internet connection. By the mid-2000s, educators were increasingly experimenting with using web conferencing for distance education, whether that be by offering weekly synchronous class sessions, supplemental synchronous sessions (e.g., review sessions, class presentations, guest presenters), or even weekly office hours. However, just as Cox et al. (2004) recommended in terms of using text-based chat, rarely have educators solely used web conferencing to teach a distance or online course; at minimum, email but often a learning management system are used in conjunction with these video-based tools.

From these early days until today, most web conferencing applications include a number of different synchronous applications–thus, making it difficult to truly label any of them simply as “video-based tools.” For instance, they include not only the ability to share video through a webcam but also the ability to share audio and text-based communication in real time as well as the ability to screen share, share files, and complete polls to name a few others. To complicate matters further, instructors and/or students can use a web conferencing application like Webex or Zoom and choose not to enable or use certain features. For example, an instructor can enable students to turn their webcams on or to use audio to communicate with others but students can choose to simply chat with others using text only.

Around 2010, companies started developing video chat tools (e.g., Skype and FaceTime) that enabled people to use video-based synchronous communication in one-on-one or in small groups. Instructors and students continue to use tools like this in distance and online learning but for the most part they are either in ad-hoc situations or for small groups but its use has never been as popular as web conferencing.

Other Synchronous and Semi-Synchronous Tools

There are still a number of other tools like online whiteboards that can be used without a web conferencing application or a number of tools that might better be classified as semi-synchronous because they can be used asynchronously or synchronously depending on when and how they are used. For instance, tools like Jamboard or Padlet that enable instructors to use them in real time like a whiteboard but students can also collaborate asynchronously over a period of time. Then there are other social networking tools like Twitter that have been used a lot in massive open online courses to enable students an authentic way to collaborate with other learners in a course as well as a larger community of practice. Tools like twitter enable users to post and for other users to view and if they choose to respond after the fact or if they are online at the same time (e.g., for twitter chats or as a back channel during live events) they can respond and chat in real time. Different tools like this, though not unlike web conferencing applications, continue to blur the boundaries between classifying something as purely synchronous or asynchronous.

Implications for Research and Practice

Research on open, distance, and digital education suggests that while there are some inherent affordances and constraints with different communication technologies, ultimately the success of using these communication technologies–whether they are synchronous, asynchronous, or even semisynchronous–depends not only on situational factors (e.g., how they are used in a given learning environment, the context they are used, etc.) but also on the experience, comfort level, and actual use of participants. For instance, web conferencing applications have the potential to address many of the constraints of text-based asynchronous communication; however, this assumes things such as that all of the users have their webcams on, that the group is not too large, and that the instructor is using the tool in an interactive, if not collaborative, way. Therefore, as the use of synchronous tools, and specifically synchronous video-based tools increases, more research needs to be conducted to find out under what contexts and which ways do adding synchronous tools to courses make up for the inconvenience of taking away the benefit of learning from any time that they want.

References

Bali, M., & Meier, B. (2014). An affinity for asynchronous learning. *Hybrid Pedagogy*. https://hybridpedagogy.org/affinity-asynchronous-learning/

Barron, A. E. (2004). Auditory instruction. In D. Jonassen (Ed.), *Handbook of research for educational communications and technology* (2nd ed., pp. 949–978). Lawrence Erlbaum, Malwah, New Jersey.

Beatty, B. J. (2007). Hybrid classes with flexible participation options–If you build it, how will they come. In M. Simonson (Ed.), *30th annual proceedings: Selected research and development papers presented at the 2007 annual convention of the association for educational communications and technology* (Vol. 1, pp. 15–24). Association for Educational Communications and Technology, Bloomington, IN.

Beatty, B. J. (2019). *Hybrid-flexible course design: Implementing student-directed hybrid classes*. EdTech Books, BYU, Provo, UT. https://edtechbooks.org/hyflex/

Bober, M. J., & Dennen, V. P. (2001). Intersubjectivity: Facilitating knowledge construction in online environments. *Educational Media International, 38*(4), 241–250. https://doi.org/10.1080/09523980110105150.

Bower, B. L., & Hardy, K. P. (2004). From correspondence to cyberspace: Changes and challenges in distance education. *New Directions for Community Colleges, 2004*, 5–12. https://doi.org/10.1002/cc.169.

Calvo, R., Arbiol, A., & Iglesias, A. (2014). Are all chats suitable for learning purposes? A study of the required characteristics. *Procedia Computer Science, 27*, 251–260.

Casey, D. M. (2008). A journey to legitimacy: The historical development of distance education through technology. *TechTrends, 52*, 45–51. https://doi.org/10.1007/s11528-008-0135-z.

Chatterjee, S., Abhichandani, T., Li, H., TuIu, B., & Byun, J. (2005). Instant messaging and presence technologies for college campuses. *IEEE Network, 19*(3), 4–13.

Correia, A. P., Liu, C., & Xu, F. (2020). Evaluating videoconferencing systems for the quality of the educational experience. *Distance Education, 41*(4), 429–452.

Cox, G., Carr, T., & Hall, M. (2004). Evaluating the use of synchronous communication in two blended courses. *Journal of Computer Assisted Learning, 20*(3), 183–193. https://doi.org/10.1111/j.1365-2729.2004.00084.x.

Day, J., & Verbiest, C. (2021). Lights, camera, action? A reflection of utilizing web cameras during synchronous learning in teacher education. *The Teacher Educators' Journal, 14*, 3–21. https://files.eric.ed.gov/fulltext/EJ1296278.pdf.

Dennen, V. P., Word, K. D., & Arslan, Ö. (2021). *Webcams at work: A survey of learning professionals' practices and perceptions. [Research Brief]*. Instructional Systems & Learning Technologies, Florida State University.

Dias, M., Lopes, R. D. O. A., & Teles, A. C. (2020). Will virtual replace classroom teaching? Lessons from virtual classes via Zoom in the times of COVID-19. *Journal of Advances in Education and Philosophy, 4*(5), 208–213. https://doi.org/10.36348/jaep.2020.v04i05.004

Duin, A. H., & Archee, R. (1996). Collaboration via e-mail and internet relay chat: Understanding time and technology. *Technical Communication, 43*(4), 402–412.

Dunlap, J. C., & Lowenthal, P. R. (2010). Defeating the Kobayashi Maru: Supporting student retention by balancing the needs of the many and the one. *Educause Quarterly, 33*(4). https://er.educause.edu/articles/2010/12/defeating-the-kobayashi-maru-supporting-student-retention-by-balancing-the-needs-of-the-many-and-the-one

Fadde, P. J., & Vu, P. (2014). Blended online learning: Benefits, challenges, and misconceptions. In P. R. Lowenthal, C. S. York, & J. C. Richardson (Eds.), *Online Learning: Common misconceptions, benefits, and challenges* (pp. 38–48). Nova Publishers.

Flinck, R. (1975). *The telephone as an instructional aid in distance education: A survey of the literature*. Department of Education. University of Lund, Sweden. https://files.eric.ed.gov/fulltext/ED112942.pdf.

Gao, F., Zhang, T., & Franklin, T. (2013). Designing asynchronous online discussion environments: Recent progress and possible future directions. *British Journal of Educational Technology, 44* (3), 469–483. https://doi.org/10.1111/j.1467-8535.2012.01330.x.

Garrison, D. R. (1985). Three generations of technological innovations in distance education. *Distance Education, 6*(2), 235–241.

Garrison, D. R., & Anderson, T. (2003). E-learning in the 21st century: A community of inquiry framework for research and practice. *RoutledgeFarmer*, New York, NY.

Garrison, R. (2009). Implications of online learning for the conceptual development and practice of distance education. *Journal of Distance Education, 23*(2), 93–104.

Gunawardena, C. N., & McIsaac, M. S. (2004). Distance education. In D. Jonassen (Ed.), *Handbook of research for educational communications and technology* (2nd ed., pp. 355–395). Lawrence Erlbaum, Malwah, New Jersey.

Harasim, L. (1986). Educational applications of computer conferencing. *International Journal of E-Learning & Distance Education, 1*(1), 59–70. http://www.ijede.ca/index.php/jde/article/view/305.

Harasim, L. (2000). Shift happens: Online education as a new paradigm in learning. *Internet and Higher Education, 3*, 41–61.

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020, March). The difference between emergency remote teaching and online learning. EDUCAUSE Review. https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-andonline-learning

Hrastinski, S. (2008). The potential of synchronous communication to enhance participation in online discussions: A case study of two e-learning courses. *Information & Management, 45*(7), 499–506. https://doi.org/10.1016/j.im.2008.07.005.

Irvine, V. (2009, June). The emergence of choice in "multi-access" learning environments: Transferring locus of control of course access to the learner. In G. Siemens & C. Fulford (Eds.), *Proceedings of ED-MEDIA 2009 – World conference on educational multimedia, hypermedia & telecommunications* (pp. 746–752). Association for the Advancement of Computing in Education.

Irvine, V. (2020, October). The landscape of merging modalities. EDUCAUSE Review. https://er.educause.edu/articles/2020/10/the-landscape-of-merging-modalities

Irvine, V., Code, J., & Richards, L. (2013). Realigning higher education for the 21st century learner through multi-access learning. *Journal of Online Learning and Teaching, 9*(2), 172–186. https://jolt.merlot.org/vol9no2/irvine_0613.pdf.

Jaschik, S., & Lederman, D. (2016). The 2016 inside higher Ed survey of faculty attitudes on technology. Inside Higher Ed & Gallup. https://www.insidehighered.com/booklet/2016-surveyfaculty-attitudes-technology

Johnson, G. M. (2006). Synchronous and asynchronous text-based CMC in educational contexts: A review of recent research. *TechTrends, 50*(4), 46–53.

Kimbrough, D. R., Hochgurtel, B. D., & Smith, S. S. (1998). Using internet relay chat to provide on-line tutorials in a distance-learning chemistry course. *Journal of College Science Teaching, 28*(2), 132–136.

Kirby, E. (1999). Building interaction in online and distance education courses. In J. Price, J. Willis, D. Willis, M. Jost, & S. Boger-Mehall (Eds.), *Proceedings of SITE 1999 – Society for Information Technology & Teacher Education international conference* (pp. 199–205). Association for the Advancement of Computing in Education.

Lederman, D. (2020a). The shift to remote learning: The human element. *InsideHigherEd*. https://www.insidehighered.com/digital-learning/article/2020/03/25/how-shift-remote-learning-might-affect-students-instructors-and.

Lederman, D. (2020b). Will shift to remote teaching be boon or bane for online learning? *Insider HigherEd*. https://www.insidehighered.com/digital-learning/article/2020/03/18/most-teaching-going-remote-will-help-or-hurt-online-learning.

Liu, J. C., & Alexander, R. (2017). Factors affecting faculty use of video conferencing in teaching: A mixed-method study. *Journal of Educational Technology Development and Exchange, 10*(2), 37–54. https://doi.org/10.18785/jetde.1002.03.

Lowenthal, P. R. (2010). The evolution and influence of social presence theory on online learning. In T. T. Kidd (Ed.), *Online education and adult learning: New frontiers for teaching practices* (pp. 124–139). IGI Global. https://doi.org/10.4018/978-1-60566-830-7.ch010.

Lowenthal, P. R., & Mulder, D. (2017). Social presence and communication technologies: Tales of trial and error. In A. Whiteside, A. Garrett Dikkers, & K. Swan (Eds.), *Social presence in online learning: Multiple perspectives on practice and research* (pp. 32–44). Stylus.

Lowenthal, P. R., & Dunlap, J. C. (2020). Social presence and online discussions: A mixed method investigation. *Distance Education, 41*(4), 490–514. https://doi.org/10.1080/01587919.2020.1821603.

Lowenthal, P. R., Dunlap, J. C., & Snelson, C. (2017). Live synchronous web meetings in asynchronous online courses: Reconceptualizing virtual office hours. *Online Learning, 21*(4). https://doi.org/10.24059/olj.v21i4.1285.

Lowenthal, P., Borup, J., West, R., & Archambault, L. (2020). Thinking beyond Zoom: Using asynchronous video to maintain connection and engagement during the COVID-19 pandemic. *Journal of Technology and Teacher Education, 28*(2), 383–391.

Lowenthal, P. R., West, R. E., Archambault, L., Borup, J., & Belt, E. (2021). Faculty perceptions of using synchronous video-based communication technology. *Online Learning, 25*(4), 49–78. https://doi.org/10.24059/olj.v25i4.2890.

Lowenthal, P. R., Wilson, B., & Parrish, P. (2009). Context matters: A description and typology of the online learning landscape. In M. Simonson (Ed.), *32nd Annual proceedings: Selected research and development papers presented at the annual convention of the Association for Educational Communications and Technology* (pp. 161–172). Association for Educational Communications and Technology.

Martin, F., Polly, D., & Ritzhaupt, A. (2020). Bichronous online learning: Blending asynchronous and synchronous online learning. *Educause Review.* https://er.educause.edu/articles/2020/9/bichronous-online-learning-blending-asynchronous-and-synchronous-online-learning

McDaniels, M., Pfund, C., & Barnicle, K. (2016). Creating dynamic learning communities in synchronous online courses: One approach from the Center for the Integration of Research, Teaching and Learning (CIRTL). *Online Learning, 20*(1), 110–129. https://doi.org/10.24059/olj.v20i1.518.

McIsaac, M. S., & Gunawardena, C. N. (1996). Distance education. In D. H. Jonassen (Ed.), *Handbook of research for educational communications and technology* (pp. 403–437). Simon & Schuster Macmillan.

Moore, M. G. (1989). Three types of interaction. *American Journal of Distance Education, 3*(2), 1–6. https://doi.org/10.1080/08923648909526659.

Moore, J. L., Dickson-Deane, C., & Galyen, K. (2011). e-Learning, online learning, and distance learning environments: Are they the same? *Internet and Higher Education, 14*(2), 129–135. https://doi.org/10.1016/j.iheduc.2010.10.001.

Motteram, G. (2001). The role of synchronous communication in fully distance education. *Australasian Journal of Educational Technology, 17*(2), 131–149.

Murphy, E., & Coleman, E. (2004). Graduate students' experiences of challenges in online asynchronous discussions. *Canadian Journal of Learning and Technology, 30*(2). https://doi.org/10.21432/T27G7N.

Olgren, C. H. (1997). Teaching by telephone. *New Directions for Teaching and Learning, 71*, 59–66.

Oztok, M., Zingaro, D., Brett, C., & Hewitt, J. (2013). Exploring asynchronous and synchronous tool use in online courses. *Computers & Education, 60*(1), 87–94. https://doi.org/10.1016/j.compedu.2012.08.007.

Park, Y. J., & Bonk, C. J. (2007). Synchronous learning experiences: Distance and residential learners' perspectives in a blended graduate course. *Journal of Interactive Online Learning, 6*(3), 245–264. http://www.ncolr.org/jiol/issues/pdf/6.3.6.pdf.

Parker, M., & Martin, F. (2010). Using virtual classrooms: Student perceptions of features and characteristics in an online and a blended course. *Journal of Online Learning and Teaching, 6*(1), 135–147. https://jolt.merlot.org/vol6no1/parker_0310.pdf.

Peterson, A. T., Beymer, P. N., & Putnam, R. T. (2018). Synchronous and asynchronous discussions: Effects on cooperation, belonging, and affect. *Online Learning, 22*(4), 7–25. https://doi.org/10.24059/olj.v22i4.1517.

Power, M. (2008). The emergence of a blended online learning environment. *Journal of Online Learning and Teaching, 4*(4), 503–514.

Preece, J., Maloney-Krichmar, D., & Abras, C. (2003). History of online communities. In K. Christensen & D. Levinson (Eds.), *Encyclopedia of community: From village to virtual world* (pp. 1023–1027). Sage.

Rovai, A. (2009). *The internet and higher education: Achieving global reach*. Chandos.

Saba, F. (2011). Distance education in the United States: Past, present, future. *Educational Technology, 51*, 11–18.

Saettler, P. (2004). *The evolution of American educational technology*. IAP.

Schulman, C. (2020). I used to shut my windows to New York's noise. Now I long for a honking horn. *Washington Post*. https://www.washingtonpost.com/outlook/2020/04/09/new-york-silent-coronavirus/.

Seaman, J. E., Allen, I. E., & Seaman, J. (2018). *Grade increase: Tracking distance education in the United States*. Babson Survey Research Group.

Smith, B., Reed, P., & Jones, C. (2008). 'Mode neutral' pedagogy. *European Journal of Open, Distance and E-learning, 11*(1). https://old.eurodl.org/?p=archives&year=2008&halfyear=1&article=315.

Snyder, T., & Garner, B. (2020). Engaging faculty to connect with online learners in real time. *EDUCAUSE Review*. https://er.educause.edu/blogs/2020/11/engaging-faculty-to-connect-with-online-learners-in-real-time.

Stein, D. S., Wanstreet, C. E., Glazer, H. R., Engle, C. L., Harris, R. A., Johnston, S. M., … & Trinko, L. A. (2007). Creating shared understanding through chats in a community of inquiry. *The Internet and Higher Education, 10*(2), 103–115. https://doi.org/10.1016/j.iheduc.2007.02.002.

Stewart, W. (2021). A global crash-course in teaching and learning online: A thematic review of empirical Emergency Remote Teaching (ERT) studies in higher education during Year 1 of COVID-19. *Open Praxis, 13*(1), 89–102. https://doi.org/10.5944/openpraxis.13.1.1177.

Tait, A. (2008). What are open universities for? *Open Learning, 23*(2), 85–93. https://doi.org/10.5944/openpraxis.13.1.1177.

Themelis, C. (2014). Synchronous video communication for distance education: the educators' perspective. *Open Praxis, 6*(3), 245–256. https://doi.org/10.5944/openpraxis.6.3.128.

Wang, Y., & Chen, N. S. (2007). Online synchronous language learning: SLMS over the Internet. *Innovate: Journal of Online Education, 3*(3). https://nsuworks.nova.edu/cgi/viewcontent.cgi?article=1102&context=innovate.

Watts, L. (2016). Synchronous and asynchronous communication in distance learning: A review of the literature. *Quarterly Review of Distance Education, 17*(1), 23–32.

Wedemeyer, C. A. (1981). *Learning at the back door: Reflections on non-traditional learning in the lifespan*. The University of Wisconsin Press.

Wolcott, L. L. (1994). Audio tools for distance education. In B. Willis (Ed.), *Distance education: Strategies and tools* (pp. 135–164). Educational Technology Publications.

Asynchronous Tools for Interaction and Collaboration

58

Gayle Davidson-Shivers and Angela Rand

Contents

Abstract

The shift from conventional classrooms to the use of various types of distributed education is well documented in the literature. This shift occurred over the past 30 years, if not longer. Open, distance, and digital education (or ODDE) has become ubiquitous in education and training in a variety of settings such as the military, business, higher education, and K12 schools. More recently, ODDE has seen a rise in use in other settings, such as health care organizations. Although both synchronous and asynchronous technologies are available for teaching and learning, it appears that asynchronous tools are predominant in these settings. The use of asynchronous tools is the primary focus of this chapter, with consideration of both the technologies employed and the strategies applied. The purposes are to summarize their appropriate uses in terms of collaborative learning and share any insights to guide future research and practice. The chapter begins with a brief definition of terms used in this chapter along with descriptions of the types and

G. Davidson-Shivers (✉) · A. Rand
University of South Alabama, Mobile, AL, USA
e-mail: gvds@southalabama.edu; arand@southalabama.edu

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_56

purposes of asynchronous tools. The chapter culminates in directions for future research as well as any improvements in ODDE practice.

Keywords

Asynchronous tools · Interaction · Collaboration · Technologies · Strategies

Introduction

Open education can be viewed narrowly as being focused on OER and MOOCs (Zawacki-Richter & The COER Group, 2020). A broader view considers open education as being the dissemination and access to education and training to widen participation for all (Wikipedia, 2021). Zawacki-Richter and The COER Group (2020) views open education as an umbrella term to encompass distance and digital education. However, one distinction among the terms is with distance education in that it is often found in formal educational settings, whereas open education may be found in both formal and informal settings. However, as technologies and ways of learning evolved, distinctions tend to blur. The inclusive term: open, distance, and digital education and its acronym (ODDE) will be used in this chapter. ODDE can be found at all levels of education and in a variety of settings, such as the military, business, higher education, and K12 schools (Moore, 2019; Zawacki-Richter & Naidu, 2016; Zawacki-Richter & The COER Group, 2020). ODDE has given rise in other settings, such as the health sciences (Glover & Bodzin, 2021).

The various environments of open education, or ODDE, can be considered synchronous, asynchronous, or both. Generally speaking, *synchronous* is participants being together at the same time, but at either the different location (Davidson-Shivers, Rasmussen, & Lowenthal, 2018), whereas *asynchronous* is when participants may be in different places and at different times. Again, these two terms have seen a merging and blending over the years due to new technologies being used in terms of face-to-face, blended or hybrid, or fully online or at a distance type of environments (Petronzi & Petronzi, 2020). With newer technologies, participants may meet or work together simultaneously even when they are in different time zones and locations. The focus in this chapter is asynchronous tools for interaction and collaboration.

A Brief Review of Early and Current Research

Early research indicated an interest in media comparison; that is, whether online learning is better or worse than on campus learning or comparison of different types of mobile learning. Zawacki-Richter and Naidu (2016) among others pointed out such comparisons were not promising or helpful. Later, Bozhurt et al. (2015) using bibliometrics found that the highest ranking conceptual or theoretical background concepts were community of inquiry, collaborative learning, constructivism and connectivism, blended learning, and transactional analysis. Although some of these concepts or topics are still present in the literature, others are found as well. They include online social communities, socialized e-learning, mobile assisted language learning, and game-based learning among others (Chen & Kinshuk, 2020). One other area, instructional design theories, was mentioned in Bozhurt et al.'s (2015) article. Chen et al. (2020) also found that case studies were mentioned often.

Defining Interaction and Collaboration

A basic definition of *Interaction* is when two or more people communicate or act together for mutual or reciprocal influence. Moore (1989) identified three types of interaction needing to occur for learning to place: student to instruction (or content), student to student, and student to instructor. Student to instruction is when the student is connecting to information and activities contained within the [ODDE]. Student-to-student interactions occur when participants interact with each other on an individual, small group, or large group basis and should facilitate some affiliation with each other (Davidson-Shivers et al., 2018). With student to instructor, the instructor and participants communicate with each other directly through many various formats: emails, feedback on assignments, and general communiques; these formats may be either on an individual or group basis (Davidson-Shivers, 2009). Northrup (2002) identified a fourth type of interaction, the student-to-learning management system (LMS), in which learners are able to see their grades, post assignments, and so on.

Collaboration is defined as when participants communicate and work together to complete a task or achieve a common goal. Through the use of participants' interactions and collaborations, a learning community may form. Collaborative learning is considered as a strategy to help students engage in activities to encourage a collaborative process to share and create information and meaning (Inchaouh & Tchaïcha, 2020). At a basic level, the elements of a learning community include the instructors, learners, and the instructional information (Davidson-Shivers et al., 2018) and given Northrup's (2002) fourth interaction type, the environment itself. To form a learning community, they provide not only cognitive presence from shared ideas and experiences, but also may form a shared or social presence by sharing skills and developing mutual relationships (Gast as cited in Mahoney & Hall, 2020).

Furthermore, collaborative learning is a situation in which participants communicate with each other to improve their learning and is best when they share information, ask questions, provide their own reflections, and learn or attempt to learn something together (Goodman, Geier, Haverty, Linton, & McCready, 2001). Such participation often assists learners to form some type of learning community (Palloff & Pratt, 2007) in which they can be cognitively and socially engaged in activities and construct new understandings (Inchaouh & Tchaïcha, 2020. Inchaouh and Tchaïcha (2020) also suggest that collaborative learning is thought to be effective because students gain new habits and approaches to gain new information while interacting with each other or the instructor. However, they also mentioned a few challenges might occur when a team organizes and the following results occur: a) the free ride effect, when a member does not complete their tasks, b) the sucker effect, when a member does all the work, or c) the silo effect in which members split the task and work alone and later combine their information or product at the end; these effects often lead to poor quality results and inefficiencies (Nebel et al., 2017).

To reduce such an intended outcome, various instructional tools and strategies can promote participant collaboration and interaction. Such tools and strategies among others might be used to not only meet student needs, but support collaborative efforts as well.

Asynchronous Tools for Teaching and Learning

Additionally, another way to consider asynchronous tools as the hardware and software, or technologies with a second way being to view tools as instructional or learning strategies (Lai, 2020). The advancement in these current technologies has the potential for students to enhance their negotiation skills, obtain instant feedback, and become more efficient in their learning according to Lai (2020). However, even when the advancement in the technologies is promising, it is only when appropriate technologies are used along appropriate instructional strategies that the potential of student engagement can be effective (Bozhurt et al., 2015; Clark & Mayer, 2016a, 2016b). Thus, asynchronous tools can also be considered as the instructional/learning strategies used to support student learning in such environments (Mahoney & Hall, 2020).

Background on Asynchronous Tools and Use of Technologies

Although the Internet was developed and in use in the 1960s, it was not until the mid-1980s that wider applications for teaching occurred (Zawacki-Richter & Naidu, 2016). Access to the Internet was through Local area networks and Wide area networks (Davidson-Shivers et al., 2018) and communications were a text-based form of communication (Al Tawil, 2019). Harasim (2012) stated online applications had become a part of traditional courses in a substantial manner during this time. The early asynchronous technologies mainly consisted of discussion boards or forums and chats. However, with the advent of the World Wide Web or Web, graphics could be combined with text-based applications and access became easier. With the inclusion of graphics, new forms of technology were developed for use in ODDE. Currently the ODDE environments, comprised of interrelated and integrated components which interact with each other, facilitate online learning situations through LMSs. These open environments have had exponential growth in education and training (Seaman, Allen, & Seaman, 2018).

The advancements in technologies such as interactive whiteboards, webcams, web simulations, and video conferencing made such things possible. New media continue to be developed and used (Mahoney & Hall, 2020). The main technologies currently in use are as follows:

Discussion boards/threaded discussion. Discussion boards and threaded discussions refer to e-learning applications using a text-based forum in which the instructor posts discussion topics (Chen & Kinshuk, 2020). In this student-centered environment, learners are tasked with responding to the initial prompt and are required to also read and respond to classmates (Jo, Park, & Lee, 2017). This interaction is to facilitate the learners' exposure to alternate ideas, experiences, and perspectives of their peers as well as sharing their own. With discussions, there are pros and cons for their use.

Pros: Ability to participate in discussions about the content with others and the instructor can occur irrespective of time and place. Opportunity to reflect on and ponder the topic and readings before responding is valued. Non-native language participants have additional time to compose their responses.

Cons: Opportunities for misunderstandings, going off topic, bullying, and/or domination of the conversation can occur if immediate feedback from the instructor is missing. Some students delay posting to the forum that can be frustrating for early responders and lead to a less dynamic interchange.

Instant messaging or IMs. Messages sent via mobile, wireless, and desktop devices allow real time text chat in a pop-up notification window to a select list of recipients (Rambe & Bere, 2013). Message metadata may include timestamps and messages can contain links to images, websites, podcasts, and maps (Robles, Guerrero, LLinas, & Montero, 2019).

Pros: IMs promote social interaction. They can support immediate communication notices and facilitate group cohesion (Sun, Lin, Wu, Zhou, & Luo, 2018).

Cons: Learners may engage in off-topic conversations. They might be less effective at generating knowledge construction (Rambe & Bere, 2013; Sun et al., 2018).

Social media. Social media apps are designed with features to promote social interaction (Akcaoglu & Lee, 2018). They have an advantage over learning management systems (LMS) which are designed to hold course content, assignments, and assessments in a format more conducive to task management.

Pros: facilitates connections between formal and informal learning (Gurjar, 2020). Familiarity with social networking sites can increase the likelihood of students using the tools and interacting with each other and with the course content (Beach & O'Brien, 2014; Pallas, Eidenfalk, & Engel, 2019).

Cons: Learners may attend to social connections to the detriment of engaging with the course content and may not make connections between social content and the learning objectives. Heavier workload for the instructor due to efforts to post, administer the social site, and patrolling for student misconceptions and even cyberbullying. The social media platform privacy settings and business model may be contradictory to the academic institution's requirements.

Online websites and learning management systems (LMSs). Online websites, LMSs, and mobile device applications designed with features that promote social interaction (Akcaoglu & Lee, 2018). They have an advantage over LMSs which are designed to hold course content, assignments, and assessments in a format more conducive to task management.

Pros: Online websites facilitate connections between formal and informal learning (Gurjar, 2020). Familiarity with social networking sites can increase the likelihood of students using the tools and interacting with each other and with the course content (Beach & O'Brien, 2014; Pallas et al., 2019).

Cons: Learners may attend to social connections to the detriment of engaging with the course content and may not make connections between social content and the learning objectives. Could be a heavier workload for the instructor due to efforts to post, administer the social site, and patrolling for student misconceptions and even cyberbullying. The social media platform privacy settings and business model may be contradictory to the academic institution's requirements.

Screencasts (authoring tools) capture recordings of a computer screen accompanied by explanatory video (Wakefield, Tyler, Dyson, & Frawley, 2019). Captured recordings can include text, audio, video, slides, and webcam images.

Pros: Screencasts promote active learning and can increase skills identified in Bloom's Digital Taxonomy, such as communication, creativity, and multimedia skills (Wakefield et al., 2019).

Cons: The technological infrastructure needs can be vast and vary greatly with different tools. File storage needs vary with some requiring cloud storage and others' needing local storage. Users may not have threshold technology skills needed to use the tool. LMS integration varies across platforms.

Video conferencing is a digital learning environment using the Internet to broadcast one-to-many, or one-to-one, instruction sessions either synchronously, prerecorded, or recorded during broadcast for sharing at a later time. Video conferencing supports the transmission of information for instructional and non-instructional purposes. Instructors and students can use video conferencing to send and receive information and communications to complete learning objectives (Gegenfurther & Ebner, 2019).

Pros: Video conferencing is effective at facilitating academic achievement and positive outcomes are possible for foundational or procedural knowledge whether presented as a single event or over time. Longer broadcasts can be more effective than shorter ones, but no optimal duration has been identified.

Cons: Many platforms lack social opportunities such as comments, likes, and emojis that might promote interactions.

Gamification/role play/simulations refers to the addition of game structures and elements for educational purposes. Gamification can be achieved through the use of quests, simulations, role-play, and quizzes and often incorporates multimedia elements, hand-held mobile devices, and a variety of Web-based tools (Faiella & Ricciardi, 2015; Karaaslan et al., 2018).

Pros: Gamification of instruction elicits motivation to learn and facilitates a host of cognitive, behavioral, and affective skills development. It is useful for problem-based learning, developing critical thinking, and creative exploration. Gamification is appropriate for business and humanities disciplines and in employee training and development.

Cons: Some students may exhibit resistance to group competition. Gamification relies on sufficient student self-efficacy and technological skills. The novel effects of game use may affect learning outcomes when the novelty wears off. This tool or strategy is not appropriate for final assessment. They can be time consuming to design.

Interactive whiteboard/slide show/collaborative canvas are online interactive shared digital screens for writing and sketching, to which multimedia, audio, and images can be added during collaborative assignments (Ng, Ting, Lam, & Liu, 2020; Sweeney, Beger, & Reid, 2021).

Pros: Most tools in this category feature the ability to record and share activities for later viewing; zoom features for close-up views. They provide a means to facilitate student interaction and collaboration and they promote social interaction. These tools can support a self-directed learning experience and students can access many of them via mobile devices and desktop browsers. Group assignments are supported with features that allow multiple participants to work on one board at the same time. Lesson and project templates are freely available. The nonpermanent surface supports student exploration of topics.

Cons: Some learners may experience high cognitive load and resist using these tools. Preinstruction lessons for teaching the tool can be time consuming. There are some limits to the size of the board and some tools do not allow audio and video media.

Podcasts are serially broadcast information in audio format presented as lectures, conversations, commentaries, and interviews. Broadcasts can be streamed live on the Internet and are downloadable to be listened to on digital and mobile devices for just-in-time listening (Shiang, Cerniglia, Lin, & Lo, 2021; Elekaei et al., 2020).

Pros: Podcasts contribute to improved listening skills and the variety of topics covered is vast. They are easy to access and share via desktop or mobile devices.

Podcasts are motivating to students as an alternative to text-based content and they can be listened to while performing other activities. Podcasts support independent study and learning.

Cons: Podcast transcripts are often not available. Students may become overwhelmed and not listen when they perceive podcasts to be extra work and they are not suitable for long, elaborated lectures. Podcasts are subject to fading or sporadic broadcasts. There is a lack of empirical research on knowledge retention when using podcasts for instructional purposes.

Blockchain/badging. Blockchain is a network of encrypted databases housing a digital ledger of educational credentials (Weller, 2020). It is a binder, or e-portfolio, for diverse academic accomplishments and credentials such as formal course work, degrees, certifications, badges, and Personal Learning Environment (PLE). In a blockchain learning environment, learners choose their own learning adventure by accessing a network of open access resources (Alexander & Wang, 2019).

Pros: Users can update educational records in one place and changes are populated across the network of databases linked by blockchain. Employers and academic institutions have access to applicants' credentials without having to log into various accounts. Addresses issues of Universal Design for Learning (UDL), motivation, and self-efficacy when learners can seek out preferred learning experiences.

Cons: Its application to educational use is in its infancy. Expanded use of digital ledgers places a power consumption and the proposed transparency it offers may not be forthcoming (Weller, 2020). Blockchains in their current form appear to be expensive in terms of climate energy.

Background on Asynchronous Tools and Use of Strategies

Strategies are the design elements for individual and group activities to align with objectives; they also may be ways the instructor communicates about the content assignments and assessment methods (Rios, Elliott, & Mandernach, as cited in Mahoney & Hall, 2020). In other words, strategies are used as tools to meet student needs, build on their capabilities, and strengthen their skills to interact and collaborate with others (Davidson-Shivers et al., 2018).

To support the development of a shared community and student learning in such environments, the design elements and strategies for individual and group activities should be aligned with course objectives and the ways instructors communicate about the course goals, procedures, contents, assignments, and assessment methods (Rios, Elliott, & Mandernach, as cited in Mahoney & Hall, 2020). Such strategies among others might be used to not only meet student needs, but support collaborative efforts as well.

Theoretical underpinnings of strategy use. Online instructional strategies have come a long way from early learning communities using online discussion boards.

Expanded access to the Internet and digital technologies and devices spurred development of innovative strategies to support learning. The following are the main theoretical ideas, which relate to asynchronous tool use.

Clark and Mayer's Guidelines. Clark & Mayer (2016a, 2016b) suggest that asynchronous and synchronous instruction share a common goal in support of collaboration and interaction. They suggested that in order for interaction to promote meaningful learning, it requires strategies and activities to have high cognitive engagement (Clark & Mayer, 2016a, 2016b). Effective asynchronous tools can stimulate varying levels of psychological processing leading to knowledge construction. They also suggest that interaction activities should be designed to promote cognitive processing along a continuum of engagement leading to learning. The learners and learning context drive the need for varying interactions which support low to high psychological engagement (Clark & Mayer, 2016a, 2016b). At the lowest level of engagement, the instruction is designed to strengthen associations between what is already known and the new content being presented. At the high end of the continuum, instruction prompts and guides the learner toward the acquisition of new mental models. Clark and Mayer (Clark & Mayer, 2016a, 2016b) also explained that behavioral engagement such as clicking, dragging elements on screens does not lead to learning unless appropriate instructional strategies which are activities that deliberately lead to cognitive engagement. Furthermore, designing instruction that includes cognitive engagement can be effective even in the absence of physical activity. The benefit of designing instruction that includes having learners construct artifacts is in the evaluation and feedback process.

Additionally, Bozhurt et al. (2015) found that collaboration does not occur without active interactions with each other in accordance with other theoretical perspectives of constructivism and connectivism. Their findings suggested that "these theories explain how learning occurs on networks through collaboration in a community by interactions" (Bozhurt et al., 2015, p. 344) among other theories such as community of inquiry, cognitive load theory, and transactional distance theory. Bozhurt et al. (2015) also found that learner motivation and being self-regulated as well as instructional design theories were important for efficient and effective learning.

The community of inquiry. Garrison, Anderson, and Archer (1999) developed the Community of Inquiry (COI) as a framework to study text-based computer-mediated communication used to exchange ideas and experiences in online learning environments. Within the framework, cognitive presence, social presence, and teaching presence encompass a range of interactions within a dynamic relationship that can be used to influence instructional design to elicit optimal learning outcomes (Akyol & Garrison, 2008; Garrison et al., 2010).

Cognitive load theory. Sweller's (2011) Cognitive load theory (CLT) is also important to consider. It relates the amount of memory needed when learning or problem solving, especially in online environments. CLT demonstrates the limitations of the human brain when processing information from multiple sources. CLT posits the human brain has limited working memory capacity, and that activating auditory and visual channels as points of entry into memory facilitates remembering and learning. This means allowing learners time on tasks to process new information with the goal of moving the information into long term memory.

When using technology tools, it is important to avoid introducing extraneous cognitive load. Providing detailed instruction on how to use a tool prior to using it in a lesson will help reduce cognitive load. During instruction, using techniques such as priming, chunking, rehearsal, and worked examples allows learners time to make connections between the new information and what they already know. The implications of CLT become apparent when faced with creating instruction using digital tools. The sheer vastness of options and features available for some tools, coupled with the complexity of becoming familiar with how to use the tool, and new content being introduced can easily lead to cognitive overload and negatively impact learning.

Transactional Distance theory. According to Moore (2019), transactional theory is based on the idea of "transactional distance as the gap between the understanding of a teacher (or teaching team) and that of a learner, and distance education is the methodology of structuring the courses and managing dialogues between teacher and learner t bridge that gap through communications technology" (p. 34). That is, as structure increases, the transactional distance increases and as dialog decreases, transactional distance decreases. For instance, in low transactional distance, in which structure is low and dialog is high, learners receive information and guidance in an ongoing, frequent manner with the instructor and the instructional materials. Lower distance might be more suitable for a less self-directed learner, whereas a learner who is highly self-directed might prefer a higher structured lesson and with less dialog.

Self-regulated theory. Bozhurt et al. (2015) suggested that learners needed to have some sense of self-regulated learning when in an open environment. Self-regulation is attributed to Bandura's early work. Self-regulation emphasizes that the learner has the capability to set goals and monitor and reflect on their learning and the outcome in a cyclical manner (Kirk, 2021; Ormrod, 2016). Rand and Davidson-Shivers (2013) suggested that online learners should have a minimal working knowledge of the computer, Web, and software applications. However, more importantly, they need to be self-directed and motivated. It also requires that learners display self-motivation and good study skills. Kirk suggests that it is different for each learner and the various learning tasks.

Motivational theories. Ormrod (2016) defined motivation as "an internal state that arouses us to action, pushes us in particular directions, and keeps us engaged in certain activities" (p. 424). Motivational theories direct designers and teachers to consider appropriate conditions to incorporate into instruction (Driscoll & Burner, 2005), and there are multiple theories which relate to student learning successfully and to participate effectively in the learning environment (Davidson-Shivers et al., 2018).

One motivational theory, Wlodkowski and Ginsberg's (2009) Motivational Framework for Culturally Responsive Teaching, works well in all types of learning. It contains four elements: establish inclusion, develop learner attitudes, enhance meaningful learning, and promote learner competence (Ginsberg & Wlodkowski, 2009) and provide strategies to assist learners to become a member of the learning community and engage in their learning processes (Wlodkowski & Ginsberg, 2010). For establishing inclusion, the strategies of using icebreakers might help learners get to know each other. Having open chats or discussions to talk about the course could also be useful for assisting students. Angleo and Cross (1993) suggest using what they call the "muddiest points" discussion or chat to clear up any misconceptions in the instruction or preconceptions in a learner's prior knowledge. A strategy for the second element, develop learner attitudes, might allow learners to choose types of assignments or project topics to help facilitate relevance and volition for learners. The next element, make learning meaningful, could be obtained by creating instruction which is engaging and challenging (to a degree) by using case studies that are challenging to allow for critical thinking and problem-solving techniques or strategies that ask learners to reflect or apply their knowledge. The last element, promote learner competence, might use the strategy of providing ways for learners to practice at various levels of Bloom's Taxonomy or Gagne's Categories of Learning (Davidson-Shivers et al., 2018).

Instructional Design Strategies for Asynchronous Teaching and Learning

Based on the various theories described above, strategies for teaching and learning become a part of the asynchronous tools. Davidson-Shivers et al. (2018) developed a strategy worksheet to assist in the design of online learning. It is based on various learning, communication, and design theories. The main four sections frame the instruction/learning process from start to finish:

1. *Orientation to learning* purpose is to draw student awareness to the instructional purposes and goal, establish learner expectations, determine learners' prior knowledge, and assist in their navigating the lesson site.
2. *Presenting the instruction* purpose is to provide the content and learning activities along with guiding the learners, allow for practice with feedback, and at the end of the lesson summarize the major concepts and help learners plan for any assessments to occur.
3. *Measuring and assessment of learning* is to provide an appropriate measurement tool that is aligned with the learning goal, advise the learners of their progress and scores, and offer remediation as necessary.
4. *Summary and closing the lesson (or unit or course)* is to provide additional opportunities for retention, remediate for unmet learning, and enhance and enrich students' learning.

Other authors such as Ko & Rossen (2017) developed guidelines for online teaching. Angleo and Cross (1993) provided information about types of assessment that can be used throughout the instruction and as ways of measuring learner knowledge, attitudes, capabilities, and needs. According to Davidson-Shivers et al. (2018), the following list is a compilation of various strategies that could be incorporated in ODDE environments. The list of strategies is based on the work of Davidson-Shivers et al. (2018) as well as other sources cited throughout this chapter and is as follows.

Strategies used for orientation and helping the learner attend

- Use questionnaires, pretests, or advance organizers to probe learners' prior knowledge, skills, interests, and understandings.
- Use stories, scenarios, etc., to draw attention to the learning goal or purpose and expected learning performance.
- Use a concept map or other navigational tools to orient the learner to the environment.
- Use icebreakers to help build the learners' community.
- Use reflection questions to relate to personal or professional interests.
- Use advance organizers.

Strategies used for presenting instruction to facilitate learner knowledge gain

- Provide content information through a variety of media: audio, video lectures, or discovery learning.
- Elaborate on the content by interaction with experts.
- Use case studies or problems solving techniques.
- Use pertinent games or simulations for students to connect prior knowledge to new learning.
- Provide learning cues such as Socratic dialogues, pose questions.
- Highlight key information through visuals or audio
- Allow students to practice their knowledge gains through roleplaying, games, reciprocal teaching, etc.
- Provide rubrics on scoring prior to any practice or assessment.
- Provide feedback on learners' performance by text or media comments, peer reviews, automated feedback from the course site.
- Close the lesson with a review or summation of the content by instructor or students.
- Preview the next topic or task (if any) with a question or directions.

Strategies for measuring and assessing the learners

- Use low stakes quizzes or tests for units within a course.
- Use projects or roleplaying situation.
- Pose interesting questions or issues for learners to address through discussions, debates either text-based or video-conferencing tools.
- Provide rubrics or checklists to score or measure learning.
- Ask students to recall, summarize, or make meaningful connections about the content and learning.

Strategies for summarizing and closing the instruction

- For retention, ask learners to summarize or highlight main points of learning.
- For remediation, allow learners to review assessment to understand their errors and have them review the content again.

- For enhancement and enrichment, discuss how the lesson relates to future lessons.
- Ask learners to provide their next steps toward advancing their learning.
- Provide wrap-up remarks or ask students to provide them to close the lesson.

Two Issues Within ODDE Environments to Ponder

Is collaboration really necessary? Although this chapter's primary focus is on interaction and collaboration, there may be situations when interaction or collaboration with others is not necessary for learning to occur. Davidson-Shivers et al. (2018, p. 14) developed a continuum of interaction with ". . . one end, individual learners participate in independent, self-paced learning and interact with the content, but have minimal to no direct interaction with learners or the instructor" and "at the other end, participants are highly interactive with each other and the instructor and are motivated to build a sense of community." In between is a combination of both independent activities with other actions involving interaction and collaboration with other learners, the instructor and the content. Some individuals might prefer an independent, self-study mode. Transactional distance and self-regulated theories appear to suggest that some learners who are autonomous in nature might only need to interact with the instruction with the proviso that it has higher structure. If that is true, then further research is needed to determine how much structure is needed and for whom (i.e., the learner). One investigation could center around the questions of who are autonomous learners and how can they be supported in an environment that requires collaboration with others?

What happens when collaboration is needed, but does not occur? The second issue centers around learners not fully engaged or interacting with each other even though collaborative learning is viewed by the instructor as a necessary and beneficial part to their learning. Instead, student interactions may only be perfunctory with each other by doing the typical "respond once and reply twice" in a discussion. They might not always function as a team when trying to complete a team-based task or achieve specific goal, instead they tend to divide and conquer the task so-to-speak separately and then assemble the pieces together for the final product. As such, this could not be considered as collaborative, engaged learning. Although some studies have addressed this issue, further research study is necessary to address increasing effective collaboration among the students.

Summary and Conclusion

In this chapter, we have provided a brief overview of some important learning theories and best practices for designing instruction in asynchronous online learning. We offer a glimpse of technology tools that, when used appropriately, can enhance student engagement and result in positive learning outcomes.

Inventions and innovations in digital technologies have improved accessibility to programs and products that facilitate human communication processes and that can be enlisted into teaching and learning scenarios. Today instructors, learners, and content interactions are mediated through computer technologies such as personal computers, cellular phones, and mobile computing devices. Innovations in technology have borne new ways of communicating that can be visual, vocal, or textual. These types of communication have increasing implications for how teaching and learning are conducted. Clark & Mayer (2016a) provide scientific evidence supporting the efficacy of using multiple forms of computer-mediated communication when designing instruction. These multiple forms of communication enable elaborate and effective ways of communicating and they have potential to leverage student motivation, self-directed learning, engagement, and interaction in online learning environments.

A recent synthesis of student engagement with digital technologies conducted by Nkomo and Daniel (2021) reports on some issues of concern that have serious implications for the future of online learning. They caution that student engagement is a complex concept and educational researchers do not always agree on what constitutes engagement. However, this concept is extremely important in a digitally mediated learning environment because it influences academic success, soft skills development, and personal growth. Student engagement is multidimensional and includes behavioral, emotional, and cognitive components. Behavioral engagement is demonstrated when students complete assignments and plan for success. Emotional engagement can reveal itself in interest in course topics or through negative stress responses. Self-reflection and regulating learning are indicators of cognitive engagement. Nkomo and Daniel (2021) emphasize the importance of engaging all three dimensions of student engagement when designing instruction.

Eliciting appropriate engagement can be challenging for asynchronous learning and instructors should avoid using digital technologies in a way that might disengage students. By attending to the three elements of: (a) having students interact with peers, (b) making sure they can log into and navigate digital tools, and (c) by offering content in a format that can be replayed or viewed multiple times sets the stage for engagement. Careful design of instruction remains crucial to student engagement. Conducting a learner analysis and using good design principles will assist students in having a more successful learning experience.

Suggestions for Future Research

Based on this review of the literature, there are suggestions for future research. One area of research is to study emerging technology tools for use in ODDE environments. For example, Lund (2021) calls blockchain the fourth phase of the industrial revolution characterized by a level of interconnectedness and automation that will change the world. Tapcott and Kaplan (2019) predict blockchain will be a next generation network with nodes of teachers and learners connecting and collaborating across a secure and easily accessible network of knowledge resources.

Although artificial intelligence has been found in recent literature (e.g., a recent special issue of *British Journal of Educational Technology*), AI might be another focus area of future research. One area to explore is how AI can be incorporated or used as a tool for interaction and collaboration among participants in ODDE environments.

Past research appears to have focused on exploratory studies, case studies, and bibliometrics. Perhaps it is time to use what has been found in such studies and shift focus to the use of standard methodologies and large sample sizes in the research. Additionally, it would be good to pursue research to investigate how asynchronous tools (i.e., technologies and strategies) could be used to address current topics, which might include social justice issues, underserved populations, or diversity concerns and potential issues when algorithms are used in the analyses or configuration of a software application.

Implications for Practice

This chapter has three main implications for practice. First, when developing instruction in any ODDE environment, it would be wise to consider what technologies would be appropriate. The list of common technologies in this chapter, which briefly highlight pros and cons for each technology, may be one way to make that determination. Second, if either interaction or collaboration is considered important, consider the types of strategies and technologies that might be employed in the ODDE environment and choose wisely. Learners need to see they are relevant and meaningful. Third, consider whether collaboration is really necessary for the type of instruction being planned; it might not be necessary after all.

References

Akcaoglu, M., & Lee, E. (2018). Using Facebook groups to support social presence in online learning. *Distance Education, 39*(3), 334–352.

Akyol, Z., & Garrison, D. R. (2008). The development of a community of inquiry over time in an online course: Understanding the progression and integration of social, cognitive and teaching presence. *Journal of Asynchronous Learning Networks, 12*, 3–22.

Al Tawil, R. (2019). Nonverbal communication in text-based, asynchronous online education. *The International Review of Research in Open and Distance Learning, 20*(1), 144–163.

Alexander, C. A., & Wang, L. (2019, April). Cybersecurity, information assurance, and big data based on blockchain. In 2019 *SoutheastCon* (pp. 1–7). IEEE.

Angleo, T. A., & Cross, K. P. (1993). *Classroom assessment techniques: A handbook for college teachers* (2nd ed.). San Francisco, CA: Jossey-Bass.

Beach, R., & O'Brien, D. (2014). *Using apps for learning across the curriculum: A literacy-based framework and guide*. Routledge.

Bozhurt, A., Akgun-Ozbek, E., Yilmazel, S., Erdogdu, E., Ucar, H., Gulelr, E., . . . Aydin, C. H. (2015). Trends in distance education research: A content analysis of journals 2009-2013. *The International Review of Research in Open and Distance Learning, 161*, 330–363.

Chen, M., & Kinshuk. (2020). Effect of behavior patterns on the death of threads in asynchronous discussion forums: A study of informal learners from China. *Educational Technology Research and Development, 68*, 3371–3392. https://doi.org/10.1007/s11423-020-09827-9.

Cheong, C., Cheong, F., & Filippou, J. (2013). Quick quiz: A gamified approach for enhancing learning. *PACIS 2013 Proceedings, 206*. https://aisel.aisnet.org/pacis2013/206.

Clark, R. C., & Mayer, R. E. (2016a). *eLearning and the science of instruction: Proven guidelines for consumers and designers of multimedia learning* (4th ed.). San Francisco, CA: Wiley.

Clark, R. C., & Mayer, R. E. (2016b). Using rich media wisely. In R. A. Reiser & J. V. Dempsey (Eds.), *Trends and issues in instructional design and technology* (4th ed., pp. 259–268). New York: Pearson.

Davidson-Shivers, G. V. (2009). Frequency and types of instructor interactions in online instruction. *Journal of Interactive Online Learning, 8*(1), 23–40.

Davidson-Shivers, G. V., Rasmussen, K. L., & Lowenthal, P. R. (2018). *Web-based learning: Design, implementation, and evaluation* (2nd ed.). Cham: Springer.

Driscoll, M. P., & Burner, K. J. (2005). Psychology of learning for instruction.

Elekaei, A., Tabrizi, H. H., & Chalak, A. (2020). Evaluating learners' vocabulary gain and retention in an e-learning context using vocabulary podcasting tasks: a case study. *Turkish Online Journal of Distance Education, 21*(2), 190–203.

Faiella, F., & Ricciardi, M. (2015). Gamification and learning: A review of issues and research. *Journal of e-Learning and Knowledge Society, 11*(3), 13–21.

Garrison, D. R., Anderson, T., & Archer, W. (1999). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education, 2*(2–3), 87–105.

Garrison, D. R., Cleveland-Innes, M., & Fung, T. S. (2010). Exploring causal relationships among teaching, cognitive and social presence: Student perceptions of the community of inquiry framework. *The internet and higher education, 13*(1–2), 31–36.

Gegenfurtner, A., & Ebner, C. (2019). Webinars in higher education and professional training: A meta-analysis and systematic review of randomized controlled trials. *Educational Research Review, 28*, 100293.

Gingsberg, M. H., & Wlodkowski, R. J. (2009). *Diversity and motivation: Culturally responsive teaching in college* (2nd ed.). San Francisco, CA: Jossey Bass.

Glover, K. R., & Bodzin, A. (2021). Learner-centric design of a hand hygiene serious simulation game for grade 12 emerging health professional students. *TechTrends, 65*, 379–393. https://doi.org/10.1007/s11528-020-00577-2.

Goodman, B., Geier, M., Haverty, L., Linton, F., & McCready, R. (2001, November). A framework for asynchronous collaborative learning and problem solving. In *Proceedings of AIED'01, 10th international conference on artificial intelligence in education*, San Antonio, TX (pp. 188–199). Leeds, Uk: IAIED Society

Gurjar, N. (2020). Leveraging social networks for authentic learning distance learning teacher education. *TechTrends, 64*, 666–677.

Harasim, L. (2012). *Learning theory and online technologies*. New York: Routledge.

Inchaouh, G., & Tchaïcha, J. D. (2020). Online collaboration and experiential learning in higher education: Designing an online cross-border collaborative project for business students. *The International Journal of Technology, Knowledge, and Society, 16*(4), 37–56. https://doi.org/10.18848/1832-3669/CGP/v16i04/37-56.

Jo, I., Park, Y., & Lee, H. (2017). Three interaction patterns on asynchronous online discussion behaviours: A methodological comparison. *Journal of Computer Assisted Learning, 33*(2), 106–122.

Karaaslan, H., Kilic, N., Guven-Yalcin, G., & Gullu, A. (2018). Students' reflections on vocabulary learning through synchronous and asynchronous games and activities. *Turkish Online Journal of Distance Education, 19*(3), 53–70.

Kirk, K. (2021). Develop self-regulated Learners: Choosing and using the best strategies for the task. In *Supporting and Advancing Geoscience Education at Two-Year Colleges (SAGE 2YC)*. https://serc.carleton.edu/sage2yc/self_regulated/index.html

Ko, S., & Rossen, S. (2017). *Teaching online: A practical guide*. Routledge.

Kumar, S. (2020). *Creating engaging eLearning gamification experiences for higher impact.* https://tesseractlearning.com/blog/creating-engaging-elearning-gamification-experiences-for-higher-impact/?fbclid=IwAR3TZWKws5kq0_ovhn6o1X3ffE8gVpPDfNNF-uok-axveJgeriL1wPGey6Q

Lai, C. (2020). Trends of mobile learning: A review of the top 100 highly cited papers. *British Journal of Educational Technology, 51*(3), 721–742. https://doi.org/10.1111/bjet.12884.

Lund, B. (2021). The fourth industrial revolution does it pose an existential threat to libraries?. *Information Technology and Libraries, 40*(1).

Mahoney, J., & Hall, C. A. (2020). Exploring online learning through synchronous and asynchronous instructional methods. In *Exploring online learning through synchronous and asynchronous instructional methods* (pp. 52–76). IGI Global.

Moore, M. G. (1989). Editorial: Three types of interactions. *American Journal of Distance Education, 3*(2), 1–7.

Moore, M. G. (2019). The theory of transactional distance. In M. G. Moore & W. C. Diehl (Eds.), *Handbook of distance education* (4th ed., pp. 32–46). New York: Routledge.

Nebel, S., Schneider, S., Kolda, F., Mackiewicz, V., Rey, G. D., & Beege, M. (2017). You cannot do this alone! Increasing task interdependence in cooperative educational videogames to encourage collaboration. *Educational Technology Research and Development, 65*, 993–1014. https://doi.org/10.1007/s11423-017-9511-8.

Ng, O. L., Ting, F., Lam, W. H., & Liu, M. (2020). Active learning in undergraduate mathematics tutorials via cooperative problem-based learning and peer assessment with interactive online whiteboards. *The Asia-Pacific Education Researcher, 29*(3), 285–294.

Nkomo, L. M., & Daniel, B. K. (2021). Sentiment analysis of student engagement with lecture recording. *TechTrends, 65*, 213–224. https://doi.org/10.1007/s11528-020-00563-8.

Northrup, P. T. (2002). Online learners' preferences for interaction. *American Journal of Distance Education, 3*(2), 219–226.

Ormrod, J. E. (2016). *Human learning* (6th ed.). New York: Pearson.

Pallas, J., Eidenfalk, J., & Engel, S. (2019). Social networking sites and learning in international relations: The impact of platforms. *Australasian Journal of Educational Technology, 35*(1). https://doi.org/10.14742/ajet.3637.

Palloff, R. M., & Pratt, K. (2007). *Building learning communities: Effective strategies for the virtual classroom* (2nd ed.). San Francisco, CA: Jossey-Bass.

Petronzi, R., & Petronzi, D. (2020). The online and campus (OaC) model as a sustainable blended approach to teaching and learning in higher education: A response to COVID-19. *Journal of Pedagogical Research, 4*(4), 498–507.

Rambe, P., & Bere, A. (2013). Using mobile instant messaging to leverage learner participation and transform pedagogy at a south African University of Technology. *British Journal of Educational Technology, 44*(4), 544–561.

Rand, A. D., & Davidson-Shivers, G. V. (2013). Online learning: Houston, do we have a problem? In J. Herrington et al. (Eds.), *Proceedings of EdMedia: World conference on educational multimedia, hypermedia and telecommunications* (pp. 862–866). Chesapeake: AACE. http://www.editlib.org/p/112061. Proceedings of the 2012 World Conference, Victoria, BC, CAN.

Robles, H., Guerrero, J., LLinas, H., & Montero, P. (2019). Online teacher-students interactions using WhatsApp in a law course. *Journal of Information Technology Education: Research, 18*, 231–252.

Seaman, J. E., Allen, I. E., & Seaman, J. (2018). *Grade increase: Tracking distance education in the United States*. Babson Survey Research Group. http://www.onlinelearningsurvey.com/highered.html.
Shiang, T., Cerniglia, C., Lin, H., & Lo, H. S. (2021). Radiology podcasting as a model for asynchronous remote learning in the COVID-19 era. *Clinical Imaging, 71*, 147–154.
Sun, Z., Lin, C. H., Wu, M., Zhou, J., & Luo, L. (2018). A tale of two communication tools: Discussion-forum and mobile instant-messaging apps in collaborative learning. *British Journal of Educational Technology, 49*(2), 248–261.
Sweeney, E. M., Beger, A. W., & Reid, L. (2021). Google Jamboard for virtual anatomy education. *The Clinical Teacher*. https://doi.org/10.1111/tct.13389.
Sweller, J. (2011). Cognitive load theory. *Psychology of Learning and Motivation, 55*, 37–76. Academic.
Tapscott, D., & Kaplan, A. (2019). Blockchain revolution in education and lifelong learning. *Blockchain Research Institute-IBM Institute for Business Value*.
Wakefield, J., Tyler, J., Dyson, L. E., & Frawley, J. K. (2019). Implications of student-generated screencasts on final examination performance. *Accounting & Finance, 59*(2), 1415–1446.
Weller, M. (2020). *25 years of ed tech*. Athabasca University Press.
Wikipedia. (2021). Open education. https://en.wikipedia.org/wiki/Open_education
Wlodkowski, R. J., & Ginsberg, M. B. (2010). *Teaching intensive and accelerated courses: Instruction that motivates*. San Francisco, CA: Jossey-Bass.
Zawacki-Richter, O., & Naidu, S. (2016). Mapping research trends from 35 years of publications in distance education. *Distance Education, 37*(3), 245–269. https://doi.org/10.1080/01587919.2016.1185079.
Zawacki-Richter, O., & The COER Group. (2020). Elements of open education: An invitation to future research. *The International Review of Research in Open and Distance Learning, 21*(3). http://www.irrodl.org/index.php/irrodl/article/view/4659/5346.

Learning Analytics in Open, Distance, and Digital Education (ODDE)

59

Paul Prinsloo

Contents

Abstract

Data, and specifically student data, has always been an integral part of good teaching as well as providing evidence for strategic and operational planning, resource allocation, pedagogy, and student support. As Open, Distance, and Digital Education (ODDE) become increasingly datafied, institutions have access to greater volumes, variety, and granularity of student data, from more diverse sources than ever before. This provides huge opportunity for institutions, and specifically educators and course support teams, to better understand learning, and provide more appropriate and effective student support.

With the emergence of learning analytics (LA) in 2011, the measurement, collection, analysis, and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs, gained momentum, both as research focus and practice. Since

P. Prinsloo (✉)
University of South Africa (Unisa), Pretoria, South Africa
e-mail: prinsp@unisa.ac.za

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_57

then, LA have become institutionalized in many higher education institutions, mostly in residential institutions located in the Global North, and established a prolific presence in research on student learning in digitized environments. While LA has become institutionalized in the Open University (UK), it remains an emerging research focus and practice in many ODDE institutions across the world.

This chapter considers the implications of LA for ODDE research and practice by first providing a brief overview of the evolution of LA, and specifically the theoretical influences in this evolution. A selection of major research findings and discourses in LA are then discussed, before the chapter is concluded with some open questions for a research agenda for LA in ODDE.

Keywords

Learning analytics · Student data · Student retention · Student success

Introduction

As higher education becomes increasingly digitalized and datafied, not only did pedagogy, curriculum and assessment practices change in response to the availability of synchronous and asynchronous technologies, but also institutions had access to more granular and often real-time student and learning data, from a variety of sources (Prinsloo, Slade, & Khalil 2021). Collecting, measuring, and analyzing student data for the purposes of improving the effectiveness of teaching and learning, for use by educators, students, and course development and support teams, came to be known as *learning analytics* (LA) (Siemens & Long, 2011).

Since the emergence of LA in 2011 as a distinct research focus and practice, the field has matured and become institutionalized predominantly in the Global North and in residential institutions, with research into LA being dominated by the Global North (Guzmán-Valenzuela, Gómez-González, Tagle, and Lorca-Vyhmeister, 2021). While there is evidence emerging that LA is making inroads also in the Global South, its adoption by traditional distance and open distance education institutions remains mostly limited to the Open University in the UK (Prinsloo, Slade, & Khalil, 2022).

This chapter first provides a brief overview of LA and its relevance, especially for Open, Distance, and Digital Education (ODDE). Following this, theoretical influences guiding LA are discussed before providing a review of selected discourses and research in LA. This is followed by some open questions and directions for future research before this chapter concludes with implications for ODDE practice that arise from this research.

Central to the value contribution of this chapter is not *if* LA can contribute to more effective and successful learning in ODDE contexts, but rather, *under what conditions* will LA become an essential part of teaching and learning in ODDE institutions.

Overview of LA and Its Relevance

It is crucial to understand LA against the *historical* use of student data in service of improving teaching strategies, student support, and student learning. Collecting and using student data – whether referring to demographic, registration, prior learning experiences, or current learning behavior data – has always been essential to teaching, regardless of the modality. Data on students' performance and progression in their courses and chosen program of study inform not only institutional strategic and operational planning such as enrolment plans and resource allocation, but also teachers' choice of pedagogical strategies and assessment approaches, as well as student and course support teams' strategies. Feedback on progress in attaining the envisioned outcomes of courses, whether in the form of assignments, tasks, and examinations, is furthermore key to informing students on their progress, probabilities of passing or failing courses, and serves as an essential resource for students to make informed decisions. It is, however, clear that as institutions become digitalized and datafied, they have access to increasing volumes, variety, and granularity of student data from a variety of courses so that student data, and particularly LA, will increase in strategic and operational importance.

What Is the Relevance of LA for ODDE?

- Teachers in ODDE contexts often feel as if they are "teaching in the dark" due to physical separation between students and teachers inherent in distributed learning contexts. Teachers and institutions therefore rely on student learning data (e.g., assignments and online behavioral and engagement patterns) to get a sense of students' progress, students' risk of dropping out, and/or need for additional guidance and support.
- Since its emergence in 2011, LA has matured not only as institutional practice but also as research focus and provides a wide range of empirical evidence of its potential to predict students' performance, provide decision support for teachers and student, predictive analysis of retention/dropout, descriptive and predictive analysis of cognitive states, and learning interactions (Du, Yang, Shelton, Hung, & Zhang, 2021) (Also see Bart, Olney, Nichols, & Herodotou, 2020).
- Student retention and success in distributed learning contexts have always been and remain a cause for concern (Kember, 1995; Subotzky & Prinsloo, 2011). The measurement, collection, analysis, and use of student data therefore offers huge potential to increase student retention and success, inform learning design, assessment strategies, and student support interventions.

In the next section, the major theoretical insights that guide and emerge from LA are discussed.

Guiding Theories

Theoretical influences and the importance of theory in LA is well-established and appreciated (Wise & Shaffer, 2015). For example, Rogers, Gašević, and Dawson (2016) state that theory "is an explicit articulation of the causal forces and mechanisms in a domain of interest that purports to connect empirical findings to each other and to the whole, making sense of what is figure and what is ground" (p. 237). As such theory lays out the core assumptions and fundamental principles, in general hypothetical terms, that inform research into a particular phenomenon or practice. How theory and which theories shaped the evolution of LA and continue to shape research into and the adoption of LA are, however, more difficult to establish. Though many of the published research in LA do not explicitly mention any theory, but the mere "absence of explicit theory in [e.g.] predictive analytics research does not mean 'no theory'" (Rogers et al., 2016, p. 238).

To understand the role of theory in LA, it is important to first understand the emergence of LA in broader context and history of data-informed decision-making in higher education, and second, understand the interdisciplinary nature of LA.

Student and organizational operational data have always formed part of and as basis for data-informed decision-making in higher education institutions' planning and reporting through what has come to be known as Educational Data Mining (EDM) (Baek & Doleck, 2021; Liñán & Pérez, 2015). The specific focus on *student* learning data, to inform decisions teachers and students make, emerged from the intersection of several disciplines such as, but not limited to, psychology, education, computer science, and the broader social sciences (Ferguson, 2012). Though LA and EDM are often used interchangeably, LA is distinct from EDM with regard to theoretical influences, its purpose, and the data it collects as well as the users of the analytics (Baker & Inventado, 2014; Ferguson, 2012). The interdisciplinary nature of LA also results in discipline-specific theories and practices shaping how student learning is understood, what data are collected, as well as understandings of the data.

Though it is impossible to provide a comprehensive overview of all the theoretical insights in the field of LA as an interdisciplinary field, the next section maps some key, selected theoretical "moments" that shaped the development of theorizing the field of LA as well as LA as praxis.

Theoretical Influences

The article by Siemens and Long (2011) was the first specific overview not only of the expectations and aims of learning analytics, but also clarifying the difference between *academic* and *learning* analytics. *Academic* analytics refer to institutional (learning profiles, performance), regional, national, and international analytics used by administrators, funders, and marketing as well as a range of educational authorities and governments. In contrast, learning analytics refers to course-level (student behavioral and learning data) and departmental data used by students and faculty.

They warn that confining learning analytics to behavioral data risks “a return to behaviourism as a learning theory,” and they ask, “how can we account for more than behavioural data?” (p. 38). This early warning has continued to haunt LA up to the present day (Rogers et al., 2016; Selwyn, 2019).

The first published article that made specific reference to theories informing LA is the article by Clow (2012) in which he refers to the five-step model proposed by Campbell and Oblinger (2007) and the need to put LA on “an established theoretical base” (p. 134). Theories referred by Clow (2012) include Kolb’s (1984) Experiential Learning Cycle which refers to the work of Dewey and Piaget, Schön (1983), and Argyris and Schön’s (1974) work on reflective practice. He also refers to Laurillard’s (2002) Conversational Framework. Other educational literature mentioned are approaches to learning – deep, surface, or strategic – referring to the work of Richardson (2000) and Trigwell and Prosser (2004), as well as a reference to closed and open-loop control systems in “engineering theory” (Clow, 2012, p. 136).

Very early in the evolution of LA was considering the role of theory in making sense of having access to more data. Higher education institutions and certain forms of delivery (e.g., MOOCs) increasingly have access to more data not only on the institutional Learning Management System (LMS) but also from a range of other sources, such as geolocation, multimodal, and other forms of data “across sites and multiple identities” (Siemens & Long, 2011, p. 38). With this access to more data, a particular imaginary emerged that theory is no longer needed because “the data deluge makes the scientific method obsolete” (Anderson, 2008), and that “with enough data, the numbers speak for themselves” (in Siemens & Long, 2011, p. 34) (Also see Wise & Shaffer, 2015).

Pointing to the apparent tension between access to more data and theory, Clow (2013) states “As a field, learning analytics is data-driven and is often *atheoretical,* or more precisely, is not explicit about its theoretical basis,” and although there are attempts to ground LA in theory, “this is not universal, running the risk of treating the data that have been gathered as the data that matter” (p. 692; emphasis added). Later in 2015, Gašević, Dawson, and Siemens (2015) remark that “learning analytics tools are generally not developed from *theoretically established* instructional strategies, especially those related to provision of student feedback” (p. 65; italics added). Reflecting on the relative success of the *Signals* project at Purdue University, “the tool design did not have sufficient theoretically informed functionality to encourage adoption of effective instructional and intervention practices” (p. 66). In following Winne (2006, in Gašević et al., 2015, p. 66), the authors reflect on three axioms from the field of educational psychology – “learners construct knowledge, learners are agents, and data includes randomness” (p. 66). Building on the principles of Self-Regulated Learning (SRL), the authors focus on students *as agent*s, and their freedom to make choices, however constrained by internal and/or external conditions.

Recent research by Wang, Mousavi, and Lu (2022) mapped key theoretical constructs found in LA research and based on their analysis and found that most of the research in LA “were guided by the theories of self-regulated learning and social constructivism; most integrated theories into LA for better interpreting the data analysis results; and most linked theoretical constructs and log variables directly." The authors also found that researchers employed survey-instruments to measure theoretical constructs. (Also see Prinsloo et al., for an overview of the complexities in identifying the dominant theories in LA research.)

Though the above is anything but a systematic and comprehensive overview of theoretical underpinnings and emergent theoretical issues in LA since 2011, it does provide a very useful, and insightful, basis for which to consider, in the rest of this chapter, key theoretical moments in LA. In the next section, this chapter outlines selected major research and discourses in LA.

Selected Major Research and Discourses in LA

In selecting major research and discourses in LA of particular importance for ODDE, it is important to note that the field of LA and scope of published research are rich and wide. For example, research and discourses include, inter alia, stakeholder perspectives, new developments such as multimodal analytics and Artificial Intelligence (AI), the use of dashboards, measuring the impact of LA, and issues pertaining to student consent, privacy, and ethics. The selected research in the following section maps research into the adoption and institutionalization of LA, the role of LA in informing learning design and pedagogy, privacy and ethics in LA, and evidence of the impact of LA.

The Adoption and Institutionalization of LA

Since the emergence of learning analytics in 2011, one of the main foci in LA discourses and research was to do research on factors that may influence the adoption and institutionalization of LA. For example, the first research to provide a framework, not only for understanding LA from an institutional perspective but also to inform its adoption, was provided by Greller and Drachsler (2012). They proposed six interdependent and mandatory critical dimensions encompassing "stakeholders, objectives, data, instruments, external constraints, and internal limitations" (p. 45). Of particular interest is the authors' foregrounding of "theories of learning, teaching, cognition and knowledge" (p. 55) as it points to a recognition of theoretical influences that shape the institutionalization of LA. They state that "more empirical evidence is needed to identify which pedagogic theory LA serves best" (p. 53). They further opine that while there is evidence of LA being informed by "behaviourist-instructivist style approaches… […] there is as yet little evidence for the support of constructivist approaches to learning" (p. 53). They conclude that "technologies are not pedagogically neutral" and, as such, moot the need for constant evaluation of approaches taken.

The Learning Analytics Readiness Instrument (LARI) developed by Arnold, Lonn, and Pistilli (2014) refers to "literature [that] offers would-be practitioners a solid base of theory, process, and research" (p. 163) but does not provide any detail pertaining to what this "solid base of theory" entails. In another article, Arnold et al. (2014) refer briefly to the work of Kotter (2008), on "leading change," and emphasize "using the existing research and theory as the foundation to begin building out new theory and research in system level thinking to support learning analytics" (p. 260). The authors refer to the five stages of Puglise's student success analytics (2010, in Arnold et al. (2014), p. 258) namely (1) technology infrastructure, analytics tools, and applications; (2) policies, processes, practices, and workflows; (3) values and skills; (4) culture and behavior; and (5) leadership.

The Supporting Higher Education to Integrate Learning Analytics (SHEILA) project (https://sheilaproject.eu/sheila-framework/) cofunded by the European Commission via the Erasmus+ program (Tsai et al., 2018) is one of the more recent, comprehensive, and widely used frameworks for institutionalizing LA. The framework was developed "based on interviews with 78 senior managers from 51 European higher education institutions across 16 countries," and Tsai et al. (2018) report on findings of the implementation of the framework in four different institutional settings.

The purpose of the SHEILA project was "to guide individual institutions to develop a comprehensive policy that speaks to the needs of their particular contexts and stakeholders therein" (p. 4), and the project focused on the following research questions: (1) What is the state of the art in terms of LA adoption among European HEIs? (2) What are the key drivers for LA from the perspectives of institutional leaders, teaching staff, and students? (3) What are the key challenges for LA from the perspectives of institutional leaders, teaching staff, and students? (4) How can we move toward systematic adoption of LA in higher education? The SHEILA framework highlights four important areas of work in the implementation of LA namely (1) tool development; (2) policy development; (3) user-centered implementation; and (4) communication with primary stakeholders. As such, the SHEILA framework provides a structured approach to drafting a policy for learning analytics by allowing institutions wanting to implement LA to map the political context, identify key stakeholders, identify desired behavior changes, develop an engagement strategy, and analyze the internal capacity to effect change and establishing monitoring and learning frameworks (https://sheilaproject.eu/sheila-framework/).

LA As Informing Learning Design and Pedagogy

Ameliorating the effects of the geographic separation between students and teachers has been central to the evolution of ODDE praxis and theorization, for example, Moore's (2019) work on transactional distance, the promise of guided didactic conversation (Holmberg, 1999), getting the right mix of different elements and technologies in the design of learning experiences (Anderson, 2003), and the Community of Inquiry Framework (Garrison & Arbaugh, 2007), to mention but a few. Considering that LA and research into LA is about improving the effectiveness of teaching and learning (Gašević et al., 2015), the success of LA in informing learning design and pedagogy is one of the most important themes in LA analytics research.

Reflecting on the alignment of LA with learning design in the context of the Open University (OU) in the United Kingdom, (UK), Rienties, Nguyen, Holmes, and Reedy (2017) report that "learning design decisions made by OU teachers seem to have a direct and indirect impact on how students are working online and offline, which in part also influenced their satisfaction and learning outcomes" (p. 147). Learning design at the OU focuses on what students do and is in contrast to many approaches that emphasize what teachers do. As such student digital engagement data in the different activities allow teachers to design formative learning activities to not only address student needs, but also ensure that students are retained and supported toward success. LA analytics allows teachers to provide feedback to students on what students do and the progress they make. Rienties et al. (2017) state that while there has been claims that learning design impacts on the effectiveness of learning and teaching, LA provides the opportunity to provide evidence of such impact. LA at the OU is based on an institutionally approved learning design taxonomy consisting of a number of learning design activities namely (1) assimilative; (2) finding and handling information; (3) communication; (4) productive; (5) experiential; (6) interactive/adaptive; and (7) assessment.

Another study providing evidence of the positive correlation between LA, pedagogy, and student engagement is the research by Macfadyen, Lockyer, and Rienties (2020) foregrounding the impact of the decisions made by educators, and "how students are reacting to these decisions" (p. 10). Considering the diversity of students, especially in ODDE environments, LA provides key insights into how to personalize learning experiences depending on student profiles, behavior, and support needs.

Where Is the Evidence? Mapping the Impact of LA

Considering evidence that suggests that LA helps to improve learning design and pedagogy (as discussed above), it is less clear to what extent LA impacts on student retention and success.

One of the first published reports on the impact of LA, by Arnold et al. (2012), shares findings of the use of a "predictive student success algorithm (SSA) is run on-demand by instructors," and the reported positive outcomes of the *Signals* project. An algorithm was developed consisting of four components namely "performance, effort, as defined by interaction . . .; prior academic history. . .; and, student characteristics, such as residency, age, or credits attempted." Each of these components was weighted and then operationalized by the algorithm to determine students' chances of success resulting in red, yellow, or green signals that were then displayed on students' course homepages. "A red light indicates a high likelihood of being unsuccessful; yellow indicates a potential problem of succeeding; and a green signal demonstrates a high likelihood of succeeding in the course." The authors conclude that "The use of learner analytics through the application of Course Signals to difficult courses has shown great promise with regard to the success of first- and second-year students, as well as their overall retention to the University" (Arnold et al. 2012). In the light of the fact that the study by Arnold et al. (2012) is the "most frequently cited institutional deployment of learning analytics," it is important to note that some of the claims of the improved retention of students have been disputed (Jisc, 2016) by Caulfield (2013), Straumsheim (2013), and Clow (2013).

Forward to 2017, Ferguson and Clow (2017) point to a number of problems with evidence pertaining to the impact of LA such as a lack of geographical spread, gaps in the knowledge base of LA such as no evidence of LA in, for example, informal learning contexts, "little evaluation of commercially available tools" and a "lack of attention to the learning analytics cycle (by Clow, 2012), limited attention to ethics, issues pertaining to sample selection, access to research findings, and an "over-representation of LAK conference papers." The authors conclude that "there is considerable scope for improving the evidence base for learning analytics." The quest to find evidence of the impact of LA on student learning is also addressed in Kitto, Shum, and Gibson (2018) who opine that the lack of evidence could be attributed to the "mistake of concentrating development in LA upon a concept that is easy to define and track, but not particularly useful to learning" combined with an overemphasis on "upon valuing what we can measure, instead of measuring what we value — a longstanding concern in educational assessment" (p. 454).

A more recent attempt to map evidence of the efficacy of LA is found in the systematic review by Larrabee Sønderlund, Hughes, and Smith (2019). Their research found only 11 studies that evaluated the effectiveness of interventions based on LA. The authors conclude "While there is plenty of research on the forecasting of student performance and retention, there is very little on the effectiveness of LA interventions" (p. 2613). They further note that "The LA interventions that we have identified centre on the idea that alerting students to their risk status, and engaging them on this basis, will change their performance for the better," and according to the authors, there are several caveats in this assumption. These research findings are also confirmed by Ifenthaler, Mah, and Yau (2019). Viberg and Gronlund (2021) confirm that there is still "very little existing evidence" that LA improves teaching, learning, and student support *at scale,* and Guzmán-Valenzuela et al. (2021) propose that there is a "preponderance of analytics but very little learning" in their bibliometric and a content analysis. These authors venture the existence of two communities within the LA landscape namely "a *practice-based community* led by management units within higher education institutions and an *academic community* whose object of research study is LA as such" (p. 16). Of specific importance to this chapter is their finding that "there is a shortage of papers devoted to developing or expanding educational theories about students' learning" (p. 16).

Early research on understanding student retention and success in distance education environments from a socio-critical perspective (Subotzky & Prinsloo, 2011), points to the role the lack of and inefficiencies in administrative support attribute to student frustration and dropout. In a recent article by Herodotou, Naydenova, Boroowa, Gilmour, and Rienties (2020), they explore how predictive learning analytics and motivational interventions increase student retention and enhance administrative support in distance education. The research used a Student Probabilities Model (SPM) that "produced predictions of whether an individual student would reach specific milestones (different points in a course presentation or between courses), such as completing and passing a course, or returning in the next academic year" (p. 75). Based on the outcomes of the SPM, proactive interventions were executed including text, mail, and phone calls and "likely helped students remain engaged and progress through their studies" (p. 78) and confirmed that "interpersonal contact and communication with support and academic teams is more likely to contribute to a sense of belonging and social integration with the university, connecting students with the institution from a distance" (p. 80). Also see Herodotou et al. (2020).

Ethics and Privacy in LA

Concerns about privacy and ethics in the measurement, analysis, and use of student data have been part and parcel of the evolution of LA from before its official launch in 2011 (Knox, 2010; Slade & Galpin, 2012). Since then, various issues and concerns regarding ethics and privacy in LA formed part of the mainstream discussions in LA. The first comprehensive attempt to map the ethical and privacy concerns and propose a pointer for consideration is found in the work of Slade and Prinsloo (2013) mooting several principles for consideration namely (1) LA as moral practice; (2) students as agents; (3) student identity and performance are temporal dynamic constructs; (4) student success is a complex and multidimensional phenomenon; (5) transparency; and (6) higher education cannot afford to not use data. Of particular interest in the context of this chapter, this work by Slade and Prinsloo (2013) formed the basis for the first institutional policy for ethics in LA, developed at the Open University (UK) (OUUK, 2014). Other examples of how ethics and privacy claimed a space in LA research, discourses, and practice include an article by Pardo and Siemens (2014) on ethical and privacy principles in LA and a proposal by Willis (2014) to go beyond utilitarianism in thinking about ethics in LA.

Since these early research into the ethical and privacy concerns in LA, numerous initiatives, both institutional and as research, followed such as a Code of Practice for Learning Analytics (Jisc, 2018), a Discussion Paper, "The ethics of learning analytics in Australian higher education" (Corrin et al., 2019), "Global guidelines: Ethics in learning analytics" developed by the Association for the Advancement of Computing in Education (Alayan, 2019), and codes of practice/ethics for learning analytics in several higher education institutions such as the University of Leeds (UK) (2019). See Pargman and McGrath (2021) for a systematic review on ethics in LA.

Open Questions and Directions for Future Research

From the preceding and selective overview of some of the major research foci and discourses in LA research, several questions arise that may serve as directions for further research. Most probably, the most pertinent question that arises pertains to the scattered and incomplete evidence that LA impacts positively on student retention and success. While it falls outside of the scope of this chapter to speculate regarding the lack of unequivocal evidence, there are glimpses in the above overview that may hold clues such as the following:

- How does LA research build on existing theory? Many authors pointed to the lack of theoretical grounding in LA research (e.g., Misiejuk & Wasson, 2017). Despite or amid the reality that LA is found in the nexus of various disciplines, and methodological approaches and theoretical frameworks, the evident lack of explicit theory is cause for further research, if not concern. Even when reference is made to the work of Tinto (e.g., Arnold et al. 2012), the reference is as background. Considering the rich theoretical and empirical history of research into student success and retention (e.g., Spady, 1970; Tinto, 1975, 1982; Kember, 1995; Subotzky & Prinsloo, 2011), it is not clear to what extent LA as field and as practice takes its cues from theory.
- What does LA research contribute to theory? We also have to ponder the inverse, namely, to what extent does LA contribute to theory development on student success and retention? Tinto (1982) proposes we have to recognize that "current theory cannot do or explain everything" (p. 688). Acknowledging current theoretical limitations should not "constrain us from seeking to improve our existing models or replace them with better ones" (Tinto, 1982, p. 689). We therefore have to contemplate to what extent LA can expand existing theories or provide novel understandings of student persistence and success.
- What are the practical effects of LA? We also need to heed the words of Tinto (1982) that we should "also recognize that there are deep- rooted limits to what we can do to reduce dropout both at the national and institutional levels of practice" (p. 699). The chapter provided evidence that much of LA focuses on providing students with information to make better choices, institutions with information on how to support identified at-risk students better, and data to teachers and learning designers to design better pedagogical strategies. Considering that student success is multidimensional and emerges from various, interdependent, and often mutually constitutive factors in the nexus of *students* (habitus, loci of control, self-efficacy, and prior learning experiences), *institutions* (character, disciplinary domains, efficiencies, and responsiveness), and *macro-societal* factors, is LA measuring the wrong things? It is therefore significant that Tinto (1982) proposes that we "need ask not whether we should eliminate dropout (since that is not possible) but for which types of students in which types of settings we should act to reduce it" (p. 699). This may also require that we question some of the defaults and normalized assumptions in LA (Archer & Prinsloo, 2020).
- What is the student role in LA? Lastly, growing a student-centered approach to LA means that we need to reconsider the role students play not only in providing data, but also in making sense of the data. We need to engage them on classification systems and categories used (e.g., household), the proxies for their (dis)engagement, as well as preventing LA from becoming a datafied voice-

over of the student experience (Broughan & Prinsloo, 2020), ignoring the complexities not only of student learning, but also in facilitating learning and providing administrative, affective, and cognitive support.

The above questions and pointers for future research are, of course, neither comprehensive, nor neutral. For a more comprehensive analysis of current research in LA, see the systematic review by Du et al. (2021). There are, also, a number of authors who have mapped alternative research agendas for LA such as Gunn (2014), Selwyn (2019, 2020), Wise, Sarmiento, and Boothe (2021), and Prinsloo et al. (2021).

Implications for ODDE Practice

The introduction to this chapter made it clear that collecting and using student data has been part and parcel of education, irrespective of the mode of delivery or its openness. With the emergence of LA in 2011 as a distinct research focus and practice, the potential of using the increasing volumes, diversity, and granularity of data from a variety of sources opened opportunities but also raised several ethical and privacy issues. In the light of concerns about student retention and success in ODDE contexts, LA offers scope for critical interrogation and ethical operationalization. Despite that most, if not all open, distributed, and online provision is, in one form or the other, digitalized and therefore datafied, it is somewhat strange that, outside of the adoption and institutionalization of LA at the Open University (UK), there is no evidence of the adoption of LA, at scale, in other ODDE institutions (Prinsloo et al., 2022).

Following from this, the most important question that emerges is to understand what is preventing ODDE institutions to embrace and operationalize LA? Considering that LMSs may form, to a large extent, the backbone of administrative and teaching systems in ODDE institutions, more research is needed to investigate the reasons why not more ODDE institutions are adopting LA. The issue is not if LA can contribute to more effective and successful learning in ODDE contexts, but rather, under what conditions will LA become an essential part of teaching and learning in ODDE institutions?

References

Alayan A. (2019). Global guidelines: Ethics in learning analytics. AACE Review. Retrieved from https://www.aace.org/review/global-guidelines-ethics-in-learning-analytics/

Anderson, C. (2008, June 23). The end of theory: The data deluge makes the scientific method obsolete. *Wired.* Retrieved from http://www.wired.com/science/discoveries/magazine/16-07/pb_theory

Anderson, T. (2003). Getting the mix right again: An updated and theoretical rationale for interaction. *The International Review of Research in Open and Distributed Learning, 4*(2), 1–14. https://doi.org/10.19173/irrodl.v4i2.149.

Archer, E., & Prinsloo, P. (2020). Speaking the unspoken in learning analytics: Troubling the defaults. *Assessment & Evaluation in Higher Education, 45*(6), 888–900.

Argyris, C., & Schön, D. A. (1974). *Theory in practice: Increasing professional effectiveness*. San Fransisco, CA: Jossey-Bass.

Arnold, K. E., Pistilli, M. D., & Arnold, K. E. (2012). Course Signals at Purdue: Using Learning Analytics to Increase Student Success. In Dawson, S., Haythornwaite, C, Buckingham Shum, S., Gasevic, D., & Fergsun, R. (eds), *LAK '12: Proceedings of the 2nd International Conference on Learning Analytics and Knowledge* (pp. 267–270). New York, NY: ACM.

Arnold, K. E., Lonn, S., & Pistilli, M. D. (2014, March). An exercise in institutional reflection: The learning analytics readiness instrument (LARI). In *Proceedings of the fourth international conference on learning analytics and knowledge* (pp. 163–167).

Arnold, K. E., Lynch, G., Huston, D., Wong, L., Jorn, L., & Olsen, C. W. (2014, March). Building institutional capacities and competencies for systemic learning analytics initiatives. In *Proceedings of the fourth international conference on learning analytics and knowledge* (pp. 257–260).

Baek, C., & Doleck, T. (2021). Educational data mining versus learning analytics: A review of publications from 2015 to 2019. *Interactive Learning Environments*, 1–23.

Baker, R. S., & Inventado, P. S. (2014). Educational data mining and learning analytics. In *Learning analytics* (pp. 61–75). New York, NY: Springer.

Bart, R., Olney, T., Nichols, M., & Herodotou, C. (2020). Effective usage of learning analytics: What do practitioners want and where should distance learning institutions be going? *Open Learning: The Journal of Open, Distance and e-Learning, 35*(2), 178–195.

Broughan, C., & Prinsloo, P. (2020). (Re) centring students in learning analytics: In conversation with Paulo Freire. *Assessment & Evaluation in Higher Education, 45*(4), 617–628.

Campbell, J.P., & Oblinger, D. G. (2007). Academic Analytics. *EDUCAUSE Quarterly, 42*(4), 40–57. Retrieved from https://er.educause.edu/articles/2007/7/academic-analytics-a-new-tool-for-a-new-era

Caulfield, M. (2013, November 12). Purdue Course Signals data issue explainer. *e-Literate.* [Web log post]. Retrieved from http://mfeldstein.com/purdue-course-signals-data-issue-explainer/

Clow, D. (2012, April). The learning analytics cycle: Closing the loop effectively. In *Proceedings of the 2nd international conference on learning analytics and knowledge* (pp. 134–138).

Clow, D. (2013). An overview of learning analytics. *Teaching in Higher Education, 18*(6), 683–695.

Corrin, L, Kennedy, G., French, S., Buckinghum Sum, S., Kitto, K., Pardo, A., West, D., Mirriahi, N., & Colvin, C. (2019). The ethics of learning analytics in Australian higher education. *Discussion paper*. Retrieved from https://melbourne-cshe.unimelb.edu.au/__data/assets/pdf_file/0004/3035047/LA_Ethics_Discussion_Paper.pdf

Du, X., Yang, J., Shelton, B. E., Hung, J. L., & Zhang, M. (2021). A systematic meta-review and analysis of learning analytics research. *Behaviour & Information Technology, 40*(1), 49–62.

Ferguson, R. (2012). Learning analytics: Drivers, developments and challenges. *International Journal of Technology Enhanced Learning, 4*(5–6), 304–317.

Ferguson, R., & Clow, D. (2017, March). Where is the evidence? A call to action for learning analytics. In *Proceedings of the seventh international learning analytics & knowledge conference* (pp. 56–65).

Garrison, D. R., & Arbaugh, J. B. (2007). Researching the community of inquiry framework: Review, issues, and future directions. *The Internet and Higher Education, 10*(3), 157–172.

Gašević, D., Dawson, S., & Siemens, G. (2015). Let's not forget: Learning analytics are about learning. *TechTrends, 59*(1), 64–71.

Greller, W., & Drachsler, H. (2012). Translating learning into numbers: A generic framework for learning analytics. *Journal of Educational Technology & Society, 15*(3), 42–57.

Gunn, C. (2014). Defining an agenda for learning analytics. In *Proceedings of rhetoric and reality: Critical perspectives on educational technology conference* (pp. 638–637). Retrieved from https://ascilite2014.otago.ac.nz/files/concisepapers/257-Gunn.pdf

Guzmán-Valenzuela, C., Gómez-González, C., Tagle, A. R. M., & Lorca-Vyhmeister, A. (2021). Learning analytics in higher education: A preponderance of analytics but very little learning? *International Journal of Educational Technology in Higher Education, 18*(1), 1–19.

Herodotou, C., Naydenova, G., Boroowa, A., Gilmour, A., & Rienties, B. (2020). How can predictive learning analytics and motivational interventions increase student retention and enhance administrative support in distance education? *Journal of Learning Analytics, 7*(2), 72–83.

Herodotou, C., Rienties, B., Hlosta, M., Boroowa, A., Mangafa, C., & Zdrahal, Z. (2020). The scalable implementation of predictive learning analytics at a distance learning university: Insights from a longitudinal case study. *The Internet and Higher Education, 45*, 100725.

Holmberg, B. (1999). The conversational approach to distance education. *Open Learning: The Journal of Open, Distance and E-Learning, 14*(3), 58–60.

Ifenthaler, D., Mah, D. K., & Yau, J. Y. K. (2019). Utilising learning analytics for study success: Reflections on current empirical findings. In *Utilizing learning analytics to support study success* (pp. 27–36). Cham: Springer.

Jisc. (2016). Learning analytics in higher education. A review of UK and international practice. Retrieved from https://analytics.jiscinvolve.org/wp/files/2016/04/CASE-STUDY-A-Purdue-University.pdf

Jisc. (2018). A code of practice for learning analytics. Retrieved from https://www.jisc.ac.uk/guides/code-of-practice-for-learning-analytics

Kember, D. (1995). *Open learning courses for adults: A model of student progress*. Englewood Cliffs, NJ: Education Technology Publications.

Kitto, K., Shum, S. B., & Gibson, A. (2018, March). Embracing imperfection in learning analytics. In *Proceedings of the 8th international conference on learning analytics and knowledge* (pp. 451–460).

Knox, D. (2010). Spies in the house of learning: A typology of surveillance in online learning environments. Paper presented at Edge2010, Newfoundland, Canada.

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Englewood Cliffs, NJ: Prentice Hall.

Kotter, J. (2008). *Leading change*. Boston, Massachusetts: Harvard Business Review Press.

Larrabee Sønderlund, A., Hughes, E., & Smith, J. (2019). The efficacy of learning analytics interventions in higher education: A systematic review. *British Journal of Educational Technology, 50*(5), 2594–2618.

Laurillard, D. M. (2002). *Rethinking University teaching: A conversational framework for the effective use of learning technologies*. London, UK: Routledge Falmer.

Liñán, L. C., & Pérez, Á. A. J. (2015). Educational data nining and learning analytics: Differences, similarities, and time evolution. *International Journal of Educational Technology in Higher Education, 12*(3), 98–112.

Macfadyen, L. P., Lockyer, L., & Rienties, B. (2020). Learning design and learning analytics: Snapshot 2020. *Journal of Learning Analytics, 7*(3), 6–12.

Misiejuk, K., & Wasson, B. (2017). State of the field report on learning analytics. Retrieved from https://bora.uib.no/bora-xmlui/handle/1956/17740

Moore, M. G. (2019). The theory of transactional distance. In M. G. Moore & W. C. Diehl (Eds.), *Handbook of distance education* (4th ed., pp. 32–46). Abingdon, UK: Routledge.

Open University (OUUK). (2014). Policy on ethical use of student data for learning analytics. Retrieved from https://help.open.ac.uk/documents/policies/ethical-use-of-student-data/files/22/ethical-use-of-student-data-policy.pdf

Pardo, A., & Siemens, G. (2014). Ethical and privacy principles for learning analytics. *British Journal of Educational Technology, 45*(3), 438–450.

Pargman, T. C., & McGrath, C. (2021). Mapping the terrain of ethics in learning analytics: A systematic literature review of empirical research. *Journal of Learning Analytics*. ISSN 1929-7750 (online). https://doi.org/10.18608/jla.2021.1.

Prinsloo, P., Slade, S., & Khalil, M. (2021). Learning analytics: A primer. Commonwealth of Learning. Retrieved from http://oasis.col.org/handle/11599/3883

Prinsloo, P., Slade, S., & Khalil, M. (2022). *Learning analytics in ppen and distributed learning – Potential and challenges*. Springer.

Richardson, J. T. E. (2000). *Researching student learning: Approaches to studying in campus-based and distance education*. Buckingham, UK: Open University Press.

Rienties, B., Nguyen, Q., Holmes, W., & Reedy, K. (2017). A review of ten years of implementation and research in aligning learning design with learning analytics at the Open University UK. *Interaction Design and Architecture(s) Journal, 33*, 134–154. Retrieved from http://www.mifav.uniroma2.it/inevent/events/idea2010/doc/33_7.pdf

Rogers, T., Gašević, D., & Dawson, S. (2016). Learning analytics and the imperative for theory driven research. In *The SAGE Handbook of E-Learning Research* (pp. 232–250). Retrieved from https://www.researchgate.net/profile/Tim-Rogers-3/publication/314246417_Learning_analytics_and_the_imperative_for_theory-driven_research/links/58bde643a6fdcc2d14eb50b7/Learning-analytics-and-the-imperative-for-theory-driven-research.pdf

Schön, D. A. (1983). *The reflective practitioner: How professionals think in action*. Temple Smith.

Selwyn, N. (2019). What's the problem with learning analytics? *Journal of Learning Analytics, 6*(3), 11–19.

Selwyn, N. (2020). Re-imagining 'learning analytics'... a case for starting again? *The Internet and Higher Education, 46*, 100745.

Siemens, G., & Long, P. (2011). Penetrating the fog: Analytics in learning and education. *Educause Review, 46*(5), 30.

Slade, S., & Galpin, F. (2012, April). Learning analytics and higher education: Ethical perspectives. In *Proceedings of the 2nd international conference on learning analytics and knowledge* (pp. 16–17)

Slade, S., & Prinsloo, P. (2013). Learning analytics: Ethical issues and dilemmas. *American Behavioral Scientist, 57*(10), 1510–1529.

Spady, W. G. (1970). Dropouts from higher education: An interdisciplinary review and synthesis. *Interchange, 1*, 64–85. https://doi.org/10.1007/BF02214313.

Straumsheim, C. (2013, November 6). Mixed signals. *Inside Higher Ed.* Retrieved from https://www.insidehighered.com/news/2013/11/06/researchers-cast-doubt-about-early-warning-systems-effect-retention

Subotzky, G., & Prinsloo, P. (2011). Turning the tide: A socio-critical model and framework for improving student success in open distance learning at the University of South Africa. *Distance Education, 32*(2), 177–193.

Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research, 45*, 89–125. Retrieved from http://www.jstor.org/stable/1170024

Tinto, V. (1982). Limits of theory and practice in student attrition. *The Journal of Higher Education, 53*, 687–700. Retrieved from http://www.jstor.org/stable/1981525

Trigwell, K., & Prosser, M. (2004). Development and use of the approaches to teaching inventory. *Educational Psychology Review, 16*(4), 409–424.

Tsai, Y.-S., Gašević, D., Whitelock-Wainwright, A., Muñoz-Merino, P. J., Moreno-Marcos, P. M., Fernández, A. R., Kloos, C. D., Scheffel, M., Jivet, I., Drachsler, H., Tammets, K., Calleja, A. R., & Kollom, K. (2018). SHEILA: Supporting higher education to integrate learning analytics research report (PDF). Retrieved from https://sheilaproject.eu/wp-content/uploads/2018/11/SHEILA-research-report.pdf

University of Leeds (UK). (2019). Code of practice on learning analytics. Retrieved from https://forstaff.leeds.ac.uk/info/30402/university_news/1882/code_of_practice_on_learning_analytic

Viberg, O., & Gronlund, A. (2021). Desperately seeking the impact of learning analytics in education at scale: Marrying data analysis with teaching and learning. *arXiv preprint arXiv:2105.06680*.

Wang, Q., Mousavi, A., & Lu, C. (2022). A scoping review of empirical studies on theory-driven learning analytics. *Distance Education*. https://doi.org/10.1080/01587919.2021.2020621.
Willis, J. E. (2014). Learning analytics and ethics: A framework beyond utilitarianism. *Educause Review*. Retrieved from https://er.educause.edu/articles/2014/8/learning-analytics-and-ethics-a-framework-beyond-utilitarianism
Wise, A. F., Sarmiento, J. P., & Boothe Jr, M. (2021, April). Subversive learning analytics. In *LAK21: 11th international learning analytics and knowledge conference* (pp. 639–645).
Wise, A. F., & Shaffer, D. W. (2015). Why theory matters more than ever in the age of big data. *Journal of Learning Analytics, 2*(2), 5–13.

The Rise of Multimodal Tutors in Education 60

Insights from Recent Research

Daniele Di Mitri, Jan Schneider, and Hendrik Drachsler

Contents

Abstract

This chapter describes the insights derived by the design and development of the Multimodal Tutor, a system that uses artificial intelligence for providing digital feedback and to support psychomotor skills acquisition. In this chapter, we discuss the insights which we gained from eight studies: (1) an exploratory study combining physiological data and learning performance (Learning Pulse); (2) a literature survey on multimodal data for learning and a conceptual model (the Multimodal Learning Analytics Model); (3) an analysis of the technical challenges of Multimodal Learning Analytics (the Big Five Challenges); (4) a technological framework for using multimodal data for learning (the Multimodal Pipeline); (5) a data collection and storing system for multimodal data (the

D. Di Mitri (✉) · J. Schneider · H. Drachsler
DIPF – Leibniz Institute for Research and Information in Education, Frankfurt, Germany
e-mail: dimitri@dipf.de; drachsler@dipf.de

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_58

Learning Hub); (6) a data annotation tool for multimodal data (the Visual Inspection Tool); (7) a case study in Cardiopulmonary Resuscitation training (CPR Tutor) consisting of a feasibility study for detecting CPR mistakes; and (8) a real-time feedback study.

Keywords

Artificial Intelligence in Education · Real-time feedback · Multimodal learning analytics

Introduction

Learning is a fundamental part of human nature. The knowledge acquired from learning new skills helps individuals change their cognition and affection, the center of human growth and development, and is hoped to be the mean for happiness, safety, emancipation, productivity, and societal success. *Education*, as the set of all planned learning processes and activities, is a "means by which men and women deal critically and creatively with reality and discover how to participate in the transformation of their world" (Freire, 1970).

Despite being so important in the development of an individual, learning is not always easy. In 1978, Vygotsky explained the difficulty of learning by introducing the *Zone of Proximal Development* (Vygotsky, 1978) indicating the psychological processes that the learner can reach with the support of knowledgeable guidance. According to Vygotsky, there are certain skills and competencies that the learner can only acquire if given the right support. With the right guidance, each learner can stretch outside of the *zone of comfort* and can experience and learn new skills and concepts. Besides external guidance, also internal factors play a determining role in learning success. Those are, for example, motivation to learn (Pintrich, 1999), the self-determination of an individual (Ryan & Deci, 2000) or metacognitive skills like self-regulation (Winne & Hadwin, 1998; Zimmerman, 2002), and the right set of dispositions (Shum & Crick, 2012), skills, values, and attitudes. Among all these individual factors, the learning science field also provides best practices to instruct an individual or a group of learners by providing evidence-driven instructional models like 4CID (Van Merrienboer, Clark, & De Croock, 2002).

For several decades, educational researchers were busy understanding the "black box" of learning, unveiling the underlying dynamics and factors that lead to successful learning. More recently, the education technology research community was busy trying to understand the following question: *Is there place for technology to facilitate learning and teaching*?

An Historical Perspective on Education Technologies

The first massive implementation of digital technologies in education dates back to the mid-1980s, with the diffusion of the modern personal computer. American universities started sharing course content in the university libraries implementing the so-called *Computer-Based Learning*. Higher education institutions took advantage of the computer by developing distance courses and primitive forms of e-learning systems. The 1980s constituted a "new spring" for *Artificial Intelligence* research. The invention of the *back-propagation rule*, which allowed *Artificial Neural Networks* to learn complex, nonlinear problems, generated a new wave of enthusiasm. The 1980s were characterized by the surge of *Expert Systems*, computer programs typically written in LISP that modeled specific portions of knowledge. In the domain of education and training, these systems took the name *Intelligent Tutoring Systems (ITS)*, adaptive computer programs which aimed at providing rich interaction with the student (Anderson, Boyle, & Reiser, 1985; Yazdani, 1986). The ITSs introduced the idea of the *Tutor*, an intelligent algorithm able to adapt to the individual learner characteristics, and that works as "instructor in the box" (Polson, Richardson, & Soloway, 1988) capable of replacing the human teacher. The AI-ITS vision was both controversial as well as technically complex to achieve for the 1980s. It did not fully take off as much as other educational technologies such as e-learning.

In the 1990s, the e-learning systems took further steps of developments. The computer in education shifted from being a knowledge diffusion system to a platform that encouraged sharing and developing knowledge between groups of learners. E-learning, however, became more popular as it was less ambitious and more applicable also to more ill-structured subjects, other than mathematics, programming, or other natural science. E-learning became a tool that could support *computer-supported collaborative learning* (Dillenbourg, 1999).

In the 2000s, digital technologies met a fast development also thanks to the fast-spreading of the Internet and the *World Wide Web*. In education research, the *Technology-Enhanced Learning* (TEL) community emerged. The initial focus of TEL was the e-learning systems and multimedia educational resources. While these educational contents were previously only accessible via a personal computer, in the late 2000s, they became available for portable computing devices such as smartphones, tablets, or laptops. These new technological affordances established the research focus on *ubiquitous and mobile learning* (Sharples, Arnedillo-Sánchez, Milrad, & Vavoula, 2009), i.e., learning *anywhere at any time* without physical nor geographical location constraints.

In the 2010s, we observed a *data-shift* in education technologies with the rise of the *Learning Analytics* (LA) research community (Ferguson, 2012). The core idea at the basis of the LA research was that learners interacting with computer devices leave behind a considerable number of *digital footprints* which can be collected and analyzed for describing the learning progress and help to optimize it (Greller & Drachsler, 2012). Ten years later, after LA research was introduced, the field moved significant steps forward by identifying additional fundamental challenges. Despite the vast amount of data collected, there is still confusion about how these data can be harnessed to support learners. One part of the LA research aims to foster *self-regulated learning* by stimulating learners to improve their metacognitive skills through self-reflection and social comparison with peer learners (Winne, 2017). Nevertheless, the common idea of providing learners with LA dashboards for raising their awareness does not naturally lead to change their behavior and meet their goals (Jivet, Scheffel, Drachsler, & Specht, 2017). LA deals also with challenges like how to ensure ethics and privacy (Drachsler & Greller, 2016), and how to change and improve learning design with the support of learning analytics and data-driven methods (Schmitz, van Limbeek, Greller, Sloep, & Drachsler, 2017).

Another limitation of LA relates to the data source used. So far, LA data are mostly related to learners interacting with a digital platform (e.g., Learning Management System) utilizing mouse and keyboard. LA research – as well as its predecessors – were born nested into the *glass slab era*: The primary learning and productivity tools are mediated by a computer screen, a mouse, or a keyboard. With such tools, there is little space for interactions with physical objects in the physical world. The lack of physical interactions during learning led to a *reality drift* for learning science. According to the theory of *embodied cognition*, humans have developed their cognitive abilities together with the use of their bodies and that is encoded in the human DNA (Shapiro, 2019). For example, the hands are made for grasping physical objects, or the human senses developed for witnessing sound, smell, or light. The limited data sources raise valid questions concerning the *understandability* and *interpretability* of the digital footprints analyzed by LA researchers. Trying to derive meaning from limited educational data brings the risk of falling into the *street-light effect (*Freedman*,* 2010*)*, the standard practice in the science of searching for answers only into places that are easy to explore.

To include novel data sources and new forms of interaction, a new research focus has emerged within the LA research, coined as *Multimodal Learning Analytics* (MMLA) (Blikstein, 2013). The objective of MMLA is to track learning experiences by collecting data from multiple modalities and bridging complex learning behaviors with learning theories and learning strategies (Worsley, 2014). The *multimodal shift* is motivated from a theoretical point of view by the need to achieve more comprehensive evidence and analysis of learning activities taking place in the physical realm such as colocated collaborative learning (e.g., Pijeira-Díaz, Drachsler, Kirschner, & Järvelä, 2018), psychomotor skills training (e.g., Di Mitri, Schneider, Specht, & Drachsler, 2019a; Schneider & Blikstein, 2015), and dialogic classroom discussions (e.g., D'mello et al., 2015) which were underrepresented in LA research and other data-driven learning research. In parallel, the *multimodal shift* is also stimulated from a technological push given by the latest technology developments (Dillenbourg, 2016). Learning researchers are making use of new technological affordances for gathering evidence about learning behavior. In recent years, the low costs of sensor devices made them more affordable. Sensors can be found embedded in smartphones, fitness trackers, wrist-based monitors, or Internet of Things devices and provide the possibility to continually measuring human behavior. These devices can collect streams and measure life aspects such as hours and quality of sleep, working and productivity time, food intake, and physiological responses such as heart rate or electrodermal activity. The multimodal sensors can collect "social signals" – thin slices of interaction that predict and classify physical and nonverbal behavior in group dynamics. Multimodality is relatively a novelty in the field of learning. For this reason, we introduce the metaphor of the *new land* which encloses the promise – or probably the hope – to understand learning and human behavior better.

In the 2020s, a new kind of educational technology is taking off. We introduce this new technology under the name of *Multimodal Tutor*, a new approach for generating adaptive feedback from capturing multimodal experiences. The Multimodal Tutor capitalizes on the support of multimodal data for understanding learning and human behavior pushing it to the next level. It proposes a theoretical and methodological approach to deal with the complexity of multimodal data, combining artificial intelligence with human assessment. With this hybrid approach, the Multimodal Tutor carries an advanced promise for learners, making learning more authentic, adaptive, and immersive. We argue the Multimodal Tutor may enable us to move toward a *learner-centered* and *constructionist* idea of learning as an active and contextualized process of construction of knowledge (Piaget, 1952). The multimodal approach is learner-centered as it focuses on the entire span of human senses and embodied cognitive abilities. It moves away from nonnatural interactions introduced by computers or smartphones, and it stimulates interactions with the physical world. In the meantime, it tracks information about the learner' physiology, behavior, and learning context.

The Multimodal Tutor advocates for reuniting two branches of developments in education technology which have been developing in parallel. The first one is Learning Analytics and TEL research focusing primarily on deriving insights from learning data to support human decision-making. The second one is AI-ITS research, which for almost three decades has designed, developed, and tested artificially intelligent systems that model the knowledge of the learners and guide them through the learning activities domain.

Outline of This Book Chapter

This book chapter reports the insights of eight subsequent studies, which lead to the final design, ideation, and technical implementation of one example of Multimodal Tutor in the field of Cardiopulmonary Resuscitation.

The first study is *Learning Pulse* (section “Research study: Learning Pulse”) where we investigate the complexity of using multimodal data for learning which paved the way to the Multimodal Tutor. Learning Pulse discovered empirically a series of complex dynamics, of both conceptual and methodological nature, derived by using multimodal data for predicting learning performance.

In the literature study *From Signals to Knowledge* (section “Literature Study on Multimodal Data for Learning”), we explore the concept of multimodality by analyzing existing constructs and by conducting a literature survey. This qualitative research approach leads to the formulation of the *Multimodal Learning Analytics Model* (MLeAM), a conceptual model which serves as the “Map of Multimodality.” The MLeAM sheds light on the multimodal feedback loop that the Multimodal Tutor is set to accomplish.

If the MLeAM indicates the "way to go," it does not say "how to get there." There is, in fact, the need for a better understanding of the problem from a technological standpoint and the formulation of a possible solution. We describe this in 2.3 with the "Big Five challenges" for the Multimodal Tutor.

The Multimodal Pipeline (section "Position Paper: The Multimodal Pipeline") proposes a technological framework for the cyclic nature of the MLeAM and addresses the "Big Five" challenges with technical infrastructure. The *Multimodal Pipeline* reveals to be the most critical part of the Multimodal Tutor research. The multimodal data streams are complex to align, synchronize, and store.

The *Multimodal Learning Hub* (section "Technical implementation: The Multimodal Learning Hub") is the first prototype of the Multimodal Pipeline, which is designed to track learning experiences using customizable multisensor setups flexibly.

In section "Technical implementation: the Visual Inspection Tool," we decide to focus on one specific, unsolved aspect of the Multimodal Pipeline, the Data Annotation. From this challenge emerges the idea of creating a *Visual Inspection Tool*, an application for annotating and inspecting multimodal data streams, which allows to "read between the lines."

In this phase, we decide to narrow the focus to the specific domain of Cardiopulmonary Resuscitation Training (CPR). In section "Feasibility Study: Detecting CPR Mistakes," we focus on modeling the CPR domain, mainly how to detect multimodal mistakes using machine learning techniques. Finally, the CPR Tutor is employed in a field study for feedback generation in (section "Research Study: Keep Me in The Loop") where we report the design, development, and experimental testing of the CPR Tutor.

Main Findings

Research Study: Learning Pulse

The exploratory study *Learning Pulse* (Di Mitri et al., 2017). Learning Pulse aimed at predicting levels of stress, productivity, and level of flow during self-regulated learning. In the study, we gathered multimodal data from nine participants. The data consisted of (1) physiological data (heart rate and step count) from Fitbit HR wristbands; (2) software applications used on their laptops from RescueTime; and (3) environmental information (temperature, humidity, pressure, and geolocation coordinates) using web APIs. In two weeks, the participants had to self-report every working hour via a mobile application, the *Activity Rating Tool*. The participants' data were collected in a *Learning Record Store* using custom *Experience API* (xAPI) triplets. The experimental setup chosen allowed too much diversity of tasks, resulting in an uncontrolled study and negatively influencing the results' quality. Although the nine participants were PhD students of the same department, throughout the 2 weeks of the data collection, they used different laptops and software applications, which were grouped into categories. The collected data were heterogeneous: Some attributes as "step-count" exhibited random behavior, and some other attributes such as "heart-rate" had continuous values instead. To accommodate both types of continuous and random effects, we opted for *Linear Mixed Effect Model* (LMEM), a multilevel prediction algorithm typically used for time-series forecasting.

The collection of the labels needed for the data annotation was among the biggest challenges of Learning Pulse. The self-perceived levels of stress, productivity, and flow were reported by the participants retrospectively every hour using the Activity Rating Tool. We thus realized that the number of labels was not sufficient for supervised machine learning. For this reason, from each labeled hour, we derived 12 labeled intervals of 5 minutes. Finally, the data-processing approach was elementary, especially the *Data Processing Application*. The processing pipeline was tailor-made and not flexible nor reusable for other purposes outside of the study. The xAPI format revealed being a bottleneck when used for high-frequency sensor data such as heart rate or step-count. Storing each heart-rate update with an xAPI triplet store generated a load of redundant information that slowed down the data import and the overall computation. Finally, the poor results in the model accuracy did not allow to explore further the feedback mechanisms.

Findings

- Data collections during long periods need to deal with the task diversity of each user and uncontrolled setups.
- Tracking software applications used by the user leads to diverse sets of attributes for each user, which makes it more difficult to compare them.
- Some modalities are continuous variables (e.g., heart-rate), and some others are random variables (e.g., step-count), which makes it hard to combine them and analyze them.
- Fixed-time (e.g., hourly) self-reports are not always reliable and are subject to bias.
- There is a trade-off between the number of labels needed for supervised machine learning and the time that humans need to annotate the data.
- Harnessing the potentials of multimodal data require run-time systems such as data-processing pipelines instead of data analysis scripts which run only once.
- xAPI is not suitable for storing and exchanging high-frequency sensor data due to the high overhead of the XML format.

Literature Study on Multimodal Data for Learning

This literature study (Di Mitri, Schneider, Specht, & Drachsler, 2018a) aimed at mapping the state of the art of Multimodal Data for learning. This field was emerging as *Multimodal Learning Analytics* (MMLA). The exploratory study Learning Pulse in (Di Mitri et al., 2017) and the related work done in the field were the main motivations driving this scientific investigation. Surveying the related literature showed that MMLA covered a scientific field scattered and not yet coherent. This work contributed to framing the mission of MMLA: using multimodal data and data-driven techniques for filling the gap between observable learning behavior and learning theories. We coined this mission "from signals to knowledge." We conducted a literature survey of MMLA studies using the proposed *classification framework* in which we separate two main components: the input space and the hypothesis space that are separated by the *observability line*. The literature survey led to the *Taxonomy of multimodal data for learning* and the *Classification table for the hypothesis space*. Surveying the related studies allowed discovering exciting commonalities. For example, most of the studies using multimodal data looked primarily at metacognitive dimensions as a hypothesis as the presence of specific emotions in learning.

The literature survey led to propose a new theoretical construct, the *Multimodal Learning Analytics Model* (MLeAM), a conceptual model for supporting the emerging field of MMLA. MLeAM has three main objectives: (1) mapping the use of multimodal data to enhance the feedback in a learning context; (2) showing how to combine machine learning with multimodal data; (3) aligning the terminology used in the field of machine learning and learning science.

Findings

- Sensors can capture observable learning dimensions that include behavioral, activity, and contextual data – we refer to this as the *input space.*
- The unobservable learning dimensions such as cognitive, metacognitive, or emotional aspects stand below the *observability line* –we refer to this as the *hypothesis space.*
- Using human-driven data annotation and machine learning, it is possible to infer the unobservable from the observable dimensions. This process is described by the *Multimodal Learning Analytics Model* (MLeAM).
- MLeAM shows how best to exploit machine learning and multimodal data to support human learning.
- The work in MMLA is jeopardized as it cannot yet rely on standardized approaches and techniques.
- Further research efforts must be put in technical prototypes, standardized technical infrastructure, run-time systems, and common practices for multimodal data for learning.

Position Paper: The "Big Five" Challenges

In the Big Five, we address one structural shortcoming in the MMLA field, as evidenced by the literature survey conducted in (Di Mitri et al., 2018a): the lack of standardized technical approaches for multimodal data support of learning activities. We claimed that this technical gap is holding back the development of the MMLA field by imposing the MMLA researchers to duplicate efforts in setting up data collection infrastructures and preventing them from focusing on data analysis research questions answering. In (Di Mitri, Schneider, Specht, &

Drachsler, 2018b), the identified technical challenges are grouped into five categories, named the *"Big Five" challenges of Multimodal Learning Analytics* which are the (1) *data collection*, (2) *data storing*, (3) *data annotation*, (4) *data processing,* and (5) *data exploitation*. The chapter attempts to provide possible solutions to the flexible enough challenges for being employed in different contexts.

Findings

- The technical challenges of MMLA can be grouped into five categories (1) data collection, (2) data storing, (3) data annotation, (4) data processing, and (5) data exploitation.
- The five challenges represent the steps that need to be addressed for implementing a data-driven feedback loop.
- Each of the challenges categories presents a set of subchallenges that need to be addressed by MMLA researchers.
- Tackling all these challenges together is a complicated research effort.

Technical Implementation: The Multimodal Learning Hub

As tackling all the five challenges requires a complex effort, we decided to build upon an existing research prototype, a solution for the data collection and synchronization and the data storing: the Multimodal Learning Hub (Schneider, Di Mitri, Limbu, & Drachsler, 2018) (LearningHub). The LearningHub is a platform that can collect data from multiple sensor applications and synchronize them into session files. The most significant research outputs of the LearningHub are (1) a software prototype that can connect to multiple sensor applications running on Windows, and (2) the introduction of a new data-storing logic and custom data-format which we coined as *Meaningful Learning Task* (MLT-JSON).

Findings

- Sensor devices have different software systems making the integration of data.
- From multiple sources not trivial.
- Sensors generate data at different frequencies.
- One sensor stream can be composed of several attributes.
- A typical problem of sensor fusion is the time synchronization of different devices. This problem can be addressed using having the LearningHub working as "master" that decides when the sensor applications should begin collecting the data.
- As data continuous data collection is complex and expensive to realize. It is easier to adopt a "batch approach," in which the user can decide when to "start" and "stop" the data collection.
- The MLT-JSON format allows creating a document for each sensor device with multiple attributes and stores the data into human-readable format.
- Although MLT-JSON adopts a verbose format (due to repetitive JSON tags) when compressed, its file size is reduced by 90–95%.

Technical Implementation: The Visual Inspection Tool

In (Di Mitri, Schneider, Klemke, Specht, & Drachsler, 2019), we focused on one of the five big challenges, the *data annotation*. This challenge deals with how humans can make sense of complex multidimensional data. In this chapter, we proposed a new technical prototype, *Visual Inspection Tool* (VIT). The VIT allows the researchers to visually inspect and annotate various psychomotor learning tasks captured with a customizable set of sensors. The file format supported by VIT is MLT-JSON, meaning that any recording session recorded with LearningHub can be loaded, visualized, and annotated using the VIT. The VIT enables the researcher (1) to triangulate multimodal data with video recordings; (2) to segment the multimodal data into time intervals and to add annotations to the time intervals; and (3) to download the annotated dataset and use the annotations as labels for machine learning predictions. Besides generically addressing the data annotation, the VIT also facilitates data processing and exploitation. The VIT is released as Open Source software (Code available on GitHub (https://github.com/dimstudio/visual-inspection-tool)).

Findings

- Sensor data are poorly informative when visualized; for this reason, they need to be complemented by evidence interpretable for humans, such as video data. Without video, data is not easy to make sense of what happened in the recorded session.
- The numerical sensor attributes (as opposed to categorical variables) can be visualized as time series. The visualization of more than a couple of time series is tricky for the human eye; manually selecting the attributes to visualize, therefore, is crucial.
- Audio and video data can be transformed into numerical time series (e.g., by extracting colors of pixels or audio features) and added in the multimodal dataset.
- The annotation is a human interpretation of the data which apply to a specific time interval with a begin and end.
- Each time interval (annotation) can consist of multiple attributes; this approach allows the optimal definition of binary and nonbinary classes.
- Manually selecting the time intervals is an expensive task, which should be automated if possible – in the best-case scenario, the human role should be only of supervising, i.e., correcting and integrating the (semi)-automatic annotations.

Position Paper: The Multimodal Pipeline

The VIT, as well as the LearnigHub and its custom data format MLT-JSON, constitutes a chain of technical reusable which we coined as Multimodal Pipeline and that we described in (Di Mitri, Schneider, Specht, & Drachsler, 2019c). The Multimodal Pipeline is an integrated technical workflow that works as a toolkit for supporting MMLA researchers to set up new studies in various psychomotor learning scenarios. Using components from this toolkit can reduce developing time to set up studies, and it can facilitate and speed up the transfer of research knowledge in the MMLA community. The Multimodal Pipeline connects a set of technical solutions to the “Big Five” challenges described presented in (Di Mitri, Schneider, Specht, & Drachsler, 2019c). The Multimodal Pipeline has two main stages; the first one is the “offline training,” in which the collected sessions are annotated, and the ML models are trained with the collected data. The second stage is the “online exploitation,” which corresponds to the “run-time” behavior of the Multimodal Pipeline.

Findings

- The Multimodal Pipeline describes in technical terms the data-driven feedback cycle proposed by MLeAM in (Di Mitri et al., 2018a).
- There are two flows of data in the Multimodal Pipeline, the “offline-training” and the “online-exploitation.”
- The Data Annotation happens typically before the data processing, as annotations are required for training the models.
- The Data Annotation is not always required. The Multimodal Pipeline can serve different strategies of exploitation for the Multimodal Pipeline, besides predictive feedback using supervised ML; these include rule-based corrective feedback, pattern identification, historical reports, diagnostic analysis, or expert learner comparison.
- The Multimodal Pipeline can harness multimodal data both for Learning Analytics Dashboards, for example, for raising awareness and stimulating orchestration in the learning activities; similarly, it can be embedded in Intelligent Tutors to achieve better adaptation personalization of the tutoring experience.

Feasibility Study: Detecting CPR Mistakes

In (Di Mitri, Schneider, Specht, & Drachsler, 2019a), we selected Cardiopulmonary Resuscitation (CPR) as an application case for the Multimodal Tutor. We selected CPR training as a representative learning task for carrying a study on mistake detection. CPR was chosen primarily because it is an individual learning task. It is repetitive and highly structured. It has clear performance indicators and training with high social relevance. Among the different specialization options that the Multimodal Tutor could take, we decided to focus on the design of a CPR Tutor. We introduced a new approach for detecting CPR training mistakes with multimodal data using neural networks. The proposed system was composed of a multisensor setup for CPR, consisting of a Kinect camera and a Myo armband. We used the system in combination with the ResusciAnne manikin for collecting data from 11 experts performing CPR training. We first validated the collected multimodal data upon three performance indicators provided by the ResusciAnne manikin, observing that we can classify the training mistakes accurately on these three standardized indicators. We further concluded that it is possible to extend the standardized mistake detection to additional training mistakes on performance indicators such as correct locking of the arms and correct body position. So far, those mistakes could only be detected by human instructors.

Findings

- The quality of the data-training corpus is crucial for ensuring solid model training. Collecting data and training classifiers for a small number of participants leads to particular models that do not generalize well. Diversity and amount of the training data is the key.
- There is no gold number in the number of annotated samples (chest compressions – CC) which needs to be collected; there is, however, a dependency with the number of attributes that will be considered.
- Given that the samples (CCs) have different duration, it is important to resample to a fixed number of bins applying some trimming or.
- Applying normalization, and min-max scaling of all attributes is important for achieving the best result; this has to follow the activation function used in the neural networks.
- Increasing the number of input attributes (e.g., adding new modalities) increases the classification accuracy of the model; these attributes work as regularization factor, adding more "background noise" to the model and making it more robust.
- Neural Network seems robust in accepting heterogeneous input while converging to good results; we decided that we could use the participants' data as part of the same training set with the individual body differences.
- It is difficult to capture the span of all possible mistake with a restricted number of participants; each participant tends to make only a small subset of mistakes; the solution found was asking participants to mimic some types of mistakes.
- The task structure two sessions of 2 minutes performing CC is a tiring task for the participants.
- Body size is different among participants, and it has an effect on sensor wearing, for instance, people with thinner forearms had some trouble wearing the Myo, which was too loose.

Research Study: Keep Me in The Loop

In (Di Mitri et al., 2021), we presented the design and the development of real-time feedback architecture for the CPR Tutor. To complete the chain of flexible technical solutions proposed by the Multimodal Pipeline, we developed *SharpFlow* (Code available on GitHub (https://github.com/dimstudio/SharpFlow)) , an open-source data-processing tool. SharpFlow supports the MLT-JSON format used as well by the VIT and the LearningHub. The data serialized in this format are transformed by SharpFlow into a tensor representation and fed into a Recurrent Neural Network architecture trained to classify the different target classes contained in the annotation files. SharpFlow also implements the two data-flows of *offline training* and *online exploitation*. SharpFlow achieves the latter using a

TCP server for classifying in real-time every new chest compression. In (Di Mitri et al., 2021), the architecture was employed first in an Expert Study involving ten participants, aimed at training the mistake classification models, second in a User Study involving ten additional participants in which the CPR Tutor was prompting real-time feedback interventions.

Findings

- Learning from experts is complicated as experts do not make enough mistakes; instances of mistakes are needed to train the machine learning algorithm; in (Di Mitri et al., 2021), we asked the experts to mimic some common mistakes.
- The amount of training data got from 10 experts was limited; while the findings could not be generalized, they provided some indication that the feedback of the CPR tutor had a positive influence on the CPR performance on the target classes.
- The proposed architecture used for the CPR Tutor allowed for successful provision of real-time multimodal feedback.
- The generated feedback seemed to have a short-term positive influence on the CPR performance on the target classes considered.
- There is a hierarchy among the performance indicators: Some mistakes are less frequent but more critical than others, and they need to be corrected first; some other mistakes are more frequent but not so critical.
- Imbalanced class distribution is a real problem; there seems to be an amplifying effect: The majority class in the training set tends to prevail even more in the test set and in the classification of new instances.
- Down-sampling is not trivial; as we had five target classes, down-sampling one class would also affect the other ones; finding a fair balance among the classes was hard.
- Oversampling seemed not trivial either with time series; generating fake data could undermine the prior class distribution.
- Highest feedback frequency was set to 10s interval; more frequent feedback would distract or confuse the participant.
- The feedback messages must be explained to the participants beforehand so that they know what to expect and what each message means, preventing confusion.
- The SharpFlow online exploitation was swift (70 ms for classifying each instance); in this way, the overall system was not heavily disrupted every time it had to assess each single CC.
- For the longer-term influence of the feedback on the target performance indicators, we would need to (1) collect data from more participants; (2) increase the number of sessions per participant; and (3) select participants with less experience so their performance is not optimal and feedback is fired more frequently.

The Multimodal Tutor presents a set of advantages for the MMLA community. It builds on top of a new proposed technological framework, the *Multimodal Pipeline*, which, in turn, is composed by a chain of technological prototypes such as the (1) *Multimodal Learning Hub*, (2) the *Visual Inspection Tool,* and (3) *SharpFlow*. All these tools are released, adopt the same data-exchange format (MLT-JSON), and are released under the Creative Commons – ShareAlike 4.0 International license (https://creativecommons.org/licenses/by-sa/4.0/).

The main advantage for the MMLA researcher of using such tools is that there is no longer a need to reinvent solutions for data collection, synchronization, storing, annotation, and processing. The MMLA researcher can focus on more specific aspects of their experiments, such as deciding which sensor configuration to use, depending on which modalities they need to be monitored. Similarly, decide what hypothesis to formulate, what unobservable dimensions of learning have to be assessed, and how can these dimensions be translated into an annotation scheme. MMLA researchers can ultimately focus on modeling the learning task, what sets of atomic actions, and what pedagogical and feedback intervention is suitable for correcting or optimizing the performance in each of these actions. The use of the Multimodal Tutor and its underpinning technological frameworks (Multimodal Pipeline) and conceptual model (Multimodal Learning Analytics Model) provide *flexibility* and *multi-purposeness*, pushing forward the entire MMLA field. By explaining how to support learning using multimodal data, the Multimodal Tutor generates scientific added value for different data-driven learning research communities, like the Learning Analytics & Knowledge and the Intelligent Tutoring System / Artificial Intelligence in Education. Ultimately, the Multimodal Tutor set the way for more "emerging" fields of research such as *Hybrid Intelligence* (Kamar, 2016), *Social Artificial Intelligence,* or Social Robotics (Kanda & Ishiguro, 2017) that are concerned how to best interface human communication with artificial (robotic) intelligence.

Limitations

Among many advancements in MMLA research, the Multimodal Tutor still carries some limitations. First and foremost, the Multimodal Tutor consists still in a set of research prototypes not ready to be launched in the market as fully working products. There has to be extensive testing, quality-checking, or control of the existing functionalities to achieve production-ready software. Within the research applications of the Multimodal Tutor, there exist also additional limitations which can be divided into different levels: (1) learning domain level, (2) hardware level, (3) software level, (4) data level, and (5) model level.

At the *learning domain level*, we have been focusing primarily on CPR training, which is a common type of medical simulation. Related research using the components of the Pipeline have been created for Presentation Trainer (Schneider, Börner, van Rosmalen, & Specht, 2015), Calligraphy Tutor (Limbu, Schneider, Klemke, & Specht, 2018), and Tennis Table Tutor (Sanusi, Di Mitri, Limbu, & Klemke, 2021). We group all these learning tasks as *individual psychomotor learning tasks in the physical space*, i.e., practical training tasks where the learner has to individually master skills that require a high level of psychomotor coordination that takes place in the physical realm. For this reason, in this subset, we intentionally left out learning scenarios such as *cognitive learning*, i.e., tasks that require more reasoning and cognitive abilities, or *social learning*, tasks that require interaction by multiple actors and or by groups, or *distance and online learning*, including activities mediated by mouse and keyboards. We decided to narrow the focus to make the research contribution of the Multimodal Tutor more evident to the community. At the same time, we believe the boundaries of these scenarios are blurry; therefore, the proposed categorization may run into inconsistency. As specified in the next section, we firmly believe that in the future, the Multimodal Tutor can evolve to support also different types of learning scenario outside of its current focus. Modeling the learning task is a fundamental part of assessing how the Multimodal Tutor can be most supportive. Psychomotor learning tasks can differ primarily by two factors: (1) by their *repetitiveness* and (2) by their *structuredness*. Learning how to perform chest compressions during CPR is a highly repetitive learning task, as the learner needs to perform repetitive movements; at the same time, CPR is highly structured, as there are apparent performance indicators that define the characteristics of a good CPR performance. These two characteristics make CPR an ideal application scenario for the Multimodal Tutor. On the contrary, the calligraphy or foreign alphabet learning in the Calligraphy Tutor consists of repetitive tasks without clear performance indicators. The domain of public speaking of the Presentation Trainer consists of diverse and not repetitive movements which lack clear performance indicators for assessment.

At the *sensor hardware-level,* the quality of the collected data, the quality of the model training significantly, and thus of the feedback can be influenced. In the CPR Tutor and related reference application scenarios, we opted for commercial sensor devices in place of custom-made boards. Compared to custom-made boards, sensor devices such as Microsoft Kinect, Myo Armband, or Fitbit HR have the advantage of being widely tested, providing high-level drivers and having an API to connect and offer broad community support easily. Still, however, commercial devices have known limitations in terms of precision. In this research, we realized that the choice of the sensor setup should be based on compromises between precision, easiness of use, and relevance for the learning task investigated.

The third level concerns the limitations at the *software level*. The CPR Tutor and the LearningHub have been programmed using C# programming language that runs on Microsoft Windows 10 machines. The reason for such a choice was to make the best use of Microsoft devices like Kinect. The VIT has been developed in Javascript and HTML 5 but tested primarily with the Google Chrome browser. SharpFlow has been developed using Python 3.7. These choices could compromise the portability of the software components on different operating systems, browsers, or platforms.

The fourth level of limitation is at the *data level*. As mentioned earlier, the precision and quality of the sensor devices can influence the quality of the data gathered. However, the data limitations lay also in the choice of the participant size and the diversity of these participants. Participants can have different body sizes, way to approach the task, and physiological responses. We call this the *inter-subject variability* among the participants. This variability can be mitigated by training a model with a diverse population, which can generalize their behavioral characteristics. There is, however, always the risk that the general model flushes out individual peculiarities. As an alternative, it is possible to train one classifier for each participant. The drawback of this approach is that the models will be suitable only for one person and not generalizable to new participants.

Finally, some limitations can stand at the *model level*. There are several limitations to using the supervised machine learning approach. In CPR, the more collected CCs, the more robust and general neural networks can be trained for mistake classification. Such an approach is optimal when having a high number of annotated training samples available. Similarly, to set a clear division line between correct and incorrect learning performance, the learning task must have clear performance indicators. For example, in CPR, the compression rate needs to have between 100 and 120 beats per minute for being optimal. The machine learning research community well knows the drawback of supervised learning. There are alternative ways that can be explored to reduce the amount of annotated samples needed; those are unsupervised learning, one-shot learning, or transfer-learning techniques. Concerning the use of Recurrent Neural Networks, aside from the amount of training data, the other standard limitation is the tendency of *overfitting* the training set. Besides dividing the collected data set between training, test, validation, and performing cross-validation at the level of the training samples, it is essential to do it at the level of subject level. For example, it would be helpful to *hold-one-participant-out* to make sure that the data of one or more participants are entirely new and unseen by the model.

Conclusion

In this chapter, the limitations can be seen as a research plan for the future implementations of the Multimodal Tutor. Future research endeavors should go both in the theoretical and in the technical directions. From the theoretical standpoint, as evidence in the literature survey in (Di Mitri et al., 2018a), future works of the Multimodal Tutor should also look into empirical studies and meta-analysis to focus on the most suitable data representation for each modality and propose guidelines for efficient modality combination. It could be helpful to know the best between modality and available sensors in commerce, providing guidelines for the data analysis of multimodal data sets.

The Multimodal Tutor "of the future," the Multimodal Pipeline, will improve and evolve as a concept to accommodate more reference application scenarios. For instance, one aspect deliberately left out both from the theoretical and from the application side is the *social dimension of learning*: the extent to which the teacher and the learning peers influence each other in a social context. For example, during collaborative learning or physical classroom activities, social learning is of paramount importance. We think of the implementation of the Multimodal Tutor in the *Classroom of the Future*. Along the line of experimentation proposed by the *EduSense* prototype (Ahuja et al., 2019), the Classroom of The Future will embed a run-time framework which controls different sensors, for example, installed in laptops, chairs, or desk and connect to various actuators such as the projector, the smart board, some lights. The purpose is to automatically orchestrate learning activities in the classroom. For this purpose, a renewed conceptualization of the Multimodal Pipeline as a framework that runs continually on run-time is needed (Schneider, Di Mitri, Drachsler, & Specht, 2019). From such a system, learners and teachers could profit, for example, the system could identify students at-risk. Along this line, the system *Lumilo* provides an inspiring example of real-time teaching support using augmented reality by identifying and signaling students at-risk to teachers with the help of "virtual hands" (Holstein, McLaren, & Aleven, 2018).

From the technical point of view, future implementation of the Multimodal Tutor can move away from collecting short and high-frequency data sessions toward more extended data collection periods, which can last days or weeks. In our vision, the Multimodal Tutor can become a *learning companion* that supports the learner throughout the entire duration of a course until the target skill is mastered correctly. For this reason, we imagine future personalized learning technologies like the Multimodal Tutor can be *on-demand*, *wherever* and *whenever* the learner needs them. The functionalities of the Multimodal Tutor should be embedded in personal devices such as smartphones or smartwatches, which can be at the learner's fingertips. To become entirely ubiquitous, the Multimodal Tutor needs to better leverage cloud-based technologies. In that case, the learner would need only a device and an Internet connection for using the functionalities of the Multimodal Tutor for learning support. Given the significant amount and the data gathered from the sensors, sending the complete streams to the cloud might be an overhead for the network infrastructure. An option alternative to cloud computing that should be explored is *fog computing*, in which only relevant data or decisions are sent to the online server.

Future research of the Multimodal Tutor should look at improving the user experience from the learner perspective. As argued in this book chapter, self-reports, questionnaire, and user ratings are essential for collecting the learning labels necessary to annotate the multimodal experiences and allow the system to learn from historical data. Repeatedly asking the learner to answer a questionnaire or to submit a report can become, nevertheless, a pretty tiring task. Stratagems have to be thought to maximize usability and user retention, to mature the Multimodal Tutor from a research to a productivity tool.

Another paramount issue connected to the user experience is ensuring user privacy when collecting high-frequency and highly personal multimodal data. Future Multimodal Tutor applications need to be designed with better *privacy* features. For instance, they need to implement multiple privacy layers, consisting of features such as end-to-end encryption, authentication, or distributed data saving. The Multimodal Tutor should connect and use the concept of *Trusted Learning Analytics* (Drachsler & Greller, 2016). The learner has to become the ultimate authority over the data and the algorithms. The technology embedded in the Multimodal Tutor rather than judge and punish the learner should ultimately support and improve learning which is a fundamental part of human nature.

References

Ahuja, K., Agarwal, Y., Kim, D., Xhakaj, F., Varga, V., Xie, A., . . . Ogan, A. (2019). EduSense: Practical classroom sensing at scale. *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies, 3*(3), 1–26.

Anderson, J. R., Boyle, C. F., & Reiser, B. J. (1985). Intelligent tutoring systems. *Science, 228*(4698), 456–462.

Blikstein, P. (2013). Multimodal learning analytics. In *Proceedings of the Third international conference on Learning Analytics and Knowledge - LAK '13* (pp. 102–106). New York, NY: ACM.

D'mello, S., Olney, A., Blanchard, N., Sun, X., Ward, B., Samei, B., & Kelly, S. (2015). Multimodal capture of teacher-student interactions for automated dialogic analysis in live classrooms. In *Proceedings of the 2015 ACM on international conference on multimodal interaction* (pp. 557–566). New York, NY: ACM.

Di Mitri, D., Schneider, J., Specht, M., & Drachsler, H. (2019c). Multimodal pipeline: A generic approach for handling multimodal data for supporting learning. In *AIMA4EDU workshop in . CAI* 2019 *AI-based multimodal analytics for understanding human learning in real-world educational contexts* (pp. 2–4).

Di Mitri, D., Schneider, J., & Drachsler, H. (2021). Keep me in the loop: Real-time feedback with multimodal data. International Journal of Artificial Intelligence in Education. https://doi.org/10.1007/s40593-021-00281-z.

Di Mitri, D., Scheffel, M., Drachsler, H., Börner, D., Ternier, S., & Specht, M. (2017). Learning Pulse: A machine learning approach for predicting performance in self-regulated learning using multimodal data. In *LAK '17 Proceedings of the 7th international conference on Learning Analytics and Knowledge* (pp. 188–197). New York, NY: ACM.

Di Mitri, D., Schneider, J., Klemke, R., Specht, M., & Drachsler, H. (2019). Read between the lines: An annotation tool for multimodal data for learning. In *Proceedings of the 9th international conference on Learning Analytics & Knowledge – LAK19* (pp. 51–60). New York, NY: ACM.

Di Mitri, D., Schneider, J., Specht, M., & Drachsler, H. (2018a). From signals to knowledge: A conceptual model for multimodal learning analytics. *Journal of Computer Assisted Learning, 34*(4), 338–349.

Di Mitri, D., Schneider, J., Specht, M., & Drachsler, H. (2018b). The big five: Addressing recurrent multimodal learning data challenges. In M.-M. Roberto (Ed.), *Proceedings of the second multimodal learning analytics across (physical and digital) spaces (CrossMMLA)* (p. 6). Aachen, Germany: CEUR Workshop Proceedings.

Di Mitri, D., Schneider, J., Specht, M., & Drachsler, H. (2019a). Detecting mistakes in CPR training with multimodal data and neural networks. *Sensors (Switzerland), 19*(14), 1–20.

Dillenbourg, P. (1999). What do you mean by collaborative learning? In *Collaborative learning: Cognitive and computational approaches*. Oxford, UK: Elsevier.

Dillenbourg, P. (2016). The evolution of research on digital education. *International Journal of Artificial Intelligence in Education, 26*(2), 544–560.

Drachsler, H., & Greller, W. (2016). Privacy and learning analytics – It's a DELICATE issue. In *Proceedings of the sixth international conference on Learning Analytics & Knowledge (LAK'16)* (pp. 89–98). New York, NY, United States: ACM Press.

Ferguson, R. (2012). The state of learning analytics in 2012: A review and future challenges. Technical Report KMI-12-01, 4:18.

Freedman, D. H. (2010). Why scientific studies are so often wrong: The streetlight effect. Discover magazine (blog), 2010. http://discovermagazine.com/2010/jul-aug/29-why-scientific-studies-often-wrong-streetlight-effect.

Freire, P. (1970). *Pedagogy of the oppressed*. New York, NY: The Continuum International Publishing Group Inc.

Greller, W., & Drachsler, H. (2012). Translating learning into numbers: A generic framework for learning analytics. *Educational Technology and Society, 15*(3), 42–57.
Holstein, K., McLaren, B. M., & Aleven, V. (2018). Student learning benefits of a mixed-reality teacher awareness tool in AI-enhanced classrooms. *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 10947 LNAI (pp. 154–168).
Jivet, I., Scheffel, M., Drachsler, H., & Specht, M. (2017). Awareness is not enough: Pitfalls of learning analytics dashboards in the educational practice. In *EC-TEL: European conference on technology enhanced learning*. Cham, Switzerland: Springer.
Kamar, E. (2016). Directions in hybrid intelligence: Complementing AI systems with human intelligence. In *IJCAI international joint conference on artificial intelligence*, 2016-Janua (pp. 4070–4073).
Kanda, T., & Ishiguro, H. (2017). *Human-robot interaction in social robotics*. Boca Raton, FL United States: CRC Press.
Limbu, B., Schneider, J., Klemke, R., & Specht, M. (2018). Augmentation of practice with expert performance data: Presenting a calligraphy use case. In *3rd international conference on smart learning ecosystem and regional development – The interplay of data, technology, place and people* (pp. 1–13).
Piaget, J. (1952). *The origins of intelligence in children* (2nd ed.). New York, NY: International Universities Press.
Pijeira-Díaz, H. J., Drachsler, H., Kirschner, P. A., & Järvelä, S. (2018). Profiling sympathetic arousal in a physics course: How active are students? *Journal of Computer Assisted Learning, 34*(4), 397–408.
Pintrich, P. R. (1999). The role of motivation in promoting and sustaining self-regulated learning. *International Journal of Educational Research, 31*(6), 459–470.
Polson, M. C., Richardson, J. J., & Soloway, E. (1988). *Foundations of intelligent tutoring systems*. Hillsdale, NJ: Erlbaum Associates Inc..
Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*, 68–78.
Sanusi, K. A. M., Di Mitri, D., Limbu, B., & Klemke, R. (2021). Table tennis tutor: Forehand strokes classification based on multimodal data and neural networks. *Sensors, 21*(9), 3121.
Schmitz, M., van Limbeek, E., Greller, W., Sloep, P., & Drachsler, H. (2017). Opportunities and challenges in using learning analytics in learning design. In *Lecture Notes in computer science (including subseries Lecture notes in artificial intelligence and Lecture Notes in Bioinformatics)*. https://doi.org/10.1007/978-3-319-66610-5_16.
Schneider, B., & Blikstein, P. (2015). Unraveling students' interaction around a tangible interface using multimodal learning analytics. *Journal of Educational Data Mining, 7*(3), 89–116.
Schneider, J., Di Mitri, D., Drachsler, H., & Specht, M. (2019). Multimodal learning analytics runtime framework. In *Proceedings of the third Multimodal Learning Analytics Across (Physical and Digital) Spaces (CrossMMLA)* (pp. 1–6).
Schneider, J., Börner, D., van Rosmalen, P., & Specht, M. (2015). Presentation trainer, your public speaking multimodal coach. In *Proceedings of the 2015 ACM on International Conference on Multimodal Interaction - ICMI '15* (pp. 539–546). New York, NY: ACM.
Schneider, J., Di Mitri, D., Limbu, B., & Drachsler, H. (2018). Multimodal learning hub: A tool for capturing customizable multimodal learning experiences. In *Lecture notes in computer science (including subseries Lecture notes in artificial intelligence and Lecture notes in Bioinformatics)* (Vol. 11082 LNCS, pp. 45–58). Cham, Switzerland: Springer.
Shapiro, L. (2019). *Embodied cognition* (2nd ed.). London: Routledge.
Sharples, M., Arnedillo-Sánchez, I., Milrad, M., & Vavoula, G. (2009). Mobile learning: Small devices, big issues. In *Technology-enhanced learning: Principles and products* (pp. 233–249). Dordrecht, Netherlands: Springer.
Shum, S. B., & Crick, R. D. (2012). Learning dispositions and transferable competencies: Pedagogy, modelling and learning analytics. In *ACM International Conference Proceeding Series*.

Van Merrienboer, J. J. G., Clark, R. E., & De Croock, M. B. M. (2002). Blueprints for complex learning: the 4C/ID-model. Educational Technology Research and Development. https://doi.org/10.1007/bf02504993.

Vygotsky, L. S. (1978). Interaction between learning and development. *Mind and society*, 79–91. https://doi.org/10.1016/S0006-3495(96)79572-3.

Winne, P. H.. (2017). Learning analytics for self-regulated learning. In *Handbook of learning analytics* (pp. 241–249). Beaumont, Alberta: SoLAR.

Winne, P. H., & Hadwin, A. F. (1998). Studying as self-regulated engagement in learning. In D. J. Hacker, J. Dunlosky, & A. C. Graesser (Eds.), *Metacognition in educational theory and practice* (pp. 277–304). New York, NY: Lawrence Erlbaum Associates Publishers.

Worsley, M. (2014). Multimodal learning analytics as a tool for bridging learning theory and complex learning behaviors. In *Proceedings of the 2014 ACM workshop on multimodal learning analytics workshop and grand challenge – MLA '14* (pp. 1–4). New York, NY: ACM.

Yazdani, M. (1986). Intelligent tutoring systems: An overview. *Expert Systems, 3*(3), 154–163.

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory Into Practice, 41*, 64–70.

Automated Essay Scoring Systems

61

Dirk Ifenthaler

Contents

Abstract

Essays are scholarly compositions with a specific focus on a phenomenon in question. They provide learners the opportunity to demonstrate in-depth understanding of a subject matter; however, evaluating, grading, and providing feedback on written essays are time consuming and labor intensive. Advances in automated assessment systems may facilitate the feasibility, objectivity, reliability, and validity of the evaluation of written prose as well as providing instant feedback during learning processes. Measurements of written text include observable components such as content, style, organization, and mechanics. As a result, automated essay scoring systems generate a single score or detailed evaluation of predefined assessment features. This chapter describes the evolution and features of automated scoring systems, discusses their limitations, and concludes with future directions for research and practice.

D. Ifenthaler (✉)
University of Mannheim, Mannheim, Germany

Curtin University, Perth, WA, Australia
e-mail: dirk@ifenthaler.info

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_59

Keywords

Automated essay scoring · Essay grading system · Writing assessment · Natural language processing · Educational measurement · Technology-enhanced assessment · Automated writing evaluation

Introduction

Educational assessment is a systematic method of gathering information or artifacts about a learner and learning processes to draw inferences of the persons' dispositions (E. Baker, Chung, & Cai, 2016). Various forms of assessments exist, including single- and multiple-choice, selection/association, hot spot, knowledge mapping, or visual identification. However, using natural language (e.g., written prose or essays) is regarded as the most useful and valid technique for assessing higher-order learning processes and learning outcomes (Flower & Hayes, 1981). Essays are scholarly analytical or interpretative compositions with a specific focus on a phenomenon in question. Valenti, Neri, and Cucchiarelli (2003) as well as Zupanc and Bosnic (2015) note that written essays provide learners the opportunity to demonstrate higher order thinking skills and in-depth understanding of a subject matter. However, evaluating, grading, and providing feedback on written essays are time consuming, labor intensive, and possibly biased by an unfair human rater.

For more than 50 years, the concept of developing and implementing computer-based systems, which may support automated assessment and feedback of written prose, has been discussed (Page, 1966). Technology-enhanced assessment systems enriched standard or paper-based assessment approaches, some of which hold much promise for supporting learning processes and learning outcomes (Webb, Gibson, & Forkosh-Baruch, 2013; Webb & Ifenthaler, 2018). While much effort in institutional and national systems is focused on harnessing the power of technology-enhanced assessment approaches in order to reduce costs and increase efficiency (Bennett, 2015), a range of different technology-enhanced assessment scenarios have been the focus of educational research and development, however, often at small scale (Stödberg, 2012). For example, technology-enhanced assessments may involve a pedagogical agent for providing feedback during a learning process (Johnson & Lester, 2016). Other scenarios of technology-enhanced assessments include analyses of a learners' decisions and interactions during game-based learning (Bellotti, Kapralos, Lee, Moreno-Ger, & Berta, 2013; Kim & Ifenthaler, 2019), scaffolding for dynamic task selection including related feedback (Corbalan, Kester, & van Merriënboer, 2009), remote asynchronous expert feedback on collaborative problem-solving tasks (Rissanen et al., 2008), or semantic rich and personalized feedback as well as adaptive prompts for reflection through data-driven assessments (Ifenthaler & Greiff, 2021; Schumacher & Ifenthaler, 2021).

It is expected that such technology-enhanced assessment systems meet a number of specific requirements, such as (a) adaptability to different subject domains, (b) flexibility for experimental as well as learning and teaching settings,

(c) management of huge amounts of data, (d) rapid analysis of complex and unstructured data, (e) immediate feedback for learners and educators, as well as (f) generation of automated reports of results for educational decision-making.

Given the on-going developments in computer technology, data analytics, and artificial intelligence, there are advances in automated assessment systems, which may facilitate the feasibility, objectivity, reliability, and validity of the assessment of written prose as well as providing instant feedback during learning processes (Whitelock & Bektik, 2018). Accordingly, automated essay grading (AEG) systems, or automated essay scoring (AES systems, are defined as a computer-based process of applying standardized measurements on open-ended or constructed-response text-based test items. Measurements of written text include observable components such as content, style, organization, mechanics, and so forth (Shermis, Burstein, Higgins, & Zechner, 2010). As a result, the AES system generates a single score or detailed evaluation of predefined assessment features (Ifenthaler, 2016).

This chapter describes the evolution and features of automated scoring systems, discusses their limitations, and concludes with future directions for research and practice.

Synopsis of Automated Scoring Systems

The first widely known automated scoring system, Project Essay Grader (PEG), was conceptualized by Ellis Battan Page in late 1960s (Page, 1966, 1968). PEG relies on proxy measures, such as average word length, essay length, number of certain punctuation marks, and so forth, to determine the quality of an open-ended response item. Despite the promising findings from research on PEG, acceptance and use of the system remained limited (Ajay, Tillett, & Page, 1973; Page, 1968). The advent of the Internet in the 1990s and related advances in hard- and software introduced a further interest in designing and implementing AES systems. The developers primarily aimed to address concerns with time, cost, reliability, and generalizability regarding the assessment of writing. AES systems have been used as a co-rater in large-scale standardized writing assessments since the late 1990s (e.g., e-rater by Educational Testing Service). While initial systems focused on English language, a wide variety of languages have been included in further developments, such as Arabic (Azmi, Al-Jouie, & Hussain, 2019), Bahasa Malay (Vantage Learning, 2002), Hebrew (Vantage Learning, 2001), German (Pirnay-Dummer & Ifenthaler, 2011), or Japanese (Kawate-Mierzejewska, 2003). More recent developments of AES systems utilize advanced machine learning approaches and elaborated natural language processing algorithms (Glavas, Ganesh, & Somasundaran, 2021).

For almost 60 years, different terms related to automated assessment of written prose have been used mostly interchangeably. Most frequently used terms are automated essay scoring (AES) and automated essay grading (AEG); however, more recent research used the term automated writing evaluation (AWE) and automated essay evaluation (AEE) (Zupanc & Bosnic, 2015). While the abovementioned system focuses on written prose including several hundred words, another field developed focusing on short answers referred to as automatic short answer grading (ASAG) (Burrows, Gurevych, & Stein, 2015).

Functions of Automated Scoring Systems

AES systems mimic human evaluation of written prose by using various methods of scoring, that is, statistics, machine learning, and natural language processing (NLP) techniques. Implemented features of AES systems vary widely, yet they are mostly trained with large sets of expert-rated sample open-ended assessment items to internalize features that are relevant to human scoring. AES systems compare the features in training sets to those in new test items to find similarities between high/low scoring training and high/low scoring new ones and then apply scoring information gained from training sets to new item responses (Ifenthaler, 2016).

The underlying methodology of AES systems varies; however, recent research mainly focuses on natural language processing approaches (Glavas et al., 2021). AES systems focusing on content use Latent Semantic Analysis (LSA) which assumes that terms or words with similar meaning occur in similar parts of written text (Wild, 2016). Other content-related approaches include Pattern Matching Techniques (PMT). The idea of depicting semantic structures, which include concepts and relations between the concepts, has its source in two fields: semantics (especially propositional logic) and linguistics. Semantic oriented approaches include Ontologies and Semantic Networks (Pirnay-Dummer, Ifenthaler, & Seel, 2012). A semantic network represents information in terms of a collection of objects (nodes) and binary associations (directed labeled edges), the former standing for individuals (or concepts of some sort), and the latter standing for binary relations over these. Accordingly, a representation of knowledge in a written text by means of a semantic network corresponds with a graphical representation where each node denotes an object or concept, and each labeled being one of the relations used in the knowledge representation. Despite the differences between semantic networks, three types of edges are usually contained in all network representation schemas (Pirnay-Dummer et al., 2012): (a) Generalization: connects a concept with a more general one. The generalization relation between concepts is a partial order and organizes concepts into a hierarchy. (b) Individualization: connects an individual (token) with its generic type. (c) Aggregation: connects an object with its attributes (parts, functions) (e.g., wings – part of – bird). Another method of organizing semantic networks is partitioning which involves grouping objects and elements or relations into partitions that are organized hierarchically, so that if partition A is below partition B, everything visible or present in B is also visible in A unless otherwise specified (Hartley & Barnden, 1997).

From an information systems perspective, understood as a set of interrelated components that accumulate, process, store, and distribute information to support decision making, several preconditions and processes are required for a functioning AES system (Burrows et al., 2015; Pirnay-Dummer & Ifenthaler, 2010):

1. Assessment scenario: The assessment task with a specific focus on written prose needs to be designed and implemented. Written text is being collected from learners and from experts (being used as a reference for later evaluation).
2. Preparation: The written text may contain characters which could disturb the evaluation process. Thus, a specific character set is expected. All other characters may be deleted. Tags may be also deleted, as are other expected metadata within each text.
3. Tokenizing: The prepared text gets split into sentences and tokens. Tokens are words, punctuation marks, quotation marks, and so on. Tokenizing is somewhat language dependent, which means that different tokenizing methods are required for different languages.
4. Tagging: There are different approaches and heuristics for tagging sentences and tokens. A combination of rule-based and corpus-based tagging seems most feasible when the subject domain of the content is unknown to the AES system. Tagging and the rules for it is a quite complex field of linguistic methods (Brill, 1995).
5. Stemming: Specific assessment attributes may require that flexions of a word will be treated as one (e.g., the singular and plural forms "door" and "doors"). Stemming reduces all words to their word stems.
6. Analytics: Using further natural language processing (NLP) approaches, the prepared text is analyzed regarding predefined assessment attributes (see below), resulting in models and statistics.
7. Prediction: Further algorithms produce scores or other output variables based on the analytics results.
8. Veracity: Based on available historical data or reference data, the analytics scores are compared in order to build trust and validity in the AES result.

Common assessment attributes of AES have been identified by Zupanc and Bosnic (2017) including linguistic (lexical, grammar, mechanics), style, and content attributes. Among 28 lexical attributes, frequencies of characters, words, sentences are commonly used. More advanced lexical attributes include average sentence length, use of stopwords, variation in sentence length, or the variation of specific words. Other lexical attributes focus on readability or lexical diversity utilizing specific measures such as Gunning Fox index, Nominal ratio, Type-token-ratio (DuBay, 2007). Another 37 grammar attributes are frequently implemented, such as number of grammar errors, complexity of sentence tree structure, use of prepositions and forms of adjectives, adverbs, nouns, verbs. A few attributes focus on mechanics, for example, the number of spellchecking errors, the number of capitalization errors, or punctuation errors. Attributes that focus on content include similarities with source or reference texts or content-related patterns (Attali, 2011). Specific semantic attributes have been described as concept matching and proposition matching (Ifenthaler, 2014). Both attributes are based on similarity measures (Tversky, 1977). Concept matching compares the sets of concepts (single words) within a written text to determine the use of terms. This measure is especially important for different assessments which operate in the same domain. Propositional matching compares only fully identical propositions between two knowledge representations. It is a good measure for quantifying complex semantic relations in a specific subject domain. Balanced semantic matching measure uses both concepts and propositions to match the semantic potential between the knowledge representations. Such content or semantic oriented attributes focus on the correctness of content and its meaning (Ifenthaler, 2014).

Overview of Automated Scoring Systems

Instructional applications of automated scoring systems are developed to facilitate the process of scoring and feedback in writing classrooms. These AES systems mimic human scoring by using various attributes; however, implemented attributes vary widely.

The market of commercial and open-source AES systems has seen a steady growth since the introduction of PEG. The majority of available AES systems extract a set of attributes from written prose and analyze it using some algorithm to generate a final output. Several overviews document the distinct features of AES systems (Dikli, 2011; Ifenthaler, 2016; Ifenthaler & Dikli, 2015; Zupanc & Bosnic, 2017). Burrows et al. (2015) identified five eras throughout the almost 60 years of research in AES: (1) concept mapping, (2) information extraction, (3) corpus-based methods, (4) machine learning, and (5) evaluation.

Zupanc and Bosnic (2017) note that four commercial AES systems have been predominant in application: PEG, e-rater, IEA, and IntelliMetric. Open access or open code systems have been available for research purposes (e.g., AKOVIA); however, they are yet to be made available to the general public. Table 1 provides an overview of current AES systems, including a short description of the applied assessment methodology, output features, information about test quality, and specific requirements. The overview is far from being complete; however, it includes major systems which have been reported in previous summaries and systematic literature reviews on AES systems (Burrows et al., 2015; Dikli, 2011; Ifenthaler, 2016; Ifenthaler & Dikli, 2015; Ramesh & Sanampudi, 2021; Zupanc & Bosnic, 2017). Several AES systems also have instructional versions for classroom use. In addition to their instant scoring capacity on a holistic scale, the instructional AES systems are capable of generating diagnostic feedback and scoring on an analytic scale as well. The majority of AES systems use focus on style or content-quality and use NLP algorithms in combination with variations of regression models. Depending on the methodology, AES system requires training samples for building a reference for future comparisons. However, the test quality, precision, or accuracy of several AES systems is publicly not available or has not been reported in rigorous empirical research (Wilson & Rodrigues, 2020).

Open Questions and Directions for Research

There are several concerns regarding the precision of AES systems and the lack of semantic interpretation capabilities of underlying algorithms. Reliability and validity of AES systems have been extensively investigated (Landauer, Laham, & Foltz,

Table 1 Overview of AES systems

AES system	Methodology	Output	Quality	Requirements
CRASE	Statistics and NLP; machine learning; style and content-quality	Score on an essay, short constructed response item, and graphic item	N/A	75 responses for training samples and 500 responses for cross-validation
IEA	LSA, NLP, machine learning, content quality	Score, customizable dashboard	Reliability and validity studies	100–300 training samples
e-rater	NLP, linear regression, style and content quality	Holistic and analytic score; immediate feedback on traits through its instructional application (Criterion)	Reliability and validity studies	465 training samples
Benchmark-SkillWriter	NLP, neural networks, style and content quality	Analytic scores, rubric scales, and immediate feedback	Reliability and validity studies	N/A
IntelliMetric	NLP, statistical model, style and content quality	Holistic and analytic score, immediate feedback on traits through its instructional application (MY Access)	Reliability and validity studies	300 training samples
AKOVIA	NLP, statistical model, similarity matching, structure and content quality	Customizable feedback including immediate score, written and graphical feedback	Reliability and validity studies	None, requires reference text/ model
PEG	Statistical model, style	Holistic and analytic scoring; immediate feedback on traits through its instructional application (PEG Writing)	Reliability and validity studies	100–400 training samples
Markit	NLP, pattern matching, linear regression, content quality	Score on an essay	N/A	1 reference essay
LightSIDE	Machine learning, multilevel modeling techniques; content-quality	Score on an essay	N/A	300 training samples

(continued)

Table 1 (continued)

AES system	Methodology	Output	Quality	Requirements
Lexile	NLP, Lexile measure, style and content quality	Score on text characteristics	N/A	0
SAGrader	Fuzzy logic, rule-based analysis, semantics	Score on semantics, immediate feedback through its instructional application	N/A	0
BETSY	Bayesian text classification, style and content quality	Trait scoring and feedback	Reliability and validity studies	1000 training samples

Note. NLP = Natural Language Processing; LSA = Latent Semantic Analysis

2003; Shermis et al., 2010). The correlations and agreement rates between AES systems and expert human raters have been found to be fairly high; however, the agreement rate is not at the desired level yet (Gierl, Latifi, Lai, Boulais, & Champlain, 2014). It should be noted that many of these studies highlight the results of adjacent agreement between humans and AES systems rather than those of exact agreement (Ifenthaler & Dikli, 2015). Exact agreement is harder to achieve as it requires two or more raters to assign the same exact score on an essay while adjacent agreement requires two or more raters to assign a score within one scale point of each other. It should also be noted that correlation studies are mostly conducted at high-stakes assessment settings rather than classroom settings; therefore, AES versus human inter-rater reliability rates may not be the same in specific assessment settings. The rate is expected to be lower in the latter since the content of an essay is likely to be more important in low-stakes assessment contexts.

The validity of AES systems has been critically reflected since the introduction of the initial applications (Page, 1966). A common approach for testing validity is the comparison of scores from AES systems with those of human experts (Attali & Burstein, 2006). Accordingly, questions arise about the role of AES systems promoting purposeful writing or authentic open-ended assessment responses, because the underlying algorithms view writing as a formulaic act and allows writers to concentrate more on the formal aspects of language such as origin, vocabulary, grammar, and text length with little or no attention to the meaning of the text (Ifenthaler, 2016). Validation of AES systems may include the correct use of specific assessment attributes, the openness of algorithms, and underlying aggregation and analytics techniques, as well as a combination of human and automated approaches before communicating results to learners (Attali, 2013). Closely related to the issue of validity is the concern regarding reliability of AES systems. In this context, reliability assumes that AES systems produce repeatedly consistent scores within and across different assessment conditions (Zupanc & Bosnic, 2015). Another concern is the bias of underlying algorithms, that is, algorithms have their source in a human programmer which may introduce additional error structures or even features of discrimination (e.g., cultural bias based on selective text corpora). Criticism has been put toward commercial marketing of AES systems for speakers of English as a second or foreign language (ESL/EFL) when the underlying methodology has been developed based on English language with native-English speakers in mind. In an effort to assist ESL/EFL speakers in writing classrooms, many developers have incorporated a multilingual feedback function in the instructional versions of AES systems. Receiving feedback in the first language has proven benefits, yet it may not be sufficient for ESL/EFL speakers to improve their writing in English. It would be more beneficial for non-native speakers of English if developers take common ESL/EFL errors into consideration when they build algorithms in AES systems. Another area of concern is that writers can trick AES systems. For instance, if the written text produced is long and includes certain type of vocabulary that the AES system is familiar with, an essay can receive a higher score from AES regardless of the quality of its content. Therefore, developers have been trying to prevent cheating by users through incorporating additional validity algorithms (e.g., flagging written text with unusual elements for human scoring) (Ifenthaler & Dikli, 2015). The validity and reliability concerns result in speculations regarding the credibility of AES systems considering that the majority of the research on AES is conducted or sponsored by the developing companies. Hence, there is a need for more research that addresses the validity and reliability issues raised above and preferably those conducted by independent researchers (Kumar & Boulanger, 2020).

Despite the above-mentioned concerns and limitation, educational organizations choose to incorporate instructional applications of AES systems in classrooms, mainly to increase student motivation toward writing and reducing workload of involved teachers. They assume that if AES systems assist students with the grammatical errors in their writings, teachers will have more time to focus on content related issues. Still, research on students' perception on AES systems and the effect on motivation as well as on learning processes and learning outcomes is scarce (Stephen, Gierl, & King, 2021). In contrast, educational organizations are hesitant in implementing AES systems mainly because of validity issues related to domain knowledge-based evaluation. As Ramesh and Sanampudi (2021) exemplify, the domain-specific meaning of "cell" may be different in biology or physics. Other concerns that may lower the willingness to adopt of AES systems in educational organizations include fairness, consistency, transparency, privacy, security, and ethical issues (Ramineni & Williamson, 2013; Shermis, 2010).

AES systems can make the result of an assessment available instantly and may produce immediate feedback whenever the learner needs it. Such instant feedback provides autonomy to the learner during the learning process, that is, learners are not depended on possibly delayed feedback from teachers. Several attributes implemented in AES systems can produce an automated score, for instance, correctness of syntactic aspects. Still, the automated and informative feedback regarding content and semantics is limited. Alternative feedback mechanisms have been suggested, for example, Automated Knowledge Visualization and

Assessment (AKOVIA) provides automated graphical feedback models, generated on the fly, which have been successfully tested for preflection and reflection in problem-based writing tasks (Lehmann, Haehnlein, & Ifenthaler, 2014). Other studies using AKOVIA feedback models highlight the benefits of availability of informative feedback whenever the learner needs it and its identical impact on problem solving when compared with feedback models created by domain experts (Ifenthaler, 2014).

Questions for future research focusing on AES systems may focus on (a) construct validity (i.e., comparing AES systems with other systems or human rater results), (b) interindividual and intraindividual consistency and robustness of AES scores obtained (e.g., in comparison with different assessment tasks), (c) correlative nature of AES scores with other pedagogical or psychological measures (e.g., interest, intelligence, prior knowledge), (d) fairness and transparency of AES systems and related scores, as well as (e) ethical concerns related to AES systems, (f) (Elliot & Williamson, 2013). From a technological perspective, (f) the feasibility of the automated scoring system (including training of AES using prescored, expert/reference, comparison) is still a key issue with regard to the quality of assessment results. Other requirements include the (g) instant availability, accuracy, and confidence of the automated assessment. From a pedagogical perspective, (h) the form of the open-ended or constructed-response test needs to be considered. The (i) assessment capabilities of the AES system, such as the assessment of different languages, content-oriented assessment, coherence assessment (e.g., writing style, syntax, spelling), domain-specific features assessment, and plagiarism detection, are critical for a large-scale implementation. Further, (j) the form of feedback generated by the automated scoring system might include simple scoring but also rich semantic and graphical feedback. Finally, (k) the integration of an AES system into existing applications, such as learning management systems, needs to be further investigated by developers, researchers, and practitioners.

Implications for Open, Distance, and Digital Education

The evolution of Massive Open Online Courses (MOOCs) nurtured important questions about online education and its automated assessment (Blackmon & Major, 2017; White, 2014). Education providers such as Coursera, edX, and Udacity dominantly apply so-called auto-graded assessments (e.g., single- or multiple-choice assessments). Implementing automated scoring for open-ended assessments is still on the agenda of such provides, however, not fully developed yet (Corbeil, Khan, & Corbeil, 2018).

With the increased availability of vast and highly varied amounts of data from learners, teachers, learning environments, and administrative systems within educational settings, further opportunities arise for advancing AES systems in open, distance, and digital education. Analytics-enhanced assessment enlarges standard methods of AES systems through harnessing formative as well as summative data from learners and their contexts in order to facilitate learning processes in near real-time and help decision-makers to improve learning environments. Hence, analytics-enhanced assessment may provide multiple benefits for students, schools, and involved stakeholders. However, as noted by Ellis (2013), analytics currently fail to make full use of educational data for assessment.

Interest in collecting and mining large sets of educational data on student background and performance has grown over the past years and is generally referred to as learning analytics (R. S. Baker & Siemens, 2015). In recent years, the incorporation of learning analytics into educational practices and research has further developed. However, while new applications and approaches have brought forth new insights, there is still a shortage of research addressing the effectiveness and consequences with regard to AES systems. Learning analytics, which refers to the use of static and dynamic data from learners and their contexts for (1) the understanding of learning and the discovery of traces of learning and (2) the support of learning processes and educational decision-making (Ifenthaler, 2015), offers a range of opportunities for formative and summative assessment of written text. Hence, the primary goal of learning analytics is to better meet students' needs by offering individual learning paths, adaptive assessments and recommendations, or adaptive and just-in-time feedback (Gašević, Dawson, & Siemens, 2015; McLoughlin & Lee, 2010), ideally, tailored to learners' motivational states, individual characteristics, and learning goals (Schumacher & Ifenthaler, 2018). From an assessment perspective focusing on AES systems, learning analytics for formative assessment focuses on the generation and interpretation of evidence about learner performance by teachers, learners, and/or technology to make assisted decisions about the next steps in learning and instruction (Ifenthaler, Greiff, & Gibson, 2018; Spector et al., 2016). In this context, real- or near-time data are extremely valuable because of their benefits in ongoing learning interactions. Learning analytics for written text from a summative assessment perspective is utilized to make judgments that are typically based on standards or benchmarks (Black & Wiliam, 1998).

In conclusion, analytics-enhanced assessments of written essays may reveal personal information and insights into an individual learning history; however, they are not accredited and far from being unbiased, comprehensive, and fully valid at this point in time. Much remains to be done to mitigate these shortcomings in a way that learners will truly benefit from AES systems.

Cross-References

▶ Artificial Intelligence in Education and Ethics
▶ Evolving Learner Support Systems
▶ Introduction to Design, Delivery, and Assessment in ODDE
▶ Learning Analytics in Open, Distance, and Digital Education (ODDE)

References

Ajay, H. B., Tillett, P. I., & Page, E. B. (1973). *The analysis of essays by computer (AEC-II). Final report*. Storrs, CT: University of Connecticut.

Attali, Y. (2011). *A differential word use measure for content analysis in automated essay scoring*. ETS Research Report Series*,* 36.

Attali, Y. (2013). Validity and reliability of automated essay scoring. In M. D. Shermis & J. Burstein (Eds.), *Handbook of automated essay evaluation: Current applications and new directions* (pp. 181–198). New York, NY: Routledge.

Attali, Y., & Burstein, J. (2006). Automated essay scoring with e-rater V. 2. *The Journal of Technology, Learning and Assessment, 4*(3), 3–29. https://doi.org/10.1002/j.2333-8504.2004.tb01972.x.

Azmi, A., Al-Jouie, M. F., & Hussain, M. (2019). AAEE – Automated evaluation of students' essays in Arabic language. *Information Processing & Management, 56*(5), 1736–1752. https://doi.org/10.1016/j.ipm.2019.05.008.

Baker, E., Chung, G., & Cai, L. (2016). Assessment, gaze, refraction, and blur: The course of achievement testing in the past 100 years. *Review of Research in Education, 40*, 94–142. https://doi.org/10.3102/0091732X16679806.

Baker, R. S., & Siemens, G. (2015). Educational data mining and learning analytics. In R. K. Sawyer (Ed.), *The Cambridge handbook of the learning sciences* (2nd ed., pp. 253–272). Cambridge, UK: Cambridge University Press.

Bellotti, F., Kapralos, B., Lee, K., Moreno-Ger, P., & Berta, R. (2013). Assessment in and of serious games: An overview. *Advances in Human-Computer Interaction, 2013*, 136864. https://doi.org/10.1155/2013/136864.

Bennett, R. E. (2015). The changing nature of educational assessment. *Review of Research in Education, 39*(1), 370–407. https://doi.org/10.3102/0091732x14554179.

Black, P., & Wiliam, D. (1998). Assessment and classroom learning. *Assessment in Education: Principles, Policy & Practice, 5*(1), 7–74. https://doi.org/10.1080/0969595980050102.

Blackmon, S. J., & Major, C. H. (2017). Wherefore art thou MOOC?: Defining massive open online courses. *Online Learning Journal, 21*(4), 195–221. https://doi.org/10.24059/olj.v21i4.1272.

Brill, E. (1995). Unsupervised learning of dismabiguation rules for part of speech tagging. Paper presented at the Second Workshop on Very Large Corpora, WVLC-95, Boston. Paper presentation retrieved from

Burrows, S., Gurevych, I., & Stein, B. (2015). The eras and trends of automatic short answer grading. *International Journal of Artificial Intelligence in Education, 25*(1), 60–117. https://doi.org/10.1007/s40593-014-0026-8.

Corbalan, G., Kester, L., & van Merriënboer, J. J. G. (2009). Dynamic task selection: Effects of feedback and learner control on efficiency and motivation. *Learning and Instruction, 19*(6), 455–465. https://doi.org/10.1016/j.learninstruc.2008.07.002.

Corbeil, J. R., Khan, B. H., & Corbeil, M. E. (2018). MOOCs revisited: Still transformative or passing fad? *Asian Journal of University Education, 14*(2), 1–12.

Dikli, S. (2011). The nature of automated essay scoring feedback. *CALICO Journal, 28*(1), 99–134. https://doi.org/10.11139/cj.28.1.99-134.

DuBay, W. H. (2007). *Smart language: Readers, readability, and the grading of text*. Costa Mesa, CA, USA: BookSurge Publishing.

Elliot, N., & Williamson, D. M. (2013). Assessing writing special issue: Assessing writing with automated scoring systems. *Assessing Writing, 18*(1), 1–6. https://doi.org/10.1016/j.asw.2012.11.002.

Ellis, C. (2013). Broadening the scope and increasing usefulness of learning analytics: The case for assessment analytics. *British Journal of Educational Technology, 44*(4), 662–664. https://doi.org/10.1111/bjet.12028.

Flower, L., & Hayes, J. (1981). A cognitive process theory of writing. *College Composition and Communication, 32*(4), 365–387.

Gašević, D., Dawson, S., & Siemens, G. (2015). Let's not forget: Learning analytics are about learning. *TechTrends, 59*(1), 64–71. https://doi.org/10.1007/s11528-014-0822-x.
Gierl, M. J., Latifi, S., Lai, H., Boulais, A.-P., & Champlain, A. (2014). Automated essay scoring and the future of educational assessment in medical education. *Medical Education, 48*(10), 950–962. https://doi.org/10.1111/medu.12517.
Glavas, G., Ganesh, A., & Somasundaran, S. (2021). Training and domain adaptation for supervised text segmentation. Paper presented at the Proceedings of the 16th Workshop on Innovative Use of NLP for Building Educational Applications, Virtual Conference.
Hartley, R. T., & Barnden, J. A. (1997). Semantic networks: Visualizations of knowledge. *Trends in Cognitive Science, 1*(5), 169–175. https://doi.org/10.1016/S1364-6613(97)01057-7.
Ifenthaler, D. (2014). AKOVIA: Automated knowledge visualization and assessment. *Technology, Knowledge and Learning, 19*(1–2), 241–248. https://doi.org/10.1007/s10758-014-9224-6.
Ifenthaler, D. (2015). Learning analytics. In J. M. Spector (Ed.), *The SAGE encyclopedia of educational technology* (Vol. 2, pp. 447–451). Thousand Oaks, CA: Sage.
Ifenthaler, D. (2016). Automated grading. In S. Danver (Ed.), *The SAGE encyclopedia of online education* (p. 130). Thousand Oaks, CA: Sage.
Ifenthaler, D., & Dikli, S. (2015). Automated scoring of essays. In J. M. Spector (Ed.), *The SAGE encyclopedia of educational technology* (Vol. 1, pp. 64–68). Thousand Oaks, CA: Sage.
Ifenthaler, D., & Greiff, S. (2021). Leveraging learning analytics for assessment and feedback. In J. Liebowitz (Ed.), *Online learning analytics* (pp. 1–18). Boca Raton, FL: Auerbach Publications.
Ifenthaler, D., Greiff, S., & Gibson, D. C. (2018). Making use of data for assessments: Harnessing analytics and data science. In J. Voogt, G. Knezek, R. Christensen, & K.-W. Lai (Eds.), *International handbook of IT in primary and secondary education* (2nd ed., pp. 649–663). New York, NY: Springer.
Johnson, W. L., & Lester, J. C. (2016). Face-to-face interaction with pedagogical agents, twenty years later. *International Journal of Artificial Intelligence in Education, 26*(1), 25–36. https://doi.org/10.1007/s40593-015-0065-9.
Kawate-Mierzejewska, M. (2003). *E-rater software*. Paper presented at the Japanese Association for Language Teaching, Tokyo, Japan. Paper presentation retrieved from
Kim, Y. J., & Ifenthaler, D. (2019). Game-based assessment: The past ten years and moving forward. In D. Ifenthaler & Y. J. Kim (Eds.), *Game-based assessment revisted* (pp. 3–12). Cham, Switzerland: Springer.
Kumar, V. S., & Boulanger, D. (2020). Automated essay scoring and the deep learning black box: How are rubric scores determined? *International Journal of Artificial Intelligence in Education*. https://doi.org/10.1007/s40593-020-00211-5.
Landauer, T. K., Laham, D., & Foltz, P. W. (2003). Automated scoring and annotation of essays with the intelligent essay assessor. In M. D. Shermis & J. Burstein (Eds.), *Automated essay scoring: A cross-disciplinary perspective* (pp. 87–112). Mahwah, NJ: Erlbaum.
Lehmann, T., Haehnlein, I., & Ifenthaler, D. (2014). Cognitive, metacognitive and motivational perspectives on preflection in self-regulated online learning. *Computers in Human Behavior, 32*, 313–323. https://doi.org/10.1016/j.chb.2013.07.051.
McLoughlin, C., & Lee, M. J. W. (2010). Personalized and self regulated learning in the Web 2.0 era: International exemplars of innovative pedagogy using social software. *Australasian Journal of Educational Technology, 26*(1), 28–43.
Page, E. B. (1966). The imminence of grading essays by computer. *Phi Delta Kappan, 47*(5), 238–243.
Page, E. B. (1968). The use of the computer in analyzing student essays. *International Review of Education, 14*(2), 210–225. https://doi.org/10.1007/BF01419938.
Pirnay-Dummer, P., & Ifenthaler, D. (2010). Automated knowledge visualization and assessment. In D. Ifenthaler, P. Pirnay-Dummer, & N. M. Seel (Eds.), *Computer-based diagnostics and systematic analysis of knowledge* (pp. 77–115). New York, NY: Springer.

Pirnay-Dummer, P., & Ifenthaler, D. (2011). Text-guided automated self assessment. A graph-based approach to help learners with ongoing writing. In D. Ifenthaler, K. P. Isaias, D. G. Sampson, & J. M. Spector (Eds.), *Multiple perspectives on problem solving and learning in the digital age* (pp. 217–225). New York, NY: Springer.

Pirnay-Dummer, P., Ifenthaler, D., & Seel, N. M. (2012). Semantic networks. In N. M. Seel (Ed.), *Encyclopedia of the sciences of learning* (Vol. 19, pp. 3025–3029). New York, NY: Springer.

Ramesh, D., & Sanampudi, S. K. (2021). An automated essay scoring systems: A systematic literature review. *Artificial Intelligence Review*. https://doi.org/10.1007/s10462-021-10068-2.

Ramineni, C., & Williamson, D. M. (2013). Automated essay scoring: Psychometric guidelines and practices. *Assessing Writing, 18*(1), 25–39. https://doi.org/10.1016/j.asw.2012.10.004.

Rissanen, M. J., Kume, N., Kuroda, Y., Kuroda, T., Yoshimura, K., & Yoshihara, H. (2008). Asynchronous teaching of psychomotor skills through VR annotations: Evaluation in digital rectal examination. *Studies in Health Technology and Informatics, 132*, 411–416.

Schumacher, C., & Ifenthaler, D. (2018). The importance of students' motivational dispositions for designing learning analytics. *Journal of Computing in Higher Education, 30*(3), 599–619. https://doi.org/10.1007/s12528-018-9188-y.

Schumacher, C., & Ifenthaler, D. (2021). Investigating prompts for supporting students' self-regulation – A remaining challenge for learning analytics approaches? *The Internet and Higher Education, 49*, 100791. https://doi.org/10.1016/j.iheduc.2020.100791.

Shermis, M. D. (2010). Automated essay scoring in a high stakes testing environment. In V. J. Shute & B. J. Becker (Eds.), *Innovative assessment for the 21st century* (pp. 167–184). New York, NY: Springer.

Shermis, M. D., Burstein, J., Higgins, D., & Zechner, K. (2010). Automated essay scoring: Writing assessment and instruction. In P. Petersen, E. Baker, & B. McGaw (Eds.), *International encyclopedia of education* (pp. 75–80). Oxford, England: Elsevier.

Spector, J. M., Ifenthaler, D., Sampson, D. G., Yang, L., Mukama, E., Warusavitarana, A., . . . Gibson, D. C. (2016). Technology enhanced formative assessment for 21st century learning. *Educational Technology & Society, 19*(3), 58–71.

Stephen, T. C., Gierl, M. C., & King, S. (2021). Automated essay scoring (AES) of constructed responses in nursing examinations: An evaluation. *Nurse Education in Practice, 54*, 103085. https://doi.org/10.1016/j.nepr.2021.103085.

Stödberg, U. (2012). A research review of e-assessment. *Assessment & Evaluation in Higher Education, 37*(5), 591–604. https://doi.org/10.1080/02602938.2011.557496.

Tversky, A. (1977). Features of similarity. *Psychological Review, 84*, 327–352.

Valenti, S., Neri, F., & Cucchiarelli, A. (2003). An overview of current research on automated essay grading. *Journal of Information Technology Education, 2*, 319–330.

Vantage Learning. (2001). *A preliminary study of the efficacy of IntelliMetric ® for use in scoring Hebrew assessments*. Retrieved from Newtown, PA:

Vantage Learning. (2002). *A study of IntelliMetric ® scoring for responses written in Bahasa Malay (No. RB-735)*. Retrieved from Newtown, PA:

Webb, M., Gibson, D. C., & Forkosh-Baruch, A. (2013). Challenges for information technology supporting educational assessment. *Journal of Computer Assisted Learning, 29*(5), 451–462. https://doi.org/10.1111/jcal.12033.

Webb, M., & Ifenthaler, D. (2018). Section introduction: Using information technology for assessment: Issues and opportunities. In J. Voogt, G. Knezek, R. Christensen, & K.-W. Lai (Eds.), *International handbook of IT in primary and secondary education* (2nd ed., pp. 577–580). Cham, Switzerland: Springer.

White, B. (2014). Is "MOOC-mania" over? In S. S. Cheung, J. Fong, J. Zhang, R. Kwan, & L. Kwok (Eds.), *Hybrid learning. Theory and practice* (Vol. 8595, pp. 11–15). Cham, Switzerland: Springer International Publishing.

Whitelock, D., & Bektik, D. (2018). Progress and challenges for automated scoring and feedback systems for large-scale assessments. In J. Voogt, G. Knezek, R. Christensen, & K.-W. Lai (Eds.), *International handbook of IT in primary and secondary education* (2nd ed., pp. 617–634). New York, NY: Springer.

Wild, F. (2016). *Learning analytics in R with SNA, LSA, and MPIA*. Heidelberg, Germany: Springer.

Wilson, J., & Rodrigues, J. (2020). Classification accuracy and efficiency of writing screening using automated essay scoring. *Journal of School Psychology, 82*, 123–140. https://doi.org/10.1016/j.jsp.2020.08.008.

Zupanc, K., & Bosnic, Z. (2015). Advances in the field of automated essay evaluation. *Informatica, 39*(4), 383–395.

Zupanc, K., & Bosnic, Z. (2017). Automated essay evaluation with semantic analysis. *Knowledge-Based Systems, 120*, 118–132. https://doi.org/10.1016/j.knosys.2017.01.006.

The Role of the Online Instructor

62

A Nexus of Skills, Activities, and Values That Support Learning

Vanessa P. Dennen and Melissa K. Jones

Contents

Abstract

Online instructors draw upon a complex set of skills, activities, and values to meet the needs of students who are separated from them by time and/or space, but united with them through digital technologies. Berge (1995) introduced the idea that the instructor's job could be represented through four interrelated roles: pedagogical, managerial, social, and technological. Instructors who develop expertise in all four of these dimensions are well-situated for supporting online students, who similarly must navigate these dimensions. This chapter explores each of these roles and their relationship to online learning. Two additional areas of concern for online instructors, the ethical dimension and the networked dimension, are also discussed.

Keywords

Instructor role · Pedagogy · Learning technologies · Ethics · Networks

V. P. Dennen (✉) · M. K. Jones
Florida State University, Tallahassee, FL, USA
e-mail: vdennen@fsu.edu; mkjones@fsu.edu

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_62

Introduction

Instructors teach. That sentence is, of course, an oversimplification focused on the intended outcome of their work. If students are to learn, instructors are expected to teach. Teaching is the instructor's primary activity, but the full constellation of tasks that an online instructor must undertake in support of teaching are more varied and nuanced.

Berge (1995) initiated the conversation on what roles online instructors should expect to fulfill for their students. The four roles that he listed – pedagogical, social, managerial, and technological – provided guidance for early online instructors who sought to understand their students' needs. These roles were born out of Berge's experiences and observations and went on to serve as the framework for various studies that followed (e.g., Bonk, Kirkley, Hara, & Dennen, 2001; Dennen, Bagdy, Arslan, Choi, & Liu, 2021; Gómez-Rey, Barbera, & Fernández-Navarro, 2018; Liu, Bonk, Magjuka, Lee, & Su, 2005).

Renewed interest in online instructor roles arose during the first year of the COVID-19 pandemic, when educational institutions swiftly moved to remote (and often online) learning formats. At that time, instructors were not only challenged to provide learning content and assessments online, but also to support online students along both social and technical dimensions (König, Jäger-Biela, & Glutsch, 2020). The modality shift also posed new pedagogical challenges, reflecting the systemic nature of instructor competencies. Knowledge of content, pedagogy, and technology as isolated fields is insufficient for instructor success; rather it is at their intersection that robust learning is best supported (Mishra & Koehler, 2006). Various studies reporting instructional shifts during the pandemic highlighted the challenges instructors faced when navigating new roles (e.g., Dennen et al., 2021; Rapanta, Botturi, Goodyear, Guàrdia, & Koole, 2021).

This chapter discusses research on the roles of the online instructor using the four dimensions of Berge's (1995, 2008) framework as a primary organizing element. In addition, two dimensions that are not often discussed in conjunction with the existing roles – the ethical and the networked dimensions – are introduced for consideration. These two dimensions do not align directly with any single existing role but rather overlap with several of them, which is consistent with Berge's (2008) view of the roles. These additional dimensions and their underlying functions encourage individuals to reflect on the increased complexity of online learning contexts that have co-developed with advances in online learning pedagogy and technology. Collectively, all six areas – pedagogical, managerial, social, technological, ethical, and network – represent competencies that are needed by online instructors.

Background and Context

One of the first things people think about when considering online learning is the transactional distance. Transactional distance, a concept first introduced by Moore (1993), is the perception that instructors and students are separated from each by time and space, creating an interaction gulf that is exacerbated by reliance on computer-mediated interactions and a reduction in communication channels or cues when compared to physical classroom settings. This perceived distance can lead to individuals feeling isolated in online learning spaces. However, instructors can work to reduce the perception of distance by fostering a highly interactive environment, which might include instructor-learner and learner-learner interactions in addition to learner-content interactions (Moore, 1989). After all, without these human interactions, an online course effectively becomes a correspondence course.

Planning for interactions is not enough to foster positive online learning experiences for students. Students needs vary widely, and instructors are challenged to engage students across the cognitive, affective, and behavioral dimensions (Martin & Borup, 2022). In a systematic review of research on blended learning, the following issues that affect student performance in online contexts were identified: self-regulation, technology (literacy, self-sufficiency, and complexity), and isolation (Rasheed, Kamsin, & Abdullah, 2020). Each of these areas can be broken down into smaller, more specific challenges students face. Online instructors need to be attuned to these challenges and develop skills to help mitigate the challenges.

The concept of instructor roles, notwithstanding Berge's (1995, 2008) framework, can be challenging to neatly define. Various researchers have sought to describe the concept of instructor role, as can be seen in the following examples:

- In an effort to measure student perceptions of instructor roles, M.-L. Hung and Chou (2015) developed and validated the Online Instructor Role and Behavior Scale (OIRBS). OIRBS contains five subscales: course designer and organizer, discussion facilitator, social supporter, technology facilitator, and assessment designer. These constructs overlap with Berge's framework along two dimensions (social and technology) but consider pedagogical and managerial tasks in different ways.
- Alvarez, Guasch, and Espasa (2009), through an analysis of the literature, suggested five roles. Three were the identical to Berge's framework, but course design and cognitive roles were listed in lieu of the pedagogical role.
- Bawane and Spector (2009) studied eight roles, finding that three of the top four roles (pedagogical, social, technological, and evaluator) aligned with Berge's framework.
- A systematic literature review by Baran, Correia, and Thompson (2011) added two roles to Berge's framework, instructional design, and facilitator. However, as their review notes, these are not always distinct roles. For example, one might consider the instructional designer role to be subsumed by the pedagogical role, and Berge (1995, 2008) directly states that facilitation is part of the pedagogical role.
- Martin, Budhrani, Kumar, and Ritzhaupt (2019) found that instructor roles and tasks vary across institutional contexts. Larger, better-staffed institutions may provide greater support structures, and as a result instructors may be able to rely on other staff to perform certain tasks.

Regardless of the terminology, framework, and task definitions and groupings that are used, online instructors undeniably have multifaceted job duties that draw upon diverse areas of expertise. Most of the scholarly work about instructor roles, including the aforementioned studies, either situates itself in or references and builds upon Berge's (1995, 2008) framework. Thus, Berge's framework will be used to structure the discussion of instructor roles.

Pedagogical Role

The pedagogical role is the role that is most commonly associated with online instruction and has been deemed the primary or most important of the roles (Bawane & Spector, 2009; Gómez-Rey, Barbera, & Fernández-Navarro, 2017). Most scholars include tasks related to course design and facilitation as part of the pedagogical role, although some may parse roles more finely and discuss facilitation or instructional design separately from pedagogy, implying that the method of teaching is somehow separate from, although undeniably interdependent on, these other two areas.

Berge (2008) states that facilitation is an essential component of the pedagogical role. Facilitation entails not only helping students navigate course materials and activities but interacting with them and fostering peer interactions as described by Moore (1989). Scholars have been exploring online facilitation competencies since the early days of online learning, with the recognition that there is no singular approach, but rather a multitude of facilitation styles and skills (e.g., advisor, assessor, researcher) that an instructor may draw on (Goodyear, Salmon, Spector, Steeples, & Tickner, 2001).

Facilitation is often a responsive task, occurring when an instructor reacts to students over the course of a semester, but good facilitation is based on a plan and builds on a solid foundation of course design. Thus, while instructional approaches vary and course design may or may not be undertaken by instructors and considered part of the pedagogical role (e.g., Gómez-Rey et al., 2017 view design as separate from pedagogy, but Liu et al., 2005 include design as part of pedagogy), course design is nonetheless critical to the work of an online instructor (Martin, Sun, & Westine, 2020), and in particular their pedagogical tasks.

It may be futile to try to determine whether course design or facilitation is more important. In practice, the two tasks are interrelated but are recognized by instructors and students in different ways. In a study that compared instructor and student perceptions, instructors were more focused on course design and feedback, whereas students rated facilitation and communication as factors most likely to contribute to their success (Dennen, Darabi, & Smith, 2007). These findings suggest that instructors should not neglect facilitation and focus on course design, but instead they should factor facilitation and formative points of instructor-student communication into their course design. Additionally, students may not consider course design as important as course facilitation, because good facilitation is the element that connects students to course activities and materials. Instructors with strong facilitation skills may be able to compensate for poor course design, whereas good course design may not be sufficient to overcome the ill effects of poor facilitation. This premise was discovered by many instructors during the early parts of the COVID-19 pandemic. When these instructors made a rapid shift to remote teaching via online technologies, they learned that designing and delivering course content was not the only or even the most important pedagogical task. Instead, instructors needed to consider how students would interact within the course and provide opportunities for engagement (Rapanta et al., 2021).

Together, instructional design and facilitation shape the way that students perceive activities and engage in a class. Whereas the course design includes not only content but also learning activities and assessments and sets up the overall expectations for what students will do, instructors communicate their pedagogical values and expectations to students through facilitation. Ma, Han, Yang, and Cheng (2015) found that course design has an effect on how students access learning materials in an online course, but that interactions and guidance affect how students complete learning tasks. Further, the manner and frequency of instructor interaction with students can be planned and affects how students approach learning activities (Dennen, 2005). When instructors are absent from interaction spaces, students will assume their work in those spaces is not valued or monitored, likening it to busywork. Alternately, when instructors are overly dominant in the learning space, students will orient closely toward the instructor and may seek continuous instructor affirmation and place less value on peer interactions. Although this may sound like an ideal situation for students, as the dominant instructor in Dennen's (2005) study learned, it is not a sustainable solution.

Looking to the future, more work might be done to support the needs of diverse student populations in online environments. Although little studied at this time, students from different backgrounds and cultures will likely benefit when their instructors embrace anti-oppressive pedagogies and promote critical awareness through reflection and discussion (Migueliz Valcarlos, Wolgemuth, Haraf, & Fisk, 2020). This recommendation is consistent with the notion that course design and pedagogical decisions made by instructors should be flexible and empower students (Rapanta et al., 2021).

Managerial Role

The instructor's managerial role, alternately referred to as the administrative role, refers to course oversight. Berge (1995) suggested that this role is associated with managing objectives, time, and structural components of learning activities. In this sense, one can see a direct connection between the pedagogical role and the managerial role. Whereas the former is concerned directly with how students make meaning out of their course experiences, the latter provides the supporting structures and conditions for successful pedagogy.

Bonk et al. (2001) elaborated on Berge's (1995) description of the managerial role with concrete examples from four cases. Under the managerial role, instructors engaged in tasks such as determining the class schedule and deadlines; planning and assigning groups; evaluating and revising parts of the course; and providing students with regular announcements and updates (Bonk et al., 2001). In this sense, the managerial role intersects directly with the instructional design process and includes localized tasks related to setting up and running each unique course offering. When these elements are in place at the start of a course, the instructor is better able to focus on student engagement and their pedagogical role (Arbaugh, 2010). Gómez-Rey et al. (2017) found that the importance or uniqueness of the managerial role for the online instructor has subsided in recent years, likely due to improvements in course design and technology.

Course-level administrative tasks also fall under the managerial role. A major task for online instructors is setting up the learning space, whether within an LMS or some other tool (Berge, 2008). Instructors also need to organize, provide access to, and monitor files and file sharing spaces (Alvarez et al., 2009). Course oversight may also require collecting and reporting data to other institutional offices, such as attendance dates and student learning outcomes. These data may be used to support institutional research and for accountability reporting to government and accreditation agencies.

Digital learning spaces make it easy for instructors to monitor student data, such as log-ins, course material accesses, and assignment submission times. Interestingly, despite the heavy focus on learning analytics as a means of supporting learning and retention in recent years, in one study both instructors and students rated instructor monitoring of student course access as the least important activity contributing to student satisfaction (Dennen et al., 2007). Analytics are useful for identifying students who are absent or at risk of failure, but they are limited because they sit at the gateway of pedagogy. Still, this represents a growing area of research with the aim of amplifying an instructor's ability to meet both students' managerial and pedagogical needs. Perhaps with improvements in artificial intelligence, future analytic systems will be able to not only provide alerts for at-risk students but also suggest moment-by-moment facilitation strategies, also supporting the instructor's pedagogical function.

Even without using analytics, Berge (2008) suggested that instructors might monitor student interactions and intervene when students are not participating in the desired manner. In other words, instructors may need to monitor student attendance and progress in a course from an administrative perspective (e.g., maintaining attendance records) and communicate with students when their actions are not consistent with course expectations – not just for the absent or underperforming students, but for all students. For example, Berge (1995) suggests that instructors should manage students who dominate interaction spaces, encouraging them to sit back and listen more. These forms of monitoring and intervention may help uphold the course structure and foster student behaviors and a learning community that supports pedagogical functions, even if they do not directly contribute to learning.

Additionally, during their online learning journeys, students have needs at different institutional levels. The instructor's immediate sphere of influence is the micro-level, or the class, where learning is the main focus. However, an online instructor's tasks are not limited to learning or classroom-focused interventions. Online instructors often serve as the face of the university for their students, who in some instances may never visit the physical campus. Although staff members and advisors may assist with admissions and guide students toward class enrolment, once students are registered for classes, the learning management system (LMS) becomes the entry point to the university and instructors become a primary point of contact.

However, students may need help with advising or other issues related to their degree program, in which case the instructor may directly help or may connect the student to someone who works at the mesolevel, such as a department administrator or advisor. Additionally, during the pursuit of learning, students may find themselves needing to access institutional or macrolevel resources, such as information technology, instructional technology, and the library. There are myriad other reasons why a student might need to access macrolevel resources, which typically include financial aid, career centers, student groups, and recreational services. Based on best practices in online learning, Quality Matters (www.qualitymatters.org) recommends that online course instructors look beyond the microlevel needs of students and facilitate awareness of and access to macro- and mesoresources by providing links to these resources in the class's learning management system.

Social Role

Initially stemming from an awareness of the need for faculty to facilitate discussions in online environments (Berge & Collins, 2000), the social role of online instructors has continued to evolve. Facilitation is common to both the pedagogical and social roles, although each role invokes a different skill set and focus. Just as virtual learning opportunities have expanded, the social role of online educators has grown to include both the formal and informal supporting of meaningful, cooperative student-faculty, and student-student relationships (Alvarez et al., 2009; Baran et al., 2011; Berge, 2008). Alvarez et al. (2009) suggested this more encompassing understanding of the social role of online instructors could be observed in the language and naming conventions that are frequently used for online educators. They noted that terms such as facilitator, coach, mediator, and moderator, which are commonly used as titles for online instructors, are all indicative of the rising value being placed on social functions.

Some explanations for the increasing focus on the social role of online instructors can be attributed to transactional distance (Moore, 1989) and the resulting awareness of the lack of a shared physical space (Varvel, 2007) and difficulties related to expressing sensory and emotional expressions (Guasch, Alvarez, & Espasa, 2010). However, as Baran et al. (2011) noted, as technologies continue to offer increasingly advanced and accessible opportunities for people to be more social, students who use these technologies have likely grown accustomed to being engaged as active participants in online environments. These developments and changing expectations may push some instructors to reflect on and change their beliefs and practices.

While the instructor's social role is often understood in terms of supporting and maintaining relationships between students and their peers, and between students and their instructors, the process of creating these relationships involves nearly every aspect of the online learning environment. The practices associated with creating meaningful relationships often revolve around instructors' abilities to serve as guides throughout the learning process, to express empathy and understanding of their students' experiences, and to establish a sense of cohesion between the members of the class community (Bailey & Card, 2009; Guasch et al., 2010; W. C. Hung & Jeng, 2013). The social role of the instructor goes beyond the facilitation of interactions to also include the design and teaching practices that foster connectedness and identity congruence, or a shared sense of values, goals, and beliefs among the students (Hughes, 2007). In many online learning environments, these practices are rooted in social constructivism and are well-aligned with those who value student-centered approaches to learning (Berge, 1997; Berge & Collins, 2000; Varvel, 2007).

Although there is a need to situate some conversations about the social role of instructors contextually, Richardson and Lowenthal's (2017) discussion of strategies for establishing instructor social presence can be applied broadly as a way to support relationship-building in online learning environments. The three strategies they identified include the development of instructor personality or *persona*, a term they credit to Dennen (2007); the design of the course, most notably interactions and clear expectations; and the inclusion of intentional online communications, which they suggested continues to be the main way to establish social presence. Instructors must establish their own identity through various channels (Dennen & Arslan, 2022), serving as a model for their students to do likewise. Their presence in learning spaces, whether direct or indirect, indicates to students the importance and expectation of participating in these learning activities (Dennen, 2005). When students share their identity, they establish presence. Additionally, as instructors work toward best practices in online teaching, these strategies can be most effective when coupled with the understanding that the social aspects of an online class can be supportive of diverse student voices. By encouraging these voices to speak and be heard, instructors can foster more inclusive learning environments and an increased sense of belonging for learners who may feel marginalized.

Online instructors may initially see the social role as one that asks them to design and facilitate opportunities for students to form social and emotional bonds in order to improve satisfaction and motivation (Liu et al., 2005). While these practices are often associated with the affective domain of learning, the significance of the social role extends into the cognitive domain as well. When students feel as though they are part of the learning community and feel a sense of connection with each other and with their instructors, the environment becomes one that engages them with the learning outcomes, provides them with the opportunity to ask questions, and gives them the space to co-construct knowledge (Aragon, 2003; Liu et al., 2005).

Technological Role

The technological role of the online instructor is one that continues to evolve. Berge (2008) suggested that the "ultimate technical goal is to make the technology transparent to the user" (p. 410) and that the online instructor is often the initial point of contact for students with technical questions. As technologies have continued to expand, the technical skills and expected competencies of online instructors have increased as well. Online instructors often need to have plans in place to mitigate technical disruptions, system requirements, and learning curves (Berge, 2008), in addition to their focus on teaching. While some of the competencies related to the technical role can be measured through their practical applications, effective instruction goes beyond the instructor's abilities to implement and maintain the tools and platforms. Those instructors who are often seen as the most successful in online environments are the ones who are able to apply both their pedagogical and technological skills to improve instruction through the adoption of creative designs and innovative technologies that support the desired learning outcomes (Bailey & Card, 2009; W. C. Hung & Jeng, 2013).

In what Guasch et al. (2010) referred to as the technological domain, the technological role is more complex than the expected general knowledge related to computers, multimedia, and educational technologies. They noted that in their review of studies concerning online instructor competencies, the technological role, along with the managerial role, is unique in that it is associated with all the other roles and functions. As online instructors navigate the various roles, distinctions between technology and teaching become less defined and more intersectional. Rather than understanding the technological role as task-based and separate from the other roles, online instructors should work to bridge potential gaps between technology and teaching. Instructors must not only know how to work with the technologies, but also how to use the technologies in ways that support the chosen teaching and learning models (Alvarez et al., 2009; Guasch et al., 2010). Effective teaching in digital spaces relies on the instructor's awareness of the "mutually reinforcing" relationships between teaching, technology, and content (Koehler, Mishra, & Yahya, 2007).

Much like the competencies of the other roles, the competencies of the technological role tend to be understood by how they are applied (Alvarez et al., 2009), and the practical applications are often contextual (Gay, 2016). When asked to rank online instructor roles in order of importance, instructors placed the technological role toward the middle of the list (Bawane & Spector, 2009). Faculty also tend to report their technological skill level as lower than the importance of the skill, suggesting that they feel they still have room to learn and improve (Martin, Budhrani, & Wang, 2019). However, this prioritization varies across studies, though, depending on how technologist is defined, who is asked to provide the ranking, and which skills and abilities are considered essential (Egan & Akdere, 2005; Williams, 2003).

At the most basic level, online instructors should not only be comfortable using the learning systems provided by their institutions, but they should also be able to share and maintain content resources, troubleshoot both their own and their students' basic technical problems, and communicate with their students in a variety of ways. While considered fundamental, these practices are continuous and take a considerable amount of time throughout the preparation and teaching of the course. Beyond these essential competencies, online instructors also work to evaluate the ways in which technologies can enable and enhance the learning process. In the role of the course technologist, instructors should be intentional with the technology solutions they choose and transparent with their students about how they should be used and what their expected benefits are. The best educational technologies are accessible and easy to navigate and offer solutions that improve teaching and learning, and online instructors are often the ones who can determine how well technologies meet those criteria.

Ethical Dimension

None of the prior four roles explicitly discusses ethical issues related to online learning, although ethical concerns may arise in pedagogical, managerial, social, and technological contexts. The instructor's ethical role has two sides. First, the instructor has an ethical obligation to meet the needs of their students, which includes considering issues of access and equity. Instructors are models and arbiters of ethical behavior for their online students, setting the expectations and tone for their classes. Second, online instructors should strive to minimize discomfort related to learning in online spaces, which may occur due to concerns with privacy, intellectual property, and context collapse.

Prior online learning research has discussed issues of access and equity mostly at the macrolevel (Martin et al., 2020). While societal and institutional actions, which may focus on ensuring an institution has a diverse student population and fosters cross-cultural exchange, are important, the online instructor's ethical purview must operate within the microlevel of the individual class. Access and equity are not ethical issues unique to online learning, but they can be exacerbated by it. In contrast to views that learning via digital tools can lead to the democratization of education (Semerikov et al., 2020), other scholars have shown they can also widen gulfs. Technology is not a neutral force in online learning (Migueliz Valcarlos et al., 2020). The COVID-19 pandemic laid bare some of the digital inequities that students may face, not all of which are explained by socioeconomic status. Some of the issues that arose included loss of access to campus-based learning resources such as computer labs, libraries, and Internet, and home bandwidth or environmental conditions that were not conducive to completing coursework. While these situations were temporary and occurred during a time when instructors were heavily encouraged to make accommodations for struggling students, they nonetheless represent inequities and highlight the potential fragility or volatility of online learning access.

In nonpandemic times, students in rural areas often suffer from bandwidth problems and students with older devices and software may struggle to complete assignments. Additionally, instructors need to pay attention to tool accessibility issues. Some learning tools may be unavailable to or unable to be used by some students due to disabilities, geography (e.g., some online tools are blocked in China), or technological limitations (e.g., smartphone-only apps). Institutional guidelines and instructional technology support staff may help instructors navigate these challenges, but even learning management systems that are adopted institutionally require additional instructor knowledge and effort to be used in ways that minimize access problems.

Other scenarios that have historically excluded or diminished the learning opportunities of some online students include rigid temporal expectations. Many online students choose the modality because of its flexibility. However, when instructors hold synchronous sessions for a class that was meant to be asynchronous, require groupwork without providing time and guidance for completing the work, or set rigid participation deadlines (e.g., posting to a discussion on specific days of the week), students who became online students because they needed temporal flexibility may find themselves at a disadvantage. These situations may occur in the classes of well-intentioned instructors who have valid pedagogical or social reasons for their course design and expectations.

Supposing there are no issues related to access, instructors still need to grapple with concerns related to student comfort in the online learning environment. Students may be concerned with privacy, digital footprints (Dennen, 2015), and intellectual property issues (Dennen, 2016) in online learning environments. Instructors need to be able to provide assurance and guidance on these issues, reassuring students about who can see, save, and share their course contributions. When learning activities are limited to the semi-private confines of the LMS, some of these concerns may be mitigated, although instructors still need to provide leadership in this area and set expectations that help respect student privacy (e.g., *no screenshotting and sharing discussion posts*). When learning activities extend beyond the LMS, occurring on social media or when students need to share contact information or use personal accounts to access learning spaces, some students may experience discomfort due to context collapse, which occurs when personal and school life collides in digital spaces. Students have reported this phenomenon to be undesirable in prior research, and most prefer to keep their personal digital activities separate from school-related ones (Dennen & Burner, 2017).

Student comfort may also be diminished when students feel they do not belong in the class setting. This sense of othering can result in student disengagement and can be caused by students feeling they are different from their peers and, as a result, less valued in the class. Othering may occur due to ethnic, academic, or professional backgrounds (Phirangee & Malec, 2017), as well as differences in international location or origin (Choi, Arslan, Adolfson, & Screws, 2021). Instructor choices in all areas of online learning (e.g., epistemology, content, interaction, technology) wield power and have the potential to include or oppress different groups of students (Migueliz Valcarlos et al., 2020). In the ethical dimension, instructors should continuously consider the background and perspective of each student, ensuring that each is provided with activities, content, technologies, and interaction opportunities that empower them to succeed in the online class.

These ethical concerns span across the four established instructor roles. When students struggle to access or fully participate in a course or feel discomfort in the learning environment, they are affected along the pedagogical and social dimensions. Instructors have the potential and an ethical responsibility to modify their courses to be fully inclusive. Adjustments to course design, management (e.g., policies and oversight), and technologies may help minimize learning inequities, maximize student comfort, and help all students fully understand their learning options and behavioral expectations.

Network Dimension

One of the exciting dimensions of online learning is the network dimension, which suggests that class boundaries can be more fluid and expansive than they are for classes meeting in physical spaces. The temporal and geographic boundaries of a campus-based learning experience tend to confine learning experiences to people listed on the roster. The same can be true of online classes if instructors replicate the same activities and build virtual boundaries that are the equivalent of physical classroom walls. However, online learning provides instructors with opportunities to lead their students in making connections between their class and the larger online world. When students are encouraged to use the Internet as part of their learning experience, learner-network interactions (Dennen, 2019) are added to the three types of within-class student interactions identified by Moore (1989). In other words, with the instructor's blessing, support, and perhaps co-participation, students can explore and connect their class learning to content from and interactions with relevant online people, spaces, and tools. Through these opportunities, instructors find themselves playing a network role in which they demonstrate how to develop a meaningful professional learning network (PLN; Krutka, Carpenter, & Trust, 2017) and exist as co-learners alongside their students in a connectivist learning experience.

Increasingly, connectivism has become a popular approach for online learning. Connectivism was proposed as an alternate learning theory acknowledges the diverse and distributed learning experiences people have when interacting with other people and resources in online spaces (Siemens, 2005). Downes (2019) reminds that connectivism is not simply a pedagogical strategy to invoke in a class or to be measured via formal assessments. Rather, connectivism represents a contemporary way of navigating the world and making sense of one's interactions in online spaces. Invoking a connectivist approach in a formal learning context is effectively committing to supporting students as they explore relevant online spaces, each of which contributes to a unique experience that reflects both course learning objectives and personal ones.

Instructors who embrace connectivism as an online learning epistemology and who wish to support students in developing PLNs (Krutka et al., 2017) need to develop another set of skills, so they can navigate online worlds themselves and support students in doing the same. The Networked Knowledge Activities (NKA) framework (Dennen, 2019; Dennen et al., 2020) can be used to support this endeavor, highlighting the subskills (e.g., collect, curate, share, broker, negotiate, and create) that occur in a networked environment and support learning. These skills are familiar to most social media users, but are neither mastered by nor ubiquitous to all students. Integrating the skills into online classes merges classroom learning and everyday life information-seeking behaviors. By parsing larger, authentic online activities into smaller, well-defined actions instructors can be intentional about encouraging students to develop and practice skills that promote lifelong learning and productive development of and interaction in PLNs. Instructors have opportunities to help students locate and evaluate online resources, access online expertise, and develop networks that will serve them in the future.

This networked dimension of the overall instructor role has implications for each of the other roles. Networked learning reflects both pedagogical and technological choices and positions instructors and students in the midst of social spaces that may be inhabited by others. Instructors need to help students navigate these social spaces, invoking facilitation, managerial, and technology skills. Finally, when learning shifts into increasingly public online spaces, a new range of ethical concerns arise.

Conclusion

Online instruction is a complex activity, drawing upon a diverse set of skills. Attempts to separate these skills into different roles, such as Berge's (1995) framework, mark a first step toward articulating important instructor competencies and organizing them in a logical manner. These roles can be used alternately to support professional development or enable focused discussion of a single dimension of the online instructor's job. The heavy crossover and interplay among these roles are emblematic of the systemic nature of online instruction. No single role or dimension alone is sufficient to support learning, not even the pedagogical role.

Notably, these four core roles have remained constant for more than two decades and have gained widespread acceptance among educators and educational institutions. This constancy, however, does not mean that our understanding of each role has not changed. Developments in both pedagogy and online learning technologies have stretched the roles to encompass different approaches to learning. Newer concerns related to ethics and networked learning, leading to the discussion of each as its own dimension in this chapter, similarly represent developments in educational and everyday practices and values. Looking to the future of online instruction, it seems likely that these core roles will continue to guide online instructors, even as specific approaches to each role continue to develop and reflect systemic changes and advances in online education research and practice.

References

Alvarez, I., Guasch, T., & Espasa, A. (2009). University teacher roles and competencies in online learning environments: A theoretical analysis of teaching and learning practices. *European Journal of Teacher Education, 32*(3), 321–336.

Aragon, S. R. (2003). Creating social presence in online environments. *New Directions for Adult and Continuing Education, 100*, 57–68.

Arbaugh, J. B. (2010). Sage, guide, both, or even more? An examination of instructor activity in online MBA courses. *Computers & Education, 55*(3), 1234–1244. https://doi.org/10.1016/j.compedu.2010.05.020.

Bailey, C. J., & Card, K. A. (2009). Effective pedagogical practices for online teaching: Perception of experienced instructors. *The Internet and Higher Education, 12*(3-4), 152–155.
Baran, E., Correia, A.-P., & Thompson, A. (2011). Transforming online teaching practice: Critical analysis of the literature on the roles and competencies of online teachers. *Distance Education, 32*(3), 421–439. https://doi.org/10.1080/01587919.2011.610293.
Bawane, J., & Spector, J. M. (2009). Prioritization of online instructor roles: Implications for competency-based teacher education programs. *Distance Education, 30*(3), 383–397.
Berge, Z. L. (1995). Facilitating computer conferencing: Recommendations from the field. *Educational Technology, 35*(1), 22–30.
Berge, Z. L. (1997). Characteristics of online teaching in post-secondary, formal education. *Educational Technology, 37*(3), 35–47.
Berge, Z. L. (2008). Changing instructor's roles in virtual worlds. *Quarterly Review of Distance Education, 9*(4), 407–415.
Berge, Z. L., & Collins, M. P. (2000). Perceptions of e-moderators about their roles and functions in moderating electronic mailing lists. *Distance Education, 21*(1), 81–100.
Bonk, C. J., Kirkley, J. R., Hara, N., & Dennen, V. P. (2001). Finding the instructor in post-secondary online learning: Pedagogical, social, managerial, and technological locations. In J. Stephenson (Ed.), *Teaching and learning online: Pedagogies for new technologies* (pp. 76–97). London: Kogan Page.
Choi, H., Arslan, Ö., Adolfson, D., & Screws, B. (2021). The international other in online learning: Four stories from a graduate program. In *Reshaping international teaching and learning in higher education* (pp. 162–174). Routledge.
Dennen, V. P. (2005). From message posting to learning dialogues: Factors affecting learner participation in online discussion. *Distance Education, 26*(1), 125–146.
Dennen, V. P. (2007). Presence and positioning as components of online instructor persona. *Journal of Research on Technology in Education, 40*(1), 95–108.
Dennen, V. P. (2015). Technology transience and learner data: Shifting notions of privacy in online learning. *Quarterly Review of Distance Education, 16*(2), 45–60.
Dennen, V. P. (2016). Ownership of digital course artifacts: Who can access and use your words, images, sounds, and clicks? *Quarterly Review of Distance Education, 17*(4), 5–19.
Dennen, V. P. (2019). Frameworks for designing and analyzing learning: Activity interactions in online courses. In M. G. Moore & W. Diehl (Eds.), *Handbook of distance education* (pp. 244–259). New York: Routledge.
Dennen, V. P., & Arslan, Ö. (2022). The visual performance of online identity: Instructor presence and persona across tools and settings. *Studies in Technology Enhanced Learning*. https://doi.org/10.21428/8c225f6e.9e975efc.
Dennen, V. P., & Burner, K. J. (2017). Identity, context collapse, and Facebook use in higher education: Putting presence and privacy at odds. *Distance Education, 38*(2), 173–192. https://doi.org/10.1080/01587919.2017.1322453.
Dennen, V. P., Darabi, A. A., & Smith, L. J. (2007). Instructor-Learner interaction in online courses: The relative perceived importance of particular instructor actions on performance and satisfaction. *Distance Education, 28*(1), 65–79.
Dennen, V. P., Word, K., Adolfson, D., Arechavaleta, V., He, D., Hsu, C.-W., . . . Toth, K. (2020). Using the networked knowledge activities framework to examine learning on social networking sites. In P. Kommers & G. C. Peng (Eds.), *Proceedings of the international conference on Web-based Communities and Social Media 2020* (pp. 165–172). IADIS Press.
Dennen, V. P., Bagdy, L. M., Arslan, Ö., Choi, H., & Liu, Z. (2021). Supporting new online instructors and engaging remote learners during COVID-19: A distributed team teaching approach. *Journal of Research on Technology in Education*, 1–21. https://doi.org/10.1080/15391523.2021.1924093.
Downes, S. (2019). Recent work in connectivism. *European Journal of Open, Distance and E-Learning (EURODL), 22*(2), 113–132.

Egan, T. M., & Akdere, M. (2005). Clarifying distance education roles and competencies: Exploring similarities and differences between professional and student-practitioner perspectives. *The American Journal of Distance Education, 19*(2), 87–103.

Gay, G. H. (2016). An assessment of online instructor e-learning readiness before, during, and after course delivery. *Journal of Computing in Higher Education, 28*(2), 199–220.

Gómez-Rey, P., Barbera, E., & Fernández-Navarro, F. (2017). Student voices on the roles of instructors in asynchronous learning environments in the 21st century. *International Review of Research in Open and Distributed Learning, 18*(2), 234–251. https://doi.org/10.19173/irrodl.v18i2.2891.

Gómez-Rey, P., Barbera, E., & Fernández-Navarro, F. (2018). Students' perceptions about online teaching effectiveness: A bottom-up approach for identifying online instructors' roles. *Australasian Journal of Educational Technology, 34*(1). https://doi.org/10.14742/ajet.3437.

Goodyear, P., Salmon, G., Spector, J. M., Steeples, C., & Tickner, S. (2001). Competences for online teaching: A special report. *Educational Technology Research & Development, 49*(1), 65–72.

Guasch, T., Alvarez, I., & Espasa, A. (2010). University teacher competencies in a virtual teaching/learning environment: Analysis of a teacher training experience. *Teaching and Teacher Education, 26*(2), 199–206.

Hughes, G. (2007). Diversity, identity and belonging in e-learning communities: Some theories and paradoxes. *Teaching in Higher Education, 12*(5-6), 709–720.

Hung, M.-L., & Chou, C. (2015). Students' perceptions of instructors' roles in blended and online learning environments: A comparative study. *Computers & Education, 81*, 315–325. https://doi.org/10.1016/j.compedu.2014.10.022.

Hung, W. C., & Jeng, I. (2013). Factors influencing future educational technologists' intentions to participate in online teaching. *British Journal of Educational Technology, 44*(2), 255–272.

Koehler, M. J., Mishra, P., & Yahya, K. (2007). Tracing the development of teacher knowledge in a design seminar: Integrating content, pedagogy and technology. *Computers & Education, 49*(3), 740–762.

König, J., Jäger-Biela, D. J., & Glutsch, N. (2020). Adapting to online teaching during COVID-19 school closure: Teacher education and teacher competence effects among early career teachers in Germany. *European Journal of Teacher Education, 43*(4), 608–622. https://doi.org/10.1080/02619768.2020.1809650.

Krutka, D. G., Carpenter, J. P., & Trust, T. (2017). Enriching professional learning networks: A framework for identification, reflection, and intention. *TechTrends, 61*(3), 246–252. https://doi.org/10.1007/s11528-016-0141-5.

Liu, X., Bonk, C. J., Magjuka, R. J., Lee, S.-H., & Su, B. (2005). Exploring four dimensions of online instructor roles: A program level case study. *Journal of Asynchronous Learning Networks, 9*(4), 29–48.

Ma, J., Han, X., Yang, J., & Cheng, J. (2015). Examining the necessary condition for engagement in an online learning environment based on learning analytics approach: The role of the instructor. *The Internet and Higher Education, 24*, 26–34. https://doi.org/10.1016/j.iheduc.2014.09.005.

Martin, F., & Borup, J. (2022). Online learner engagement: Conceptual definitions, research themes, and supportive practices. *Educational Psychologist*, 1–16. https://doi.org/10.1080/00461520.2022.2089147.

Martin, F., Budhrani, K., Kumar, S., & Ritzhaupt, A. (2019). Award-winning faculty online teaching practices: Roles and competencies. *Online Learning, 23*(1), 184–205. Retrieved from https://eric.ed.gov/?id=EJ1211042.

Martin, F., Budhrani, K., & Wang, C. (2019). Examining faculty perception of their readiness to teach online. *Online Learning, 23*(3). https://doi.org/10.24059/olj.v23i3.1555.

Martin, F., Sun, T., & Westine, C. D. (2020). A systematic review of research on online teaching and learning from 2009 to 2018. *Computers & Education, 159*, 104009. https://doi.org/10.1016/j.compedu.2020.104009.

Migueliz Valcarlos, M., Wolgemuth, J. R., Haraf, S., & Fisk, N. (2020). Anti-oppressive pedagogies in online learning: A critical review. *Distance Education, 41*(3), 345–360. https://doi.org/10.1080/01587919.2020.1763783.

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record, 108*(6), 1017–1054.

Moore, M. G. (1989). Three types of interaction. *The American Journal of Distance Education, 3*(2), 1–6.

Moore, M. G. (1993). Theory of transactional distance. In D. Keegan (Ed.), *Theoretical principles of distance education* (pp. 22–38). New York: Routledge.

Phirangee, K., & Malec, A. (2017). Othering in online learning: An examination of social presence, identity, and sense of community. *Distance Education, 38*(2), 160–172. https://doi.org/10.1080/01587919.2017.1322457.

Rapanta, C., Botturi, L., Goodyear, P., Guàrdia, L., & Koole, M. (2021). Balancing technology, pedagogy and the new normal: Post-pandemic challenges for higher education. *Postdigital Science and Education, 3*(3), 715–742. https://doi.org/10.1007/s42438-021-00249-1.

Rasheed, R. A., Kamsin, A., & Abdullah, N. A. (2020). Challenges in the online component of blended learning: A systematic review. *Computers & Education, 144*. https://doi.org/10.1016/j.compedu.2019.103701.

Richardson, J. C., & Lowenthal, P. (2017). Instructor social presence: Learners' needs and a neglected component of the community of inquiry framework. In A. L. Whiteside, A. G. Dikkers, & K. Swan (Eds.), *Social presence in online learning: Multiple perspectives on practice and research* (pp. 86–98). Stylus.

Semerikov, S., Ovcharuk, O., Ivaniuk, I., Soroko, N., Gritsenchuk, O., Kravchyna, O., . . . Danylchuk, H. (2020). The use of digital learning tools in the teachers' professional activities to ensure sustainable development and democratization of education in European countries. *E3S Web of Conferences, 166*. https://doi.org/10.1051/e3sconf/202016610019.

Siemens, G. (2005). Connectivism: A learning theory for the digital age. *International Journal of Instructional Technology & Distance Learning, 2*(1) Retrieved from http://itdl.org/journal/jan_05/article01.htm.

Varvel, V. E. (2007). Master online teacher competencies. *Online Journal of Distance Learning Administration, 10*(1), 1–41.

Williams, P. E. (2003). Roles and competencies for distance education programs in higher education institutions. *The American Journal of Distance Education, 17*(1), 45–57.

Developing Digital Literacy for Teaching and Learning

63

Victoria I. Marín and Linda Castañeda

Contents

Abstract

Digital literacy is a critical competence for empowering citizenship in a digital world. It has become a key element in teaching and learning across the different educational stages that has been addressed since the last decade of the twentieth century within the field of open, distance, and digital education. The literature so far has not agreed on a common definition, but multiple international, national, and even local, frameworks exist to foster digital literacy and to evaluate and certificate it, especially with a focus on educators and students in different educational levels, but also with the citizen perspective. These frameworks are

V. I. Marín (✉)
University of Lleida, Lleida, Spain
e-mail: victoria.marin@udl.cat

L. Castañeda
University of Murcia, Murcia, Spain
e-mail: lindacq@um.es

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_64

reviewed in this chapter, along with the evolution and conceptualization of digital literacy and some strategies to foster digital literacy in different educational sectors, with a focus on the educator as a key player in this fostering action. The most remarkable challenges for developing digital literacy for teaching and learning include the same conception of digital literacy, which is multiple and situated, the digital divide and the actual consideration of digital literacy as a social practice. Being digital literacy a transversal competency nowadays, clear implications for education can be drawn, such as reshaping organizations to the digital conditions, thinking on digital literacy as a collective effort, and enriching the global discourse through diversity in debates.

Keywords

Digital literacy · Digital competence · Digital teaching competence · Digital literacy frameworks · Digital fluency · Digital citizenship

Introduction

Digital literacy (DL) in teaching and learning is one of the areas of research and practice in the field of open, distance, and digital education with a longer trajectory and evolution in its history. The interest around DL started when the mere reading and writing abilities ceased to be sufficient for participating as full citizens in the new technological and communicative era. Nevertheless, being intimately linked to the development of two amazingly changeable concepts – technology and education – the term “digital literacy” itself is not free from complexity and polemic. This fact cannot be omitted in a chapter such as this one.

Since DL has been studied from a huge number of perspectives since its development in the last decade of the twentieth century, it is difficult to capture the complexity and abundance of information available of DL by doing another review. Instead, this chapter draws upon existing systematic literature reviews to provide a reliable way of representing the essence of the broad range of digital literacy scholarship. For this book chapter, 33 reviews that are indexed in Web of Science during the period 2010–2021 were collected to cover classical, critical, and current definitions, frameworks, and strategies to foster DL in teaching and learning.

What Is “Digital Literacy”?

DL is not presented in the literature as a concept itself but as a kind of ensemble and joining of cultural and historical understandings and practices regarding the use of information, mediated by digital technologies, on any aspect of daily human life (Canchola-Gonzalez & Glasserman Morales, 2020; Cetindamar Kozanoglu & Abedin, 2020; da Silva & Behar, 2019; Nichols & Stornaiuolo, 2019; Reyes &

Avello-Martínez, 2021). Still, authors agree on considering it as a critical competence for personal fulfillment, active citizenship, social inclusion, and employment in the twenty-first century (Guardia et al., 2017; Littlejohn et al., 2012), and as the only way to participate and contribute to the contemporary life (MacLure & Stewart, 2016).

Nevertheless, there is not a clear definition of DL (Esteve-Mon et al., 2020). The rise of the conceptualization of DL is intimately connected not just to the technological evolution itself and the requirements of the new technological scenario (de Paulo Moura, 2019), but also to the transformation of the main aspects that define the way information is produced and shared in multimodal approaches (de Paulo Moura, 2019): the change in the code (from verbal to multimedia), the difference in the main support (from paper to screen), and the change in structure (from a linear-reading structure to a hypertextual and hypermedia) one (Avello Martínez et al., 2013).

The conceptual evolution of DL recognizes the rising importance of integrating not just instrumental components of the new communicational aspects but also the intellectual, informational, and other skills related to the role of information and technologies in people's life. This is also clear from the evolution of the DL's European Union definitions, turning from an almost instrumental perception on the first definitions before 2010 (European Communities, 2007), and becoming more focused on being critical and participating in the most recent approaches (European Commission, 2019).

Instead of a monolithic concept of literacy, specialized literature proposals mention "multiliteracies" – as 'Information Literacy', 'Computer Literacy', 'Media Literacy', 'Communication Literacy', 'Visual Literacy', and 'Technological Literacy' – when authors speak about DL to remark the complex and entangled notion they refer to (Avello Martínez et al., 2013; Manca et al., 2021; Reddy et al., 2020). Moreover, the literature remarks the importance of not considering the new communicative scenarios opposite to the traditional ones, but as more complex and networked (de Paulo Moura, 2019).

DL includes technological, attitudinal, and cognitive components, linked to the need of humans (as individuals and as groups) to express, explore, question, communicate, and understand ideas (Avello Martínez et al., 2013). This need is also historically engaged with the use of technologies to do tasks, solve problems, and communicate (Arango Morales et al., 2021).

The impact and influence of DL over time and contexts include its presence in classical frameworks and programs such as the twenty-first century skills framework (https://www.battelleforkids.org/networks/p21/frameworks-resources), the International Computer and Information Literacy Study, the OECD's Program for the International Assessment of Adult Competencies, the European Commission Key Competences for Lifelong Learning (European Commission, 2019; European Communities, 2007), as well as specific models for areas (e.g., health, see Oh et al., 2021) or countries (e.g., India, see Nedungadi et al., 2018).

In Fig. 1, some of the most important milestones on the conceptual story of DL have been collected to provide a general perspective of the field.

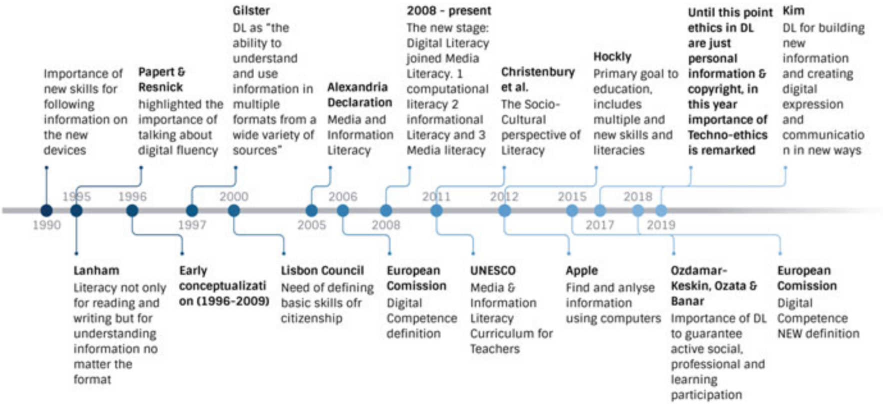


Fig. 1 Timeline for the conceptualization of DL
Note: The dates for the European Union definitions refer to the publication year of the corresponding recommendations (2006 and 2018), being the final publication of the reports a year later, which corresponds to the references cited in the text (European Commission, 2019; European Communities, 2007). This figure has been created based on the information provided by several of the reviews for the conceptualization of DL (Avello Martínez et al., 2013; Canchola-Gonzalez & Glasserman Morales, 2020; Gibson & Smith, 2018; Manca et al., 2021; Perdomo et al., 2020; Reddy et al., 2020; Reis et al., 2019; Reyes & Avello-Martínez, 2021).

DL is considered a situated concept, closely linked to the specific characteristics of people, territories, and historical moments (Avello Martínez et al., 2013; Cetindamar Kozanoglu & Abedin, 2020). At the same time, the way societies understand DL has essential cultural and social connotations (Gonzalez-Martinez et al., 2019). DL is also defined for specific uses, such as the employees' DL (Cetindamar Kozanoglu & Abedin, 2020) or the life-long learners' DL (European Commission, 2019; European Communities, 2007). Both differences and similarities between child and adults' literacy developments exist and should be considered (Esteve-Mon et al., 2020).

The definition of DL may remain elusive and not completely clear. Still, one concept that emerges around the perception and development of the desired levels of DL is the concept of digital fluency. Digital fluency is very popular in institutional implementations and has been included, for example, in the curriculum of New Zealand or Indonesia (Canchola-Gonzalez & Glasserman Morales, 2020). The most cited definition of digital fluency in the specialized literature is the one created by Christian Briggs and Kevin Makice in their 2012 book. This definition refers to the ability to achieve outcomes using digital technology reliably and remarks that a digital fluent person "not only knows what to do with a technology and how to do it but also when and why to use it" (Canchola-Gonzalez & Glasserman Morales, 2020, p. 10). It is worth saying that the concept of fluency appears as an evolving state of literacy, and both fluency and literacy appear to be very close to the notion of competence, a term that is more typically used in Europe (Canchola-Gonzalez & Glasserman Morales, 2020; Dias-Trindade & Ferreira, 2020). The three concepts of fluency, competence, and literacy include knowledge, skills, and attitudes interacting together. Even if they are not exactly the same concepts, they are used interchangeably in the global specialized literature (Arango Morales et al., 2021; Esteve-Mon et al., 2020; Fernandez-Batanero et al., 2020).

It is remarkable that almost every publication about DL, as well as digital fluency, comments on the importance of institutions and other stakeholders providing resources and conditions to support the development of the DL and digital fluency of individuals – what would be called the agency (Eteläpelto et al., 2013; Jääskelä et al., 2017). Furthermore, these publications also discuss the relevance of other people's fluency to enacting personal fluency (Arango Morales et al., 2021; Canchola-Gonzalez & Glasserman Morales, 2020). In this way, the notion of DL is intimately related to people's right to social inclusion, equity, and access to knowledge (Martinez-Bravo et al., 2020).

In sum, taking all this incredible complexity for defining DL into account, it can be concluded that **DL emerges as a notion of situated multiple integrated skills and practices (conceptual, attitudinal, procedural, and ethical) that empower people (individuals and groups) to participate and communicate efficiently in society.** Consequently, DL is a permanently evolving concept within the communicative environment.

Digital Literacy Frameworks in Education

Developing DL in educational contexts is shaped internationally, nationally, and, even in some cases, locally or institutionally, within frameworks that provide concrete dimensions to understand the concept, organize resources around, foster and evaluate individuals regarding DL. The number of frameworks developed in the last 20 years has been enormous.

In the last few years, some initiatives tried to create global frameworks that integrate and summarize all the skills and literacy competencies that anybody on any condition would need to efficiently face the new technological and social moment. The main argument for doing this is that too many frameworks are already developed (see Fig. 2) and that a global one would help to have a better overview and synthesis. However, the problem of some of those initiatives is that, even if they state to include global perspectives – as the collection in Fig. 2, the reality is that most of them do not include any framework developed outside the Western-North context.

Other approaches try to integrate different frameworks to consolidate global approaches that include intercultural perspectives and different individual interests (teachers, students, families, organizations) (Trujillo Sáez et al., 2020).

Nevertheless, with the ambition of mapping the current overview regarding DL, the most used, adapted, well known, and recognized frameworks for understanding DL are presented below. The skill-oriented operational perspective of know-how is the predominant approach in the DL frameworks due to the initial definition of the concept. Nonetheless, DL frameworks present two other perspectives: the plural

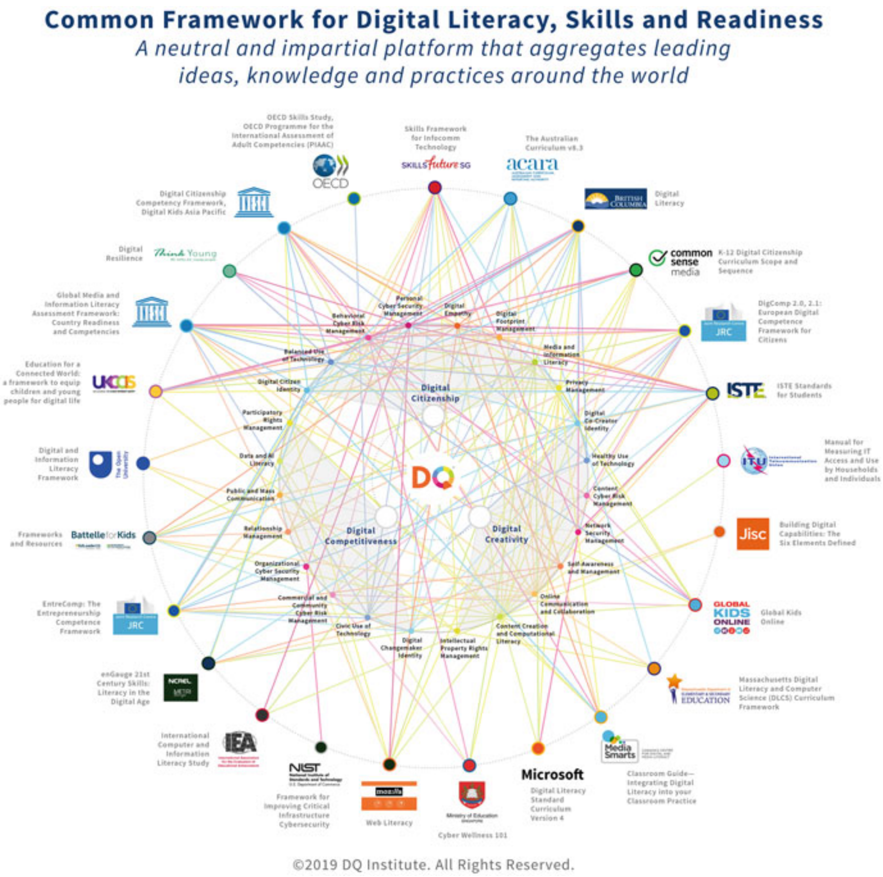


Fig. 2 Collection of 25 DL frameworks developed in the Anglo-Saxon context
Note: With permission of the DQ Institute (https://www.dqinstitute.org/global-standards/). ©2019 DQ Institute

form of DLs that emphasizes the situated nature of the concept and the more critical perspective of digital competence as a reflective approach (Spante et al., 2018).

General Focus (Learners)

With a focus on lifelong learners, the **Digital Competence Framework for Citizens (DigComp)** (https://data.europa.eu/doi/10.2760/38842) developed by the Joint Research Centre (JRC) of the European Commission is the foundation for many other DL frameworks worldwide. The last published version at the moment of writing this book chapter (the 2.1) includes the following five competence areas. Dimension 1 is information and data literacy, communication and collaboration, digital content creation, safety, and problem-solving. The other four dimensions of the framework include competence descriptors and titles (dimension 2), eight proficiency levels for each competence (dimension 3), knowledge, skills, and attitudes applicable to each competence (dimension 4), and examples of the use of the proficiency levels (dimension 5). A new version of the DigComp framework (2.2) is expected to be published in early 2022. In addition, multiple instruments have been developed to measure or evaluate DL using this framework (e.g., SELFIE, for schools: https://ec.europa.eu/education/schools-go-digital_en).

The **Digital Literacy Global Framework (DLGF)** (http://uis.unesco.org/sites/default/files/documents/ip51-global-framework-reference-digital-literacy-skills-2018-en.pdf) developed by UNESCO emphasizes that "sustainable development and cohesion of society critically depend on this new set of digital competencies" (Manca et al., 2021, p. 4). Using as the reference DigComp and looking beyond it through a systematic search for DL frameworks in targeted regions and countries, this framework proposes the following competence areas: (0) hardware and software operations, (1) information and data literacy, (2) communication and collaboration, (3) digital content creation, (4) safety, (5) problem-solving, and (6) career-related competencies. Competence areas (0) and (6) and the competence 5.5 computational thinking within (5) are the novelties concerning DigComp.

With a focus on students, the **International Society for Technology in Education (ISTE) Standards for Students** (https://www.iste.org/standards/for-students) is the United States (US) framework, which is one of the oldest DL frameworks in the world (since 1998, with different names). The framework includes the following standards: (1) empowered learner, (2) digital citizen, (3) knowledge constructor, (4) innovative designer, (5) computational thinker, (6) creative communicator, and (7) global collaborator.

In the context of the United Kingdom (UK) higher education, a review of DL frameworks found three broad areas of supported capability (Littlejohn et al., 2012, p. 6): (1) academic practice or learning skills, (2) information and media literacies, and (3) ICT skills or techno-literacy. For instance, following the Beetham and Sharpe's pyramid model of DL development model (inspired by Maslow's hierarchy of needs), the **Joint Information Systems Committee (JISC) developed a framework for DLs** (http://web.archive.org/web/20141011143516/http://www.jiscinfonet.ac.uk/infokits/digital-literacies/) with the following elements: information, media, data literacy (critical use), digital identity and well-being (self-actualizing), digital creation, scholarship and innovation (creative production), digital communication, collaboration and participation (participating), and digital learning and personal/professional development (learning). This is one of the few well-known DL frameworks developed by organizations that refer to the plurality and situated nature of the concept.

Looking at nonconventional or noninstitutional frameworks, **Selber**'s (2004) **multiliteracies for a digital age** considers three student positions towards technology critical to DL: users, producers, and questioners. Therefore, three filters need to be used to view those positions: functional literacy (effective use, prerequisite for the others), critical literacy (informed critique), and rhetorical literacy (reflective praxis).

Focus on Educators

The DL focus on teachers appears in the literature under other similar terms as digital teaching competence or digital teaching literacy, and its definition, especially with the aim of training and evaluating teachers worldwide, has been a priority in the educational literature over the last years.

Digital teacher competencies are “the set of skills, attitudes and knowledge required by educators to support student learning in a technologically rich world, design and transform classroom practices and enrich their own professional development” (Esteve-Mon et al., 2020, p. 1). In addition, Tarraga-Minguez et al. (2021, p. 1) sustain that the digital teaching competence “is a complex pedagogical concept that involves a series of dimensions and aspects linked to forms of pedagogical representation of technology in the classroom, learning, and teacher training” and this makes it different from DL.

In the systematic literature review on digital teaching competence of university teachers done by Esteve-Mon et al. (2020, p. 401), the authors identify four common areas in the studies they reviewed (n = 43): (1) basic digital skills, (2) the pedagogical application of digital technologies, (3) the use of technology for continuous professional development, and (4) the ability to further digital competencies for university students. Similarly, the review conducted by Starkey (2020) in the context of pre-service teachers, teacher educators, and the initial teacher education programs identified three complementary ways of interpreting digital competence for teachers: (1) generic digital competence, (2) competence to integrate technologies into teaching practice (using technology for teaching), and (3) critical use of technology and teaching children who are using technology, and professional digital competence (teaching, managing the digital learning environment and professional work of being a teacher).

UNESCO developed for the first time their **ICT Competency Framework for Teachers** (https://unesdoc.unesco.org/ark:/48223/pf0000265721) in 2008 and is in its third version at the time of writing this publication. It refers to six aspects of teacher professional practice in any of the three phases of teacher professional development (pre-service, in-service, and on-going formal and informal pedagogical and technical support): (1) understanding ICT in education policy, (2) curriculum and assessment, (3) pedagogy, (4) application of digital skills, (5) organization and administration, and (6) teacher professional learning. These aspects are organized over three successive stages of teacher development regarding ICT: knowledge acquisition, knowledge deepening, and knowledge creation.

The US version of the DL framework for educators is the **ISTE Standards for Educators** (https://www.iste.org/standards/for-educators), with its first version published in 2000, that includes the following standards, considering the educator as: (1) learner, (2) leader, (3) citizen, (4) collaborator, (5) designer, (6) facilitator, and (7) analyst. In the Latin American context, **ENLACES** is the Chilean Framework for Teachers’ Digital Competences (https://bibliotecadigital.mineduc.cl/handle/20.500.12365/2151). ENLACES was one of the first in the geographical area, and that included five dimensions and standards for the teaching profession: educational, technical, management, social and ethical, and professional development and responsibility.

Addressing the needs of lifelong learners, the JRC of the European Commission developed a specific digital competence framework for educators at all levels of education, the **Digital Competence Framework for Educators (DigCompEdu)** (https://doi.org/10.2760/178382). The framework details 22 competencies organized in 6 areas: professional engagement (educators' professional competencies), digital resources, teaching and learning, assessment, and empowering learners (educators' pedagogic competencies), and facilitating learners' digital competence (learners' competencies). DigCompEdu has inspired other framework developments worldwide, especially in the European sphere of influence (north of Africa and East Europe) and in Latin America.

Similarly, Pozos Pérez and Tejada Fernández (2018) identify six digital competencies that university teachers need to develop in order to meet the current needs in their educational contexts: (a) teaching planning and design in virtual environments, (b) development and implementation of collaborative learning experiences, (c) research, development, and pedagogical innovation with/for the use of ICT, (d) orientation, guidance, and evaluation, (e) management of the growth and professional development with ICT support, (f) diversity, ethics, and responsible use of ICT, and (g) environment, health, and work safety with the use of ICT. Each of these competencies can differ in mastery level or complexity degree and relation to steps related to time (integration phases: access, adoption, adaptation, appropriation, and innovation) ranging from non-developed competency to expert level, going through basic, medium, and high level.

Strategies to Foster Digital Literacy in Education

After the statement of frameworks, the second most important concern related to DL is how to foster it across the different educational stages (and actors). In this section, some of the most relevant strategies are presented.

K-12 and Secondary Education

In their review, Gibson and Smith (2018) found that children develop a mobile literacy – DL regarding the use of mobile phones and tablets – through implicit and explicit scaffolding by their parents and other family members from an early age. The same authors highlight the importance of critical DL, to develop skills to critically examine digital texts and make connections at school against the backdrop of the increase of fake news and the wealth of information available online. Strategies that teachers can apply to do it include: aiding in what young students need to know and where they can find the information, giving time to discuss texts and the choices of their authors, and analyzing practice to explore connections and own online relationships (Gibson & Smith, 2018). These practices, empower children through participation with others. Accordingly, Kirchoff and Cook (2017) propose digital comics as a way to introduce students to (critical) DL skills, accomplished by skills, accomplished by reading digital texts and creating three types of comics with different digital platforms, coupled with Selber's (2004) framework (functional, critical, and rhetorical literacy development within a digital context).

Also emphasizing the teacher's role, Hadjerrouit (2010) presents a theoretical framework to foster DL in school education by training teachers to design and critically evaluate digital learning resources. The two main factors impacting this action are pedagogical usability and cultural usability (students' preferred choices and ways of learning). Regarding pedagogical usability, the curriculum must integrate DL in all subjects in a goal-oriented way, so that it deeply affects teachers' pedagogy, shifting to constructivist or learner-centered methods (Hadjerrouit, 2010). Also, digital learning resources should add value to the learning process when compared to other materials, and teachers must be made aware that ICT is not value-neutral.

Higher Education

Research of DL in the context of higher education has been extensively done with undergraduate students, especially focusing on their perception and level of DL (Zhao et al., 2021). On the other hand, few studies focus on the pedagogical approaches to foster DL. Those that do generally emphasize teacher education.

The study in the context of UK higher education based on a literature review and an empirical study by Littlejohn et al. (2012) describes three modes of professional services offered to students: modular, freestanding resources to be studied flexibly; outreach, digitally literate individuals acting as ambassadors; and integrated, as a digital and learning skills program. The same authors highlight important considerations for designing strategies that foster DL in higher education. For instance, learners' control and ownership of technologies boosts their confidence to engage in learning; nevertheless, a variety of learners' technological skills and practices needs to be considered. In addition, findings from Littlejohn et al. (2012, p. 8) point towards the need for the process of teaching and learning that includes authentic tasks that suitably integrate digital technologies, time to explore digital academic and professional practices; consideration of the construction of academic communication through media; and recognition of previous student learning practices as resources for learning. In order to support students take ownership of search for information in their academic field, higher education institutions could shorten the duration length of their information make this search shorter and efficient. This could be done through open access journals and open education resources and providing information literacy strategies (Gibson & Smith, 2018).

For the specific, well-researched, context of teacher education programs, there are different approaches to develop DL, especially focusing on the future role of these students in schools (Starkey, 2020): including a course on technology integration, offering pedagogical tools for teaching and learning as subject specific, and by integrating DL in all subjects. Also, as the author highlights, “developing expertise in generic competencies can occur when technology is embedded in the broader educational and societal context that student teachers and teacher educators have experienced” (Starkey, 2020, p. 13). Multiple studies in this context show that pre-service teachers have developed some technical skills but not the required competence to digitally enrich the teaching-learning processes (Tarraga-Minguez et al., 2021). Howard et al. (2021) suggest an integrated approach to teaching strategies to develop digital competence in teacher education based on the Synthesis of Qualitative Evidence model (SQD), which includes six teaching strategies: (1) teacher educators as role models, (2) opportunities for reflection, (3) learning by design, (4) collaboration, (5) authentic experiences, and (6) providing feedback. Based on data from a validated SQD-scale concerning 931 pre-service teachers from Belgium, Howard et al. (2021) identified four clusters that integrated the six teaching strategies, with a clear greater importance of teacher educators as role models, learning by design and authentic experiences.

To develop critical DLs, academics and teaching staff must explore and share educational approaches (Littlejohn et al., 2012). For example, self-regulated learning strategies and domains such as metacognitive knowledge, resource management, and motivational beliefs are useful to foster DL in higher education and lifelong learning (Anthonysamy et al., 2020). Also, librarians can play an important role supporting DL among faculty and students through novel educational techniques. They may develop tools to support students’ interaction in the institutional learning spaces or support faculty in creating course curriculum (Kenton & Blummer, 2010).

Vocational Education

According to a European report on the Vocational Educational Training (VET) sector and its connection to digital competencies (Broek & Buiskool, 2020), the latter are usually best embedded in training delivery but less embedded in learning outcomes and assessment since they are not a formal requirement. Nevertheless, these competencies are considered essential and regarded as transversal in the learning process. However, the same report observes that the most significant impact of policies is on the teacher’s digital competence, encouraging teachers to work with digital technologies in education.

An example is the European project EVET2EDU (2012–2014), which aimed to support VET teachers in developing competencies to use eLearning with their students and created a task-based learning online course to do so (Gutiérrez et al., 2017). The authors’ report on the course implementation results, demonstrating the improvement of both pedagogical skills and technical skills (89% and 83% of the participants, respectively).

Some countries, at least in the European and Latin American areas, have implemented some modalities of VET that include training at work. In those approaches, the development of DL appears more and more connected with the integration of digital processes and routines in the workplace (Naji, 2018). These routines do not just affect the formal training of students, but they also affect day-to-day work.

Other initiatives have opted for more global perspectives, such as IKANOS (https://ikanos.eus/en/), an initiative of the Basque Government (Spain) focused on digital competencies that has been especially concerned about DL of workers and students of VET. This initiative developed a methodology to create holistic support on DL, not only for VET students but also for employees. This methodology ranges from raising awareness of the importance of DL for work through DL self-assessment, diagnosis of how to improve DL, and the creation of specific training programs for students, employees, and trainers, not only in generic digital skills but also in digital skills for learning.

Continuing Education

This section refers specifically to the professional development of educators. Unfortunately, there is little reference to continuing education in other professions within the DL literature base.

Pozos Pérez and Tejada Fernández (2018) suggest that digital competence should be considered as a continuous, recurrent, and gradual process for higher education instructors. Also, "pedagogical training is crucial for adequate digital competence of university teachers" (Esteve-Mon et al., 2020, p. 403). However, it is important to balance technical and pedagogical knowledge, both of which are needed to properly solve problems (Perdomo et al., 2020). The same latter authors observe that educators also need assistance to develop metacognition about their same competencies.

Lifelong Learning

The link between theory and practice for DL research in the context of working adults as lifelong learners is not broad.

However, adults are one of the groups that is increasingly taken into account in initiatives to improve DL (Flauzino et al., 2020). Adults are a large and diverse group, including workers, nonworking family members, seniors (older people, some of them retired), and any other type of person that is not covered by other initiatives. This group is not a collective because of their diverse characteristics and contexts. Still, their need to adapt to contemporary digital requirements may be higher than for the rest of the population; some of them have experienced the entire communicative revolution of the last 50 years. Therefore, they need to be able not only to enact their participative citizenship in the new technological moment, but also to set an example for their families (Costa et al., 2015).

In the LIDIA "Literacia Digital de Adultos" project (started in 2014, http://lidia.ie.ulisboa.pt/), some of the project's initiatives focus on the development of materials to be used by educators and trainers who work with adults. In other projects, such as the Initiative Faro Digital (https://farodigital.org/, an NGO that develops DL in Latin

America), the work involves publishing guides for improving specific skills and capabilities. Current projects and initiatives address an increasingly important literacy within DL for citizenship: data literacy (e.g., DALI: https://slate.uib.no/projects/data-literacy-for-citizenship). In addition, many countries have started national programs that integrate DL in the whole infrastructure of citizen services. This is the case in New Zealand, where a strategy for empowering every person in the country to actively participate in the digital world has been developed (https://2020.org.nz/). This strategy includes training for trainers and educators, a digital inclusion map (https://digitalinclusion.nz/) to improve the awareness about the need for inclusion in some zones of the country, as well as specific resources in libraries and other community development centers (https://natlib.govt.nz/schools/digital-literacy), among other initiatives.

For the specific case of workers, Oberlaender et al. (2020, p. 13) define digital competencies at work as “a set of basic knowledge, skills, abilities, and other characteristics that enable people at work to efficiently and successfully accomplish their job tasks regarding digital media at work.” Focusing on white-collar workers with office jobs, the same authors identified basic (i.e., needed for everyday tasks) and workplace-specific digital competencies, which also depend on external factors such as the structure and size of the work tasks, and the company’s background. Suggested strategies to foster DL in education for the workplace include enhancing talent management programs based on specific digital competencies needed in the workplace (Oberlaender et al., 2020).

Challenges and Future Research

One of the most significant challenges regarding DL is the immense diversity of perspectives about what digital is and what literacy implies. These issues have been mentioned in the various reviews included in this chapter. Therefore, facing DL as a multiple and diverse situated concept must be an achievable goal; trying to identify, more than a global definition of DL, a globally situated framework that would be localized on the different realities of people, as different authors suggest (Avello Martínez et al., 2013; Gonzalez-Martinez et al., 2019).

A common critique of many of the DL frameworks that have been developed so far, and that are included in this book chapter, is that they usually focus on the autonomous and universalist understanding of the DL. Under this perspective about DL, all learners are to be equipped with an uniform set of functional and technical skills so that they can start reading and writing in digital media (Manca et al., 2021). It seems essential to rethink DL frameworks from a more comprehensive perspective, considering the situated nature of DL and taking a proactive standpoint on the development of DL.

As Canchola-Gonzalez and Glasserman Morales (2020) assert, most conceptual approaches to digital fluency, competence, and literacy are from authors from North America and Europe. There are very few conceptual approaches from authors located in regions of Latin America or Africa. However, these regions have a high level of interest in the topics. Still, nearly half of the reviews included in this chapter (15 out of 33) were led by Spanish-speaking authors, even if only four of the reviews were written in Spanish, and just two other reviews were originally written in Portuguese. This observation highlights an opportunity to open the perspective about DL and contribute to the discussion process and developing thinking regarding DL to integrate knowledge from different cultural and local realities where technology has a different process of implementation, participation, enactment, and appropriation (Manca et al., 2021).

In addition to this, digital practices are present in people's daily lives, especially in screen reading and writing, and in learners' academic lives. As a result, digital literacy can be considered a social practice linked to peoples' day to day lives (Cetindamar Kozanoglu & Abedin, 2020; de Paulo Moura, 2019). DL implies both the appropriation of new languages of the digital medium and related social practices, uniting various media, resources, interfaces, genres, and digital languages. Therefore, DL cannot be conceived just as an academic term to study or as a skill for children or young people, but rather as a reality that intervenes in the daily life of employees, adults, seniors, and families.

Because of its prevalence in everyday life, DL should actively included in the curriculum at every level, in an active way – not just in a transversal way (Hadjerrouit, 2010). The approach to DL education must include not only the instrumental use of digital tools but also the use of digital languages and codes for communicating, for assessing, as well as for understanding the world (de Paulo Moura, 2019; Guardia et al., 2017; Littlejohn et al., 2012). Furthermore, it is important to remark the relevance of effectively integrating DL into different disciplines and subjects, to be able to adapt the DL education to different curricula and organization structures (Guardia et al., 2017), and guarantee the transference of digital capabilities among different contexts (Littlejohn et al., 2012).

In addition, DL is no longer considered an individual issue, rather it is viewed as a collective need. People work and learn in groups, with others, and DL must be a crucial component and an enhancing factor of this shared approach. Therefore, DL should not only be used to make the interaction more fluent but also as a collective competence for empowering groups (Manca et al., 2021). This more generic, but at the same time much more profound perspective, reinforces the significance of both literacy practices and pedagogical practices; both enable new power relations between subjects and with knowledge. Consequently, highlighting profound critical approaches to DL is important in order to emphasize the DL critical component, when understanding and addressing DL (de Paulo Moura, 2019; Kirchoff & Cook, 2017).

Another challenge concerns the interest in developing instruments for efficiently evaluating the DL performance, not just self-perceptions (Perdomo et al., 2020). Even though this lack of appropriate instruments to evaluate DL, the vast majority of authors agree that the greater number of studies are focused on defining the limits of DL to measure and evaluate it, rather than on developing it

(Cetindamar Kozanoglu & Abedin, 2020). Therefore, even though research focuses on the importance of effectively evaluating DL, and many authors are still collecting self-report data, especially from undergraduate students (Zhao et al., 2021). This situation represents a paradox given that authors agree that fostering DL is a highly important issue.

In the case of the approaches that try to improve the DL in institutions and at every educational level, the most common perspective is the understanding of DL as an individual quality that resides in the brain of people (Cetindamar Kozanoglu & Abedin, 2020). For expanding this individual and generalist notion of DL, theories such as the affordance theory or the socio-material theories regarding entanglements (Frauenberger, 2020) would be especially useful. The institutional improvement of DL is considered as something that depends only on the individual effort of the institutional members for improving their own DL. Consequently, the prevailing perspectives ignore the importance of the institutional conditions and resources for people that must be guaranteed to enact the DL; in other words, the relevance of the Agency regarding DL (Castañeda et al., 2022). Only some projects, such as the European project CUTE "Competencies for Universities using Technology in Education" (https://cute.ku.dk/), include the strategic approach to foster the DL as a crucial perspective for holistic development of DL in higher education institutions.

Probably one of the most obvious challenges regarding DL is the one concerning the digital divide. The COVID-19 crisis, and the lockdowns that closed on-site activity in educational institutions and jobs worldwide, faced every society with a desolating scenario of digital exclusion that is even more devastating in some zones of the world that are also traditionally excluded from the intellectual debates. The importance of opening the discourses about DL to voices from other realities that enrich the perspectives about what DL is and how it is developed over the world has been already mentioned. But it is not just a question of discourse and debate, one of the most problematic challenges regarding DL is how to increase DL around the world by being aware about the local approaches. Increasing DL everywhere, considering what citizenry means in each context; the empowerment of governments, societies, and people worldwide, for enacting the DL and maintaining their sovereignty to take decisions about the digital. Unfortunately, it seems that at the moment the only interested parties are companies that are investing a lot of money in implementing technology at some points, or for replacing the national educational systems with remote schools systems based on developing countries (Selwyn, 2018).

Finally, as DL evolves, the importance of understanding the ethical, political, and social dimensions of DL has increased. Renewed definitions of DL and digital competence (as the 2018 of the EU) highlight the importance of citizenship empowerment over the instrumental literacy approach. These new, more ethical approaches, are also being included in teachers' DL frameworks that highlight the importance of the social commitment and the community empowerment as a desirable goal of DL in education (Castañeda et al., 2018).

Conclusion

The world has increasingly become more digital. Indeed, some authors prefer to consider the current situation as a post-digital situation, where "digital" (tools, processes, influence) is everywhere and nothing is "normal" without being digital (de Laat & Bonderup, 2019). In this changeable scenario of the last 30 years, the ambition of DL, as a relevant notion within open, distance, and digital learning, has changed enormously, becoming ever more complex, precisely because the human relationship with technology is also much more complicated.

Technology is not just a set of tools for doing specific things anymore. Technology is a way of thinking, is an incredible market, is a scenario of political debate and fight, is a part of human nature, and is a reality that configures existence in many ways. Technology configures human physical reality to the realities of human relationships (families, love, friendship) until human realities as citizens. Therefore, the ambition of a DL that helps us enact participatory citizenship has changed. In sum, it is time to continue working on DL, especially to further explore how DL can be more fully integrated in teaching and learning contexts.

DL, with all of its different names (i.e., competence, fluency, and so on), has become one of the most transversal competencies. It is an area of increasing interest in open, distance, and digital learning research, as can be seen from the significant number of reviews on the topic. DL is necessary to support both communication and participation as a citizen in contemporary society. In this way, the following suggestions focus on the goal of increasing DL for everyone, with clear implications for open, distance and digital education. First, DL should reshape the contents, subjects, and organizations to the digital moment of schools and educational institutions. Second, at institutions and strategic bodies, a collective effort is needed to develop conditions and resources that support DL. The focus of these initiatives must aim beyond improving digital literacy among individuals, addressing how the education sector can foster the conditions for DL. Finally, for the DL field, the efforts must be concentrated on enriching the global discourse, encouraging diversity in debates, reshaping the contexts of discussions, and integrating minorities and nontraditional contexts and realities.

Above all, the ethical approaches to DL represent the next big step. In a world becoming increasingly datafied, where EdTech moves a billionaire market (Williamson & Hogan, 2021), the determination of how DL is defined, developed, and protected for the citizenry is more relevant than ever. This shift on the definition of DL highlights the importance of a multiple literacies' conception rather than a monolithic one. In addition, this turn speaks to the significance of the critical vision about the human's role in this new world with technology; it means not only how to participate/communicate but also how to enact the human role to its full extension.

Acknowledgments Victoria I. Marín acknowledges the support of the Grant RYC2019-028398-I funded by MCIN/AEI/ 10.13039/501100011033 and FSE "El FSE invierte en tu futuro." Linda Castañeda acknowledges the partial support of the project "Data Competency for Citizenship" DALI, an ERASMUS+ Strategic Partnership (KA204-076492), funded by the European Union.

References

Anthonysamy, L., Koo, A. C., & Hew, S. H. (2020). Self-regulated learning strategies in higher education: Fostering digital literacy for sustainable lifelong learning. *Education and Information Technologies, 25*(4), 2393–2414. https://doi.org/10.1007/s10639-020-10201-8.

Arango Morales, A. J., Tamayo Salcedo, A. L., & Delgado Cruz, A. (2021). Digital competence and professional training in tourism. A literature review. *Cpu-E Revista De Investigación Educativa, 32*, 62–87. https://doi.org/10.25009/cpue.v0i32.2734.

Avello Martínez, R., López Fernández, R., Cañedo Iglesias, M., Álvarez Acosta, H., Granados Romero, J., & Obando Freire, F. (2013). Evolución de la alfabetización digital: Nuevos conceptos y nuevas alfabetizaciones. *MediSur, 11*(4), 450–457. http://ref.scielo.org/jbj78y

Broek, S., & Buiskool, B.-J. (2020). *Adapting the SELFIE tool for work-based learning systems in vocational education and training: A feasibility study*. European Commission. Joint Research Centre. Retrieved from https://data.europa.eu/doi/10.2760/934724

Canchola-Gonzalez, J. A., & Glasserman Morales, L. D. (2020). Digital fluency concept: A systematic review of literature 2010–2020. *Texto Livre-Linguagem E Tecnologia, 13*(3), 25–46. https://doi.org/10.35699/1983-3652.2020.25087.

Castañeda, L., Esteve, F., & Adell, J. (2018). ¿Por qué es necesario repensar la competencia docente para el mundo digital? *Revista de Educación a Distancia (RED), 56*. https://doi.org/10.6018/red/56/6.

Castañeda, L., Esteve-Mon, F., & Postigo-Fuentes, A. Y. (2022). Digital teaching competence development in higher education: key elements for an institutional strategic approach. In R. Sharpe, S. Bennett, & T. Varga-Atkins (Eds.), *Handbook for digital higher education* (pp. 286–298). Edward Elgar Publishing.

Cetindamar Kozanoglu, D., & Abedin, B. (2020). Understanding the role of employees in digital transformation: Conceptualization of digital literacy of employees as a multi-dimensional organizational affordance. *Journal of Enterprise Information Management, 34*(6), 1649–1672. https://doi.org/10.1108/JEIM-01-2020-0010

Costa, F. A., Viana, J., Cruz, E., & Pereira, C. (2015). Digital literacy of adults education needs for the full exercise of citizenship. *International Symposium on Computers in Education (SIIE), 2015*, 92–96. https://doi.org/10.1109/SIIE.2015.7451655.

da Silva, K. K. A., & Behar, P. A. (2019). Competências digitais na educação: Uma discussão acerca do conceito. *Educação Em Revista, 35*, e209940–e209940. https://doi.org/10.1590/0102-4698209940.

de Laat, M., & Bonderup, N. (2019). Is networked learning postdigital education? *Postdigital Science and Education, 1*(1), 17–20. https://doi.org/10.1007/s42438-019-00034-1.

de Paulo Moura, K. M. (2019). Systematic Review on Digital Literacy in Teacher Training. *Texto Livre-Linguagem E Tecnologia, 12*(3), 128–143. https://doi.org/10.17851/1983-3652.12.3.128-143.

Dias-Trindade, S., & Ferreira, A. (2020). Competências digitais docentes: O DigCompEdu CheckIn como processo de evolução da literacia para a fluência digital. *Icono, 14*(18), 162–187. https://doi.org/10.7195/ri14.v18i1.1519.

Esteve-Mon, F. M., Llopis-Nebot, M. A., & Adell-Segura, J. (2020). Digital teaching competence of university teachers: A systematic review of the literature. *IEEE Revista Iberoamericana de Tecnologías Del Aprendizaje, 15*(4), 399–406. https://doi.org/10.1109/RITA.2020.3033225.

Eteläpelto, A., Vähäsantanen, K., Hökkä, P., & Paloniemi, S. (2013). What is agency? Conceptualizing professional agency at work. *Educational Research Review, 10*, 45–65. https://doi.org/10.1016/j.edurev.2013.05.001.

European Commission. (2019). *Key competences for lifelong learning*. Publications Office. Retrieved from https://data.europa.eu/doi/10.2766/569540

European Communities. (2007). *Key competences for lifelong learning*. Office for Official Publications of the European Communities.

Fernandez-Batanero, J. M., Montenegro-Rueda, M., Fernandez-Cerero, J., & Garcia-Martinez, I. (2020). Digital competences for teacher professional development. *Systematic review. European Journal of Teacher Education, 40*(4), 1–20. https://doi.org/10.1080/02619768.2020.1827389.

Flauzino, K. d. L., Pimentel, M. d. G. C., Batistoni, S. S. T., Zaine, I., Vieira, L. O. B., Rodrigues, K. R. d. H., & Cachioni, M. (2020). Digital literacy for older adults: Perceptions about teaching-learning. *Educação & Realidade, 45*(4), e104913. https://doi.org/10.1590/2175-6236104913.

Frauenberger, C. (2020). Entanglement HCI the next wave? *ACM Transactions on Computer-Human Interaction, 27*(1), 1–27. https://doi.org/10.1145/3364998.

Gibson, P. F., & Smith, S. (2018). Digital literacies: Preparing pupils and students for their information journey in the twenty-first century. *Information and Learning Sciences, 119*(12), 733–742. https://doi.org/10.1108/ILS-07-2018-0059.

Gonzalez-Martinez, J., Esteban-Guitart, M., Rostan-Sanchez, C., Serrat-Sellabona, E., & Estebanell-Minguell, M. (2019). What's up with transmedia and education? A literature review. *Digital Education Review, 36*, 207–222. https://doi.org/10.1344/der.2019.36.207-222

Guardia, L., Maina, M., & Julia, A. (2017). Digital competence assessment system: Supporting teachers with the CRISS platform. In V. Strahonja & V. Kirinic (Eds.), *Proceedings of the central European conference on information and intelligent systems* (pp. 77–82). Faculty of Organization and Informatics Varazdin.

Gutiérrez, I., Sánchez, M. M., Castañeda, L., & Prendes, P. (2017). Learning e-learning skills for vocational training using e-learning: The experience piloting the (e)VET2EDU project course. *International Journal of Information and Education Technology, 7*(4), 301–308. https://doi.org/10.18178/ijiet.2017.7.4.885.

Hadjerrouit, S. (2010). A theoretical framework to Foster digital literacy: The case of digital learning resources. In N. Reynolds & M. Turcsányi-Szabó (Eds.), *Key competencies in the knowledge society* (pp. 144–154). Springer. https://doi.org/10.1007/978-3-642-15378-5_14.

Howard, S. K., Tondeur, J., Ma, J., & Yang, J. (2021). What to teach? Strategies for developing digital competency in preservice teacher training. *Computers & Education, 165*, 104149. https://doi.org/10.1016/j.compedu.2021.104149.

Jääskelä, P., Poikkeus, A.-M., Vasalampi, K., Valleala, U. M., & Rasku-Puttonen, H. (2017). Assessing agency of university students: Validation of the AUS scale. *Studies in Higher Education, 42*(11), 2061–2079. https://doi.org/10.1080/03075079.2015.1130693.

Kenton, J., & Blummer, B. (2010). Promoting digital literacy skills: Examples from the literature and implications for academic librarians. *Community & Junior College Libraries, 16*(2), 84–99. https://doi.org/10.1080/02763911003688737.

Kirchoff, J., & Cook, M. P. (2017). Using digital comics to develop digital literacy: Fostering functionally, critically, and rhetorically literate students. *Texas Journal of Literacy Education, 5*(2), 117–129. Retrieved from https://files.eric.ed.gov/fulltext/EJ1162692.pdf

Littlejohn, A., Beetham, H., & McGill, L. (2012). Learning at the digital frontier: A review of digital literacies in theory and practice. *Journal of Computer Assisted Learning, 28*(6), 547–556. https://doi.org/10.1111/j.1365-2729.2011.00474.x.

MacLure, K., & Stewart, D. (2016). Digital literacy knowledge and needs of pharmacy staff: A systematic review. *Journal of Innovation in Health Informatics, 23*(3), 840–840. https://doi.org/10.14236/jhi.v23i3.840.

Manca, S., Bocconi, S., & Gleason, B. (2021). 'Think globally, act locally': A glocal approach to the development of social media literacy. *Computers & Education, 160*, 104025. https://doi.org/10.1016/j.compedu.2020.104025.

Martinez-Bravo, M.-C., Sadaba-Chalezquer, C., & Serrano-Puche, J. (2020). Fifty years of digital literacy studies: A meta-research for interdisciplinary and conceptual convergence. *Profesional De La Informacion, 29*(4), e290428. https://doi.org/10.3145/epi.2020.jul.28.

Naji, M. J. (2018). Industria 4.0, competencia digital y el nuevo Sistema de Formación Profesional para el empleo. *Relaciones Laborales y Derecho del Empleo, 6*(1) Retrieved from http://ejcls.adapt.it/index.php/rlde_adapt/article/view/555.

Nedungadi, P. P., Menon, R., Gutjahr, G., Erickson, L., & Raman, R. (2018). Towards an inclusive digital literacy framework for digital India. *Education + Training, 60*(6), 516–528. https://doi.org/10.1108/ET-03-2018-0061.

Nichols, T. P., & Stornaiuolo, A. (2019). Assembling "digital literacies": Contingent pasts, possible futures. *Media and Communication, 7*(2), 14–24. https://doi.org/10.17645/mac.v7i2.1946.

Oberlaender, M., Beinicke, A., & Bipp, T. (2020). Digital competencies: A review of the literature and applications in the workplace. *Computers & Education, 146*, 103752. https://doi.org/10.1016/j.compedu.2019.103752.

Oh, S. S., Kim, K.-A., Kim, M., Oh, J., Chu, S. H., & Choi, J. (2021). Measurement of digital literacy among older adults: Systematic review. *Journal of Medical Internet Research, 23*(3). https://doi.org/10.2196/28211.

Perdomo, B., Alberto Gonzalez-Martinez, O., & Barrutia Barreto, I. (2020). Digital competences in faculties: A systematic review. *Edmetic, 9*(2), 92–115. https://doi.org/10.21071/edmetic.v9i2.12796.

Pozos Pérez, K. V., & Tejada Fernández, J. (2018). Competencias Digitales en Docentes de Educación Superior: Niveles de Dominio y Necesidades Formativas. *Revista Digital de Investigación en Docencia Universitaria, 12*(2). https://doi.org/10.19083/ridu.2018.712.

Reddy, P., Sharma, B., & Chaudhary, K. (2020). Digital literacy: A review of literature. *International Journal of Technoethics, 11*(2), 65–94. https://doi.org/10.4018/IJT.20200701.oa1.

Reis, C., Pessoa, T., & Gallego-Arrufat, M. J. (2019). Literacy and digital competence in higher education: A systematic review. *Redu-Revista De Docencia Universitaria, 17*(1), 45–58. https://doi.org/10.4995/redu.2019.11274.

Reyes, C. E. G., & Avello-Martínez, R. (2021). Alfabetización digital en la educación. Revisión sistemática de la producción científica en SCOPUS. *Revista de Educación a Distancia (RED), 21*(66), 21. https://doi.org/10.6018/red.444751.

Selber, S. A. (2004). *Multiliteracies for a digital age*. Southern Illinois University Press.

Selwyn, N. (2018). Technology as a focus of education policy. In R. Papa & S. W. J. Armfield (Eds.), *The Wiley handbook of educational policy* (pp. 457–477). Wiley. https://doi.org/10.1002/9781119218456.ch20.

Spante, M., Hashemi, S. S., Lundin, M., & Algers, A. (2018). Digital competence and digital literacy in higher education research: Systematic review of concept use. *Cogent Education, 5*(1), 1519143. https://doi.org/10.1080/2331186X.2018.1519143.

Starkey, L. (2020). A review of research exploring teacher preparation for the digital age. *Cambridge Journal of Education, 50*(1), 37–56. https://doi.org/10.1080/0305764X.2019.1625867.

Tarraga-Minguez, R., Suarez-Guerrero, C., & Sanz-Cervera, P. (2021). Digital teaching competence evaluation of pre-service teachers in Spain: A review study. *Ieee Revista Iberoamericana De Tecnologias Del Aprendizaje-Ieee Rita, 16*(1), 70–76. https://doi.org/10.1109/RITA.2021.3052848.

Trujillo Sáez, F., Álvarez Jiménez, D., Montes Rodríguez, R., Segura Robles, A., & García San Martín, J. M. (2020). *Learning and educating in the digital age: Frames of reference*. ProFuturo. Retrieved from https://profuturo.education/en/reference-framework/.

Williamson, B., & Hogan, A. (2021). *Pandemic Privatisation in Higher Education: Edtech & University Reform*. Education International. https://eprints.qut.edu.au/216578/

Zhao, Y., Pinto Llorente, A. M., & Sánchez Gómez, M. C. (2021). Digital competence in higher education research: A systematic literature review. *Computers & Education, 168*, 104212. https://doi.org/10.1016/j.compedu.2021.104212.

Future Skills as New Currency for the World of Tomorrow

64

Ulf-Daniel Ehlers

Contents

Abstract

In a rapidly changing world, the discussion on Future Skills is one of the most topical in educational research. The discussion on Future Skills has been going on for a long time (starting with studies on graduate attributes), is often intangible due to conceptual ambiguity about what skills actually are, and often only refers to digital Future Skills in a reduced way. The research presented here is based on a sound empirical approach, the multi-method, and multi-part NextSkills studies. The intention of the project is to explore the demand for specific Future Skills in more detail and then, in a second step, to substantiate them in terms of educational theory. These Future Skills are classified by the "Future Skills Triple Helix-Model of Capacity to Act in Emergent Practical Contexts." More specifically, these are skills such as ambiguity competence, ethical competence, self-competence, and others.

U.-D. Ehlers (✉)
Baden-Wurttemberg Cooperative State University, Stuttgart, Germany
e-mail: ulf-daniel.ehlers@dhbw-karlsruhe.de

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_65

Keywords

Change in higher education · Future Skills · Triple Helix · Education research · Skills development · Delphi study

Future Skills: Guiding Principles of a New Educational Concept for Higher Education Institutions

In this chapter, we define Future Skills as competences that enable individuals to solve complex problems in a self-organized manner and to act (successfully) in highly emergent contexts. They are based on cognitive, motivational, volitional, and social resources, are value-based, and can be acquired in a learning process. In the public discussion on higher education concepts, they have meanwhile contributed to a decisive change, which we refer to here as the Future Skills Turn (Ehlers, 2020a, b). It is the subject of the research presented here to address and grasp its implications for the conception of future higher education. As a concept, Future Skills has gained an influence similar to that which emanated from concepts such as equal opportunities or science orientation in the 1970s. Such leading brands do not appear as precisely tailored and empirically operationalized concepts, but rather as conceptual condensations of broadly diversified bundles of arguments and objectives (Placke & Schleiermacher, 2018; Ehlers, 2020a, b).

The starting point for the enormous career of the concept of Future Skills is the diagnosis that current concepts of higher education do not confront the pressing challenges of our societies with convincing concepts for the future (Hippler, 2016; Kummert, 2017) – neither the sustainable design of our environment nor the related social or economic challenges. While societal problem situations are exacerbated by a constantly accelerating globalization process and ever faster digital progress, it is precisely here that we find the forces of enabling a multitude of new options for human development. In this situation of digital acceleration, the characteristic feature is that of uncertainty and the inescapable necessity is that of creative responsibility. For the future is unpredictable and we cannot forecast it, but we must be prepared to shape it.

Children who enter primary schools next year will go on to vocational training or higher education in 10–12 years and in 15 years will be the ones who begin to shape our society as young professionals. We know little about this future. In 2060–2065 they will in all likelihood stop working. We know nothing about this future. Our schools must prepare them for jobs that do not exist today, for technologies, apps, and applications that have not been invented today, for living in a society whose structures we cannot foresee today, and for dealing with challenges that are not yet apparent today. It is the responsibility of all of us to make the best of the possibilities and to find ways to deal with this uncertain future. This is about nothing more and nothing less than the preservation of our planet and our livelihoods.

Solving societal problems such as those associated with climate change, the challenges of migration that will increase in the future, the conflicts that arise from populist concepts of society and politics, and the associated question of the future of democracy – all of this require the ability to develop new and previously unknown approaches, to take new paths and to relate previously unconnected things to each other in new ways. In education and science, this will only succeed if we work in the best sense of inter- and transdisciplinary ways to bring together, critically reflect on, and relate to each other the solution contributions of each discipline and science. Higher education institutions find it difficult to do this – because they all share a common handicap: the history of science, research, and thus also of higher education is a history of differentiation, specialization, and delimitation of disciplines. The almost 18,000 degree programs offered at German higher education institutions bear witness to this (Hachmeister, 2017). The institution of higher education is faced with the challenge of reinventing itself – at a time when it is undergoing an enormous growth process and a rate of 70 percent higher education students of one age cohort or more is predicted worldwide by the year 2050. That's a bit like having to change pilots in a car race, in the middle of a steep curve and during a dangerous overtaking maneuver. Higher education institutions must address the question of what Future Skills the graduates of tomorrow will need and how they can support them in acquiring them. To do this, it is first necessary to describe these Future Skills in terms of educational theory – and this can be done using the Future Skills Triple Helix Model, which was developed within the framework of the Next Skills Studies (www.nextskills.org) (Ehlers, 2020a, b).

Research Design

The research project NextSkills aims to analyze which skills are needed for a productive and proactive design of future work contexts in order to derive requirements for higher education institutions. To this end, Future Skills profiles were identified in a multi-step research process:

1. Identification of Future Organizations: In a first step, organizations were identified that already had explicit experience in the implementation of competence models, ideas about Future Skills, and a high degree of maturity in the design of future work contexts. For this purpose, so-called Future Organizations were identified as an empirical field, which had developed suitable contexts for the identification of Future Skills. The selection process took place in 2015 as part of a competition in which more than 8500 partner organizations of the Baden-Wuerttemberg Cooperative State University were contacted and given the opportunity to submit their human resources development concepts and, in particular, their concepts for the supervision and support of students. 124 organizations took part in the competition. All submitted concepts were evaluated in a criteria-based expert rating. The resulting ranking was then discursively validated in a discussion by 15 experts and 20 organizations and their competence concepts were selected for a shortlist. All 20 organizations were invited to participate in the next

step of the NextSkills study, 17 responded positively and were included in the interview study. The interviews took place between December 2016 and June 2017.

2. Interview study: Guiding questions were developed for the interview study, which were used for orientation within the framework of an open, semi-structured, problem-based in-depth interviews. Participants of the interviews were the HR managers of the organizations and partly also the students who studied there in the context of (dual) study programs. A total of 17 in-depth interviews were conducted, in which 20 people participated and which resulted in about 700 minutes of qualitative interview material. The interviews were transcribed verbatim and independently coded by two researchers using the inductive coding technique (Mayring, 1996; Thomas, 2006) using MaxQDA software (VERBI Software, 2017). Constructs were extracted from the interview data to reconstruct contexts, values as well as processes, and dependencies for skills considered important in the future for individuals.
3. International Delphi study: In order to further refine and validate the qualitatively acquired results, a Delphi study was conducted with an international panel of experts. The Delphi study (for Delphi methodology see Dalkey and Helmer, 1963) entitled "Future Skills – Future Learning and Future Higher Education" (Ehlers & Kellermann, 2019) comprised two rounds of interviews. Fifty-three international experts from different organizations and institutions were invited to participate in the study (ibid.).

Future Skills for the World of Tomorrow

The higher education of the future must be oriented toward teaching Future Skills. This is shown by the results of the NextSkills study. Based on the in-depth interviews and the assessment of the experts surveyed worldwide, 17 skill profiles were constructed that are important for future higher education graduates. Each skill profile consists of a bundle of individual competences, so-called reference competences. Skill profiles are clusters of future-relevant skills. They are in turn divided into three so-called fields of competence.

At the same time, the study forms the empirical basis on which the Future Skills Triple Helix Model of Capacity to Act in Emergent Practice Contexts was constructed. Future Skills are part of the competence turn, the Future Skills Turn, which is necessary at the higher education institutions of the future. They mark a turn toward higher education that no longer focuses on the function of preparing students through knowledge transfer, but rather supports them in developing Future Skills, i.e., dispositions and readiness to act in dealing with complex, unknown problem situations through reflection, values, and attitudes. Future Skills are defined as follows:

Definition *Future Skills are competences that allow individuals to solve complex problems in highly emergent contexts of action in a self-organized way and enable*

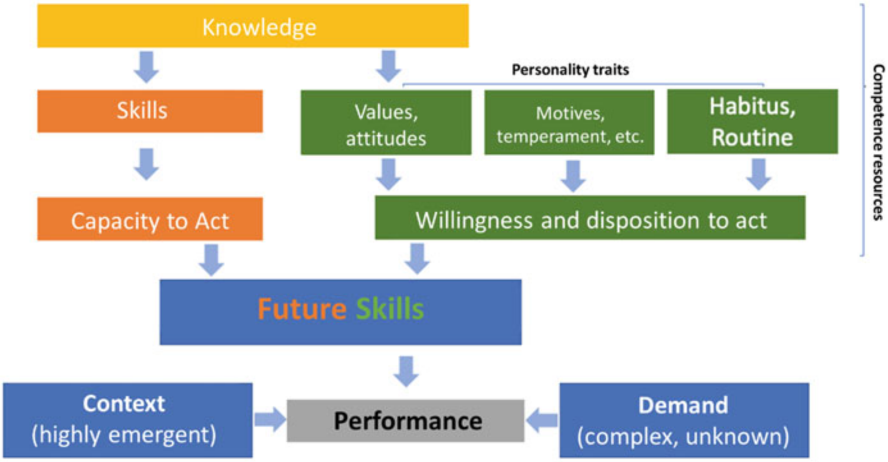


Fig. 1 The Future Skills concept from a competence perspective © Ehlers

them to act (successfully). They are based on cognitive, motivational, volitional, and social resources, are value-based, and can be acquired in a learning process.

If we formulate Future Skills in terms of competence theory, it becomes clear that they are competence constructs with a special content profile (Fig. 1). They enable individuals to act in highly emergent contexts. From a competence-theoretical perspective, the ability to act (fed by knowledge and further developed into skills) comes together with dispositions and willingness to act, which is primarily fed by values and motivational and habitual factors – i.e., personality traits.

In terms and concept, Future Skills can be distinguished from those competences that are not particularly future-oriented. The concept of emergence is used as a differentiating dimension between current or previous competence requirements and those that are future-relevant: In particular, those contexts of action that show highly emergent developments of life, work, organizational and business processes require Future Skills to cope with the requirements. Emergence thus defines the dividing line that separates previous or traditional areas of work from future areas of work. Since this boundary is not clearly schematic but fluid, and many organizations are in transformation processes in which weakly emergent work contexts evolve into highly emergent work contexts, the need for Future Skills is also an evolving field and not a binary state of either-or.

Emergence versus submergence is therefore an important basic distinction for explaining the significance of Future Skills. The NextSkills study shows that low-emergent (stable) professional contexts of action change often, quickly and with high intensity toward high-emergent contexts of action. We speak here of the drift-to-self organization. This change corresponds to a change in the systemic state of organizations. It is triggered by changes in macro-, meso-, and micro-systems and reinforced by their interdependent entanglement. In the resulting new system state, the system elements cannot be causally or linearly traced back to their previous state. The system condition of irreducibility and unpredictability applies.

The Future Skills profiles reconstructed in the NextSkills study on the basis of in-depth interviews are summarized in Table 1. Future Skills profiles consist of bundles of individual related so-called reference skills. A total of 17 such competence profiles can be reconstructed from the qualitative data (see Fig. 2), which are presented and described below. They are divided into the three competence fields of the Triple Helix model.

The division into three fields of competence follows the systematics of the Triple Helix Model for Future Skills. It is based on the idea that the skills necessary to cope with action requirements can be structured on the basis of three interacting dimensions, which are designated with specific terms in the Triple Helix Model:

1. Subject-development-related Future Skills, which refer to the ability to develop oneself, here called individual-development-related competences
2. Those Future Skills that relate to dealing with specific objects, work tasks, and problems, referred to here as object-related competences
3. Those Future Skills that relate to dealing with the social, organizational, and institutional environment, referred to here as organization-related competences

The individual Future Skills mentioned by the interviewees can be conceptually located within this three-dimensional space of action.

Future Skill Profiles of the NextSkills Study

Table 1 provides an overview of the individual Future Skill profiles, the corresponding reference competences, and the descriptions of the competence fields.

The Future Skills Triple Helix Model

Future skills can be further subdivided in terms of their internal structure. It must first be noted that skill is a term that always expresses a relation between a (requirement) context on the one hand and an action on the other. Ehlers (2020a, b) explains that not one, but three such relations can be reconstructed in the empirical data of the Future Skills study: An acting person can develop Future Skills in relation to him/herself, can develop them in relation to the handling of a task, a topic or an object he/she is working on, or in relation to the organizational environment, i.e., the social system (for a detailed description of the underlying epistemological position, see also Ehlers (2020a, b)). In the reconstruction of the data, we name these three relations as subject, object, and (social/organizational) world reference. A three-pole relation emerges, where each pole is in relation to the other. In relation to actions in highly emergent contexts, all three poles and their relationship to each other are thus always determining in any action. Because of the close interconnectedness of all

Table 1 Future Skills: Competence clusters and profiles

ID	Competence cluster/ Future Skill profile/reference competences	Definition
I	**Subject development-related Competences**	**Subject development-related competences entail the ability to be able to act from within oneself and engage in self-directed learning and development activities within a professional context. Autonomy, self-competence, self-efficacy as well as performance competence play an important role in this context.**
1	Learning literacy	Learning literacy is the ability and willingness to learn in a self-directed and self-initiated fashion. It entails metacognitive skills as well.
2	Self-efficacy	Self-efficacy as a Future Skills Profile refers to the belief and one's (self-)confidence to be able to master the tasks at hand relying on one's own abilities and taking over responsibility for one's decisions.
3	Self-determination	Self-determination as a Future Skill describes an individual's ability to act productively within the field of tension between external structure and self-organization, and to create room for self-development and autonomy, so that they can meet their own needs in freedom and self-organization.
4	Self-competence	Self-competence as a Future Skill is the ability to develop one's own personal and professional capabilities largely independently of external influences. This includes other skills such as independent self-motivation and planning. But also, the ability to set goals, time management, organization, learning aptitude and success control through feedback. In addition, cognitive load management and a high degree of personal responsibility.
5	Reflective competence	Reflective competence as a Future Skill includes the willingness and ability to reflect, i.e., the ability to question oneself and others for the purpose of constructive further development, as well as to recognize underlying systems of behavior, thought, and values and to assess their consequences for actions and decisions holistically.
6	Decision competence	Decision competence is the ability to seize decisions and to evaluate different alternatives against each other, as well as making a final decision and taking over the responsibility for it.
7	Initiative and performance competence	Initiative and performance competence refers to an individual's ability to motivate him-/herself as well as to his/her wish of contributing to achievement. Persistence and goal-orientation form the motivational basis for performance. A positive self-concept also plays an important role as it serves to attribute success and failure in such a way that the performance motivation does not decrease.
8	Ambiguity competence	Ambiguity competence refers to an individual's ability to recognize, understand, and finally productively handle ambiguity, heterogeneity, and uncertainty, as well as to act in different roles.

(continued)

Table 1 (continued)

ID	Competence cluster/ Future Skill profile/reference competences	Definition
9	Ethical competence	Ethical competence comprises the ability to perceive a situation or situation as ethically relevant, including its conceptual, empirical, and contextual consideration (perceive), the ability to formulate relevant prescriptive premises together with the evaluation of their relevance, their weight, their justification, their binding nature and their conditions of application (evaluate) and the ability to form judgments and check their logical consistency, their conditions of use and their alternatives (judge).
II	**Object-related competences**	**Individual object-related competences group together competences that refer to interacting with certain objects, topics, and tasks in a creative, agile, analytic fashion, and with a high degree of understanding of the system – also in highly uncertain and/or unknown environments.**
10	Design-thinking competence	The Future Skill Profile Design Thinking competence comprises the ability to use concrete methods to carry out creative development processes open-endedly with regard to given problems and topics and to involve all stakeholders in a joint problem and solution design process.
11	Innovation competence	Innovation competence as a Future Skill Profile includes the willingness to promote innovation as an integral part of any organizational object, topic, and process and the ability to contribute to the organization as an innovation ecosystem.
12	Systems competence	Systems competence as a Future Skill is the ability to recognize and understand complex personal-psychological, social, and technical (organizational) systems as well as their mutual influences and to be able to design and/or accompany coordinated planning and implementation processes for new initiatives in the system.
13	Digital literacy	Digital literacy is the ability and disposition to use digital media, to develop them in a productive and creative way, the capacity to critically reflect on its usage and the impact media have on society and work, both for private and professional contexts, as well as the understanding of the potentials and limits of digital media and their effects.
III	**Organization-related competences**	**A third group of Future Skills Profiles entails all those competences that refer to interaction of an individual with his/her social, organizational, and institutional environment. Among them are sensemaking and value-orientation, the ability to actively design future environments, collaborate and cooperate with others, be able to communicate in a certain way, and be open to criticism as well as to finding consensus.**
14	Sensemaking	The Future Skill Profile Sensemaking comprises the willingness and ability to construct meaning and understanding from the rapidly changing structures of

(continued)

Table 1 (continued)

ID	Competence cluster/ Future Skill profile/reference competences	Definition
		meaning within future work and life contexts, to further develop existing structures of meaning or to promote the creation of new ones where they have been lost.
15	Future and design competence	Future and design competence is the ability to master the current situation with courage for the new, willingness to change and forward thinking. To develop situations into other, new and previously unknown visions of the future and to approach these creatively.
16	Cooperation competence	Cooperation competence is the ability to cooperate and collaborate in (intercultural) teams either in face-to-face or digitally aided interactions within or between organizations with the purpose of transforming differences into commonalities. Social intelligence, openness, and advisory skills play a key role in this competence.
17	Communication competence	Communication competence as a Future Skill entails not only language skills, but also discourse, dialogue, and strategic communication aspects, which – taken together – serve the individual to communicate successfully and in accordance with the respective situation and context, in view and empathy of her/his own and others' needs.

three poles and their interrelated integration, we refer to this concept as the Future Skills Triple Helix Model. The resulting concept is suitable for the formal description of actions in highly emergent contexts. In answer to the question of whether it is rather a subjective ability related to oneself (e.g., self-directed learning, self-competence), an ability related to an object or a task, or an ability related to the social, organizational environment, the future skill constructs can be divided into three areas and internally differentiated. The classification criterion is the goal of the relation – whether it is related to a subject (individual to him/herself), object (individual to a specific object, for example a task) or the environment (individual to the social environment):

1. Relationship of an individual to him/herself in the present, past, or future (subject or time dimension)
2. Relationship of an individual to a particular object (object dimension)
3. Relationship of an individual to a person or a group in the world (social dimension)

This tripartite division is deeply rooted in the philosophy of educational science (e.g., Dewey and Bentley in their essay Knowing the Known (Dewey & Bentley, 1949)), but goes back significantly to Meder (2007; also Roth, 1971), who establishes a fundamental, constitutive structure for education as a structural tripartite

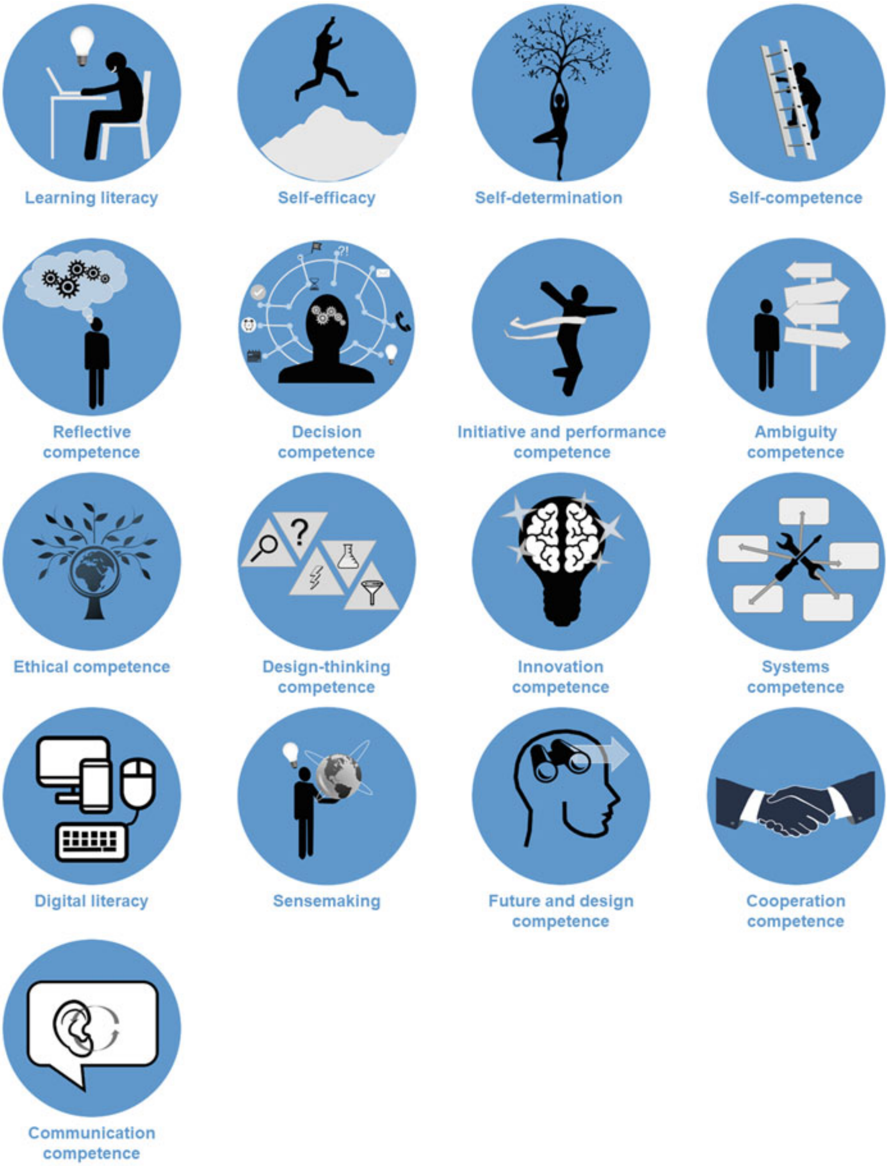


Fig. 2 Overview of Future Skills Profiles © Ehlers

relationship. For the Future Skills concept, this results in a three-dimensional breakdown: Future skills thus refer (1) according to the time or subject dimension either to individually development-related aspects of the acting subject (e.g., the ability to self-reflect in relation to something experienced in the past or ethical competence) or refer (2) to dealing with a subject, an object, such as a topic or a

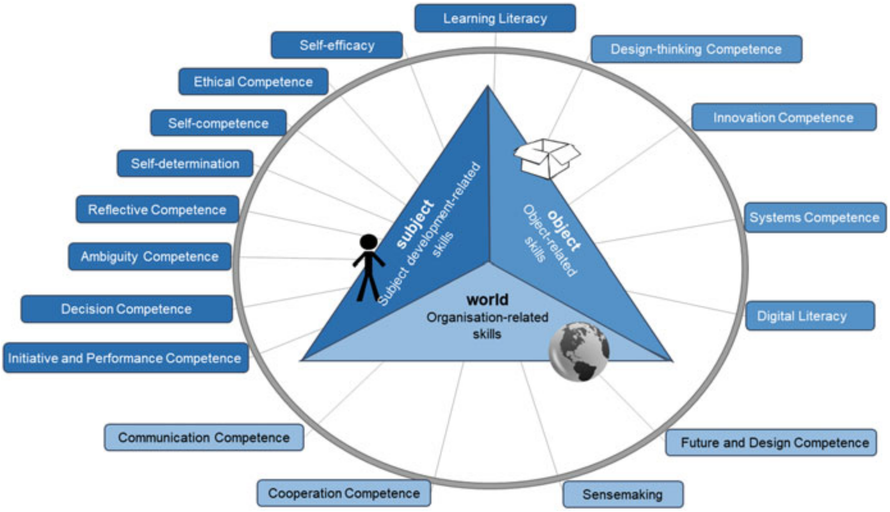


Fig. 3 Future Skills overview – allocation to three dimensions © Ehlers

task (e.g., design thinking skills), or else (3) to the social environment or the organization in which the individual acts (e.g., cooperation or communication skills). Subject, object, or world/organizational reference thus span the competence fields in which Future Skills can be located. Figure 3 shows the breakdown of Future Skills into the different fields of competence.

All three dimensions are in turn interrelated and mutually influence each other. For example, the competence of self-reflection not only affects the subjective development of an acting individual, but also the ability to communicate and cooperate (social or organizational dimension) and in turn the system competence of an individual (object dimension). In this respect, different Future Skills are equally involved in every action. The three dimensions thus form the Future Skill Triple Helix DNA, in which the three skill dimensions interact in concrete actions (see Fig. 4). They enable a better understanding of the factors that define future action skills.

Changing Contexts of Life and Work

Tracing Future Skills back to three constitutive components also allows us to clarify the causes that make Future Skills so significant. The empirical analyses of the interview data show that processes of change – referred to as shifts in the following – and movements are taking place in each of the three dimensions. It becomes clear that a clear change is emerging with regard to the nature of those skills that are significant for individuals and their ability to act in future work and life contexts. Future skill requirements can therefore be clearly distinguished from those of the past and also, to some extent, from those of the present.

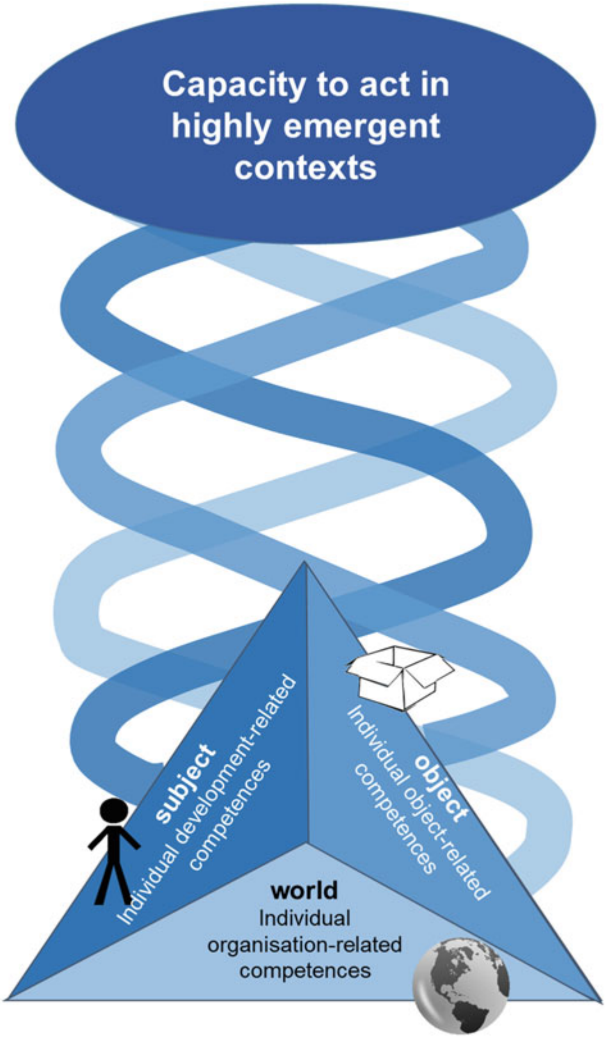


Fig. 4 The Triple Helix Model of Future Skills © Ehlers

Shift 1: From Standardization to Self-organization

The theses of Voss and Pongratz (1998) on the labor force entrepreneur, of Hitzler and Honer on the craft biography (1994), and also of Ulrich Beck (1986) on the risk society suggest an ever-decreasing standardization of employment biographies. This results in a stronger self-control of the individual with regard to his or her employment biography. This self-control of navigating from one job to the next, but also from one position within an occupation to the next or from one occupation to the next is also evident in the Future Skills data at a micro level. At this level, skills can be reconstructed for the internal demands within work processes, suggesting that there is a change that requires less prescribed work structures and more self-organization. This emphasis on self-competences is expressed in the reconstruction of the data, in which the interviewees emphasize that contexts of action in organizations are changing ever faster, both structurally (in the organization) and in terms of content (in the task area) and socially (in the environment). It becomes clear that individuals have to make ever greater individual adaptations to new contexts of action. These often arise in the context of emergent processes and are difficult to plan or predict. The necessary skills, which are demanded of the respondents as Future Skills, have the task of enabling this adaptive performance. It becomes clear that a productive-anticipatory approach to changing contexts of action is becoming increasingly important, so that the focus is not on compensatory measures that aim to restore the capacity to act in the event of a loss of capacity to act due to changing contexts of action. Rather, it is about enabling actors to productively shape new contexts of action already in the course of change processes. Future Skills have the task of enabling actors to be able to act in a self-organized way. So-called self-competences such as self-efficacy, self-determination, self-competence, reflection competence, and self-directed learning enable individuals to productively carry out the necessary adaptation processes in highly emergent contexts.

Shift 2: From Knowledge to Competence

A second shift that emerges from the interview data is the change from the originally high importance of specialized knowledge to a more generic capacity to act. Following Erpenbeck (2012), we define capacity to act as the disposition to act in a goal-oriented manner in complex and unknown problem situations. Following Baake's (1991) dimensions of competence, which he in turn develops from the concept of communicative competence based on Chomsky (1981) and which he elaborates for the area of media competence, four dimensions are central, which can well illustrate the shift described here. The competence dimensions originally developed for the area of media competence and dealing with media (based on Baake, quoted from Vollbrecht, 2001, p. 56) are generally referred to the capacity to act in emergent contexts, as they can also be used to illustrate the shift in the understanding of competence:

- The knowledge dimension with an informative and an instrumental qualification dimension
- The dimension of usage with a more receptive and a more interactive component
- The design of something new with an innovative and a creative component
- The ability to criticize a knowledge base with an analytical, a reflexive (here self-referential), and an ethical component

Beyond the realization that Future Skills rather require the capacity to act and that pure technical knowledge is no longer sufficient, the model allows for a much more precise reconstruction of which dimensions of competence are pronounced in the Future Skills model. In the interviews, it is clearly pointed out that Future Skills primarily require the development of the creative and critical dimensions of competence. In the past, individuals could limit themselves to applying knowledge, methods, and tools; in the future, however, it will become increasingly important to develop new knowledge, methods, and tools in an original and creative way.

Shift 3: From Hierarchical to Networked Organizations

A third change refers to a generally changing organizational environment from hierarchical process organizations to networked and agile organizations. The change taking place here is clearly described in the interview data: While organizations in the past were organized in clear structures and management processes, the organizations of the future will be organized in more fluid structures that are subject to faster and more fundamental changes. In this context, competing poles face each other, where the previous structures and processes of clearly defined management structures are more likely to be replaced by agile processes and enabling management in the future. In the future, process organization will be characterized by networked structures in which clearly defined processes evolve more frequently and organizational charts and responsibilities change more quickly. Relationship management will become an increasingly important factor in this. The whole area of informal initiative is an important component of organizational success and an essential future skill without which the management of organizations will become inefficient in the future. The interviewees express that in future organizations central control approaches are less and less effective and instead participation-oriented goal-setting processes are becoming more and more important.

Conclusion

With regard to Future Skills, the following points can be summarized:

1. Future Skills can be analyzed and described using a profile set that categorizes the 17 skills into three dimensions. Each of these dimensions contains a set of Future Skill profiles.
2. These skills can be described by two cornerstone characteristics: a strong, transversal, and well-developed capacity for self-organization, accompanied by the capacity to act in unpredictable contexts. These two elements thus advance to key components for professionalism – regardless of the respective professional field.
3. Future Skills can be described with a model that categorizes the 17 skills according to three dimensions: subjective – individual development-related skills, objective – task and topic-related skills, social – world/organizational skills. All

three dimensions are interrelated and should therefore not be thought of as mere expressions of isolated skill fields.

4. The future skill approach as presented here goes beyond a static model of pure skill enumeration and definition. Moreover, while the model assumes that digital or technical skills will undoubtedly be an important Future Skills ingredient in the future, it does not see these skills as sufficient on their own. The real value of these skills, therefore, lies primarily in the personal development of dispositions that can enable the individual to act in a self-organized way in a defined domain.

References

Baacke, D., Frank, G., & Radde, M. (1991). *Medienwelten – Medienorte: Jugend und Medien in Nordrhein-Westfalen*. Wiesbaden: VS Verlag für Sozialwissenschaften.

Beck, U. (1986). *Die Risikogesellschaft*. Frankfurt a. M.: Suhrkamp.

Beck, U., & Beck-Gernsheim, E. (Eds.). (1994). *Riskante Freiheiten. Individualisierung in modernen Gesellschaften*. Frankfurt a. M.: Suhrkamp.

Brown, J. (2018). *How these humanities graduates are finding jobs in Silicon Valley*. PBS. https://www.pbs.org/newshour/show/how-these-humanities-graduates-are-finding-jobs-in-silicon-valley#transcript. Accessed: 21 Oct 2020.

Chomsky, N. (1981). *Regeln und Repräsentationen*. Frankfurt a. M.: Suhrkamp.

Dewey, J., & Bentley, A. (1949). *Knowing and the known*. Boston: Beacon Press.

Ehlers, U.-D. (2020a). *NextSkills. Future skills – The future of learning and higher education*. https://nextskills.org/. Accessed: 21 Oct 2020.

Ehlers, U.-D. (2020b). *Future skills: Lernen der Zukunft – Hochschule der Zukunft*. Wiesbaden: Springer VS.

Ehlers, U.-D., & Kellermann, S. A. (2019). *Future skills. The future of learning and higher education. Results of the international future skills Delphi survey*. https://nextskills.org/library/future-skills-study/. Accessed: 21 Oct 2020.

Ehlers, U.-D., & Meertens, S. A. (Eds.). (2020). *Studium der Zukunft – Absolvent(inn)en der Zukunft*. Wiesbaden: Springer VS.

Erpenbeck, J. (2012). Führungskompetenz. In W. G. Faix (Ed.), *Kompetenz. Festschrift Prof. Dr. John Erpenbeck zum 70. Geburtstag, Band 4* (pp. 109–142). Stuttgart: Steinbeis-Edition.

Faix, W. G. (Ed.). (2012). *Kompetenz. Festschrift Prof. Dr. John Erpenbeck zum 70. Geburtstag, Band 4*. Stuttgart: Steinbeis-Edition.

Hachmeister, C.-D. (2017). *Die Vielfalt der Studiengänge. Entwicklung des Studienangebotes in Deutschland zwischen 2014 und 2017*. Centrum für Hochschulentwicklung. https://www.che.de/wp-content/uploads/upload/Im_Blickpunkt_Die_Vielfalt_der_ Studiengaenge_2017.pdf. Accessed: 21 Oct 2020.

Hartley, S. (2016). The fuzzy and the techie. Why the Liberal arts will rule the digital world. *Financial Times*. https://www.ft.com/content/e25235dc-aa8a-11e6-9cb3-bb8207902122. Accessed: 21 Oct 2020.

Hippler, H. (2016). Wozu (noch) Geisteswissenschaften? *Rotary Magazin*. https://rotary.de/bildung/wozu-noch-geisteswissenschaften-a-8984.html. Accessed: 21 Oct 2020.

Hitzler, R., & Honer, A. (1994). Bastelexistenz. Über subjektive Konsequenzen der Individualisierung. In U. Beck & E. Beck-Gernsheim (Eds.), *Riskante Freiheiten. Individualisierung in modernen Gesellschaften* (pp. 307–314). Frankfurt a. M.: Suhrkamp.

Kummert, T. (2017). *Endlich einer, der nicht nur Formeln anwenden kann*. Süddeutsche Zeitung. http://www.sueddeutsche.de/karriere/arbeitsmarkt-endlich-einer-der-nicht-nur-formeln-anwenden-kann-1.3623308. Accessed: 21 Oct 2020.

Meder, N. (2007). Der Lernprozess als performante Korrelation von Einzelnem und kultureller Welt. Eine bildungstheoretische Explikation des Begriffs. *Spektrum Freizeit, 07, I & II* (pp. 119–135). https://duepublico.uni-duisburg-essen.de/servlets/DerivateServlet/Derivate-34931/21_Meder.pdf. Accessed: 21 Oct 2020.

Nachtwey, O. (2016). *Die Abstiegsgesellschaft – Über das Aufbegehren in der Regressiven Moderne*. Berlin: Suhrkamp.

Olejarz, J. M. (2017). Liberal arts in the data age. *Havard Business Review*. https://hbr.org/2017/07/liberal-arts-in-the-data-age. Accessed: 21 Oct 2020.

Placke, B., & Schleiermacher, T. (2018). Anforderungen der digitalen Arbeitswelt. Studie der IWConsult im Auftrag des Bundesverbandes der Personalmanager e. V. https://www.iwkoeln.de/fileadmin/user_upload/Studien/Gutachten/PDF/2018/Gutachten_Anforderungen_Digitale_Arbeitswelt.pdf. Accessed: 21 Oct 2020.

Roth, H. (1971). *Pädagogische Anthropologie. Bd. 2: Entwicklung und Erziehung*. Hannover: Hermann Schroedel Verlag.

Vollbrecht, R. (2001). *Einführung in die Medienpädagogik*. Weinheim: Beltz.

Voß, G., & Pongratz, H. (1998). Der Arbeitskraftunternehmer. Eine neue Grundform der Ware Arbeitskraft? *Kölner Zeitschrift für Soziologie und Sozialpsychologie, 50*, 131–158.

Online Doctoral Education

A Synthesis of Literature

Kyungmee Lee

Contents

Abstract

This chapter discusses different factors underpinning the development of online doctoral education and pedagogical concerns influencing the design of online doctoral programs. The rapid development of online doctoral education has been guided by recent changes in doctoral education and distance education contexts, both conceptually and empirically. To develop a comprehensive understanding of the nature of online doctoral education, 47 journal articles concerning the design of existing online doctoral programs were systematically selected and reviewed. The review results demonstrate that online doctoral education is a complex entity developed and influenced by a dynamic interplay among multiple factors relevant to different aspects of online higher education, professional doctoral education and internationalized education. However, there has been a lack of holistic research approaches to develop a comprehensive understanding of online doctoral education. In particular, literature grounded in online higher education and professional doctoral education scholarship has not been effectively integrated and synthesized, creating an unhelpful chasm. Within the chasm, a range of

K. Lee (✉)
Lancaster University, Lancaster, UK
e-mail: k.lee23@lancaster.ac.uk

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_66

pedagogical concerns and contradictions have emerged in online doctoral programs, which can be understood and addressed only when online doctoral educators have a holistic perspective bridging the two. Therefore, while the present review reveals valuable insights into online doctoral education research and practice, it also suggests that more research needs to be conducted using a more comprehensive theoretical understanding of online doctoral students and their experiences.

Keywords

Online doctoral education · Online doctoral program · Online PhD · Professional doctoral education · Systematic literature review

Introduction

This chapter provides a brief overview of the development of online doctoral education, both its scholarship and practice, by reviewing relevant literature. Compared to the long establishment of doctoral education practice, which was begun in the 1800s or even compared to the emergence of distance education dates back to the 1900s, online doctoral education has a relatively short history that has arisen with the advancement of information and communications technologies (Kumar & Dawson, 2018). For example, Sunderland (2002) is one of the first articles that discussed the use of email communication in a distance doctoral program offered, by Lancaster University in the UK, to academics at Romanian universities in 1997 and 1998. Crossman (2005) also reported that email communication is an innovative pedagogical tool for distance learners in doctoral programs in Australian universities.

Online doctoral programs (ODP) began to emerge between the late 1990s and the early 2000s. In the USA, for example, Regent University set up a doctoral program in Leadership Studies in 1996, where "with the exception of three brief summer residencies, all courses are designed and delivered primarily using [computer-mediated communication] or asynchronous instruction via the Internet" (Grooms, 2003, p. 3). The first fully ODP in Nursing was established at Duquesne University in the USA in 1997 (Milstead & Nelson, 1998), followed by several UK ODPs, including one in Business Administration set up at the University of Northumbria in 2000 (Combe, 2005). Currently, there are 259 ODPs in the USA, 187 in the UK, and 596 around the globe (Studyportals, 2022, September).

Although the wide dissemination of the Internet technologies is often referred to as the main contributor to the emergence of online doctoral education, the rapid development of OPDs in their current form is closely interlocked with recent changes in general doctoral education practice (Kumar & Dawson, 2018). Thus, it would be helpful to understand those changes and related debates to the growth of online doctoral education in the literature. The changes in general doctoral education practices across the 1980s and 1990s can be conceptualized as three related phenomena: i) moving from a traditional knowledge-oriented doctorate to a training-based doctorate, ii) a decrease in traditional research students and an increase in researching professionals, and iii) a tightened public funding for doctoral studies with added pressure on improving student competition rates (Hockey, 1991).

These changes were not unique to the doctoral education context. Similar phenomena were observed across the higher education sector under the impact of neoliberalism and free-market fundamentalism (Giroux, 2014) and also noted in the open and distance education context (Lee, 2017). The idea of higher education as a public service began to be demolished, and subsequently, student fees, not only for campus-based programs but for distance programs, were rapidly increased or newly introduced in some countries (in the UK, for example). As doctoral studies were becoming an individual customer's choice, those interested in earning a doctorate for self-promoting purposes in the competitive market space signed up for doctoral programs.

These nontraditional (and fee-paying) doctoral students demanded a new, more convenient, and flexible way of engaging with doctoral education as they want to pursue a doctorate while maintaining their professional status and other social responsibilities. Also, the radical shift in the subject and purpose of doctoral education – *from* elite and "bright" student production of new knowledge *to* non-traditional and often "under-prepared" student participation in research training (Lee & Danby, 2012) – mandated universities and research institutions to change their doctoral education practices or at least to come up with different types of doctorates. Against this societal and economic backdrop, ODPs emerged as an alternative approach to doctoral education that could meet the growing needs of the new doctoral student group. That is where the affordances of information and communications technologies came to realize and accelerate the required changes in general doctoral education.

The development of the "contemporary" formats of online doctoral education has been influenced and enabled by the complex interplay between a range of social, educational, and technological changes in recent years. Subsequently, those factors have underpinned the design of ODPs, shaping student experiences in those programs. Therefore, the nature of online doctoral education is multifaceted and complex (Lee, 2020a). This chapter seeks a deeper understanding of the development of online doctoral education by reviewing diverse contributing factors to its development identified in the published literature. The chapter also discusses how those factors have guided the design of specific ODPs concerned in the same literature. 47 journal articles were systematically selected and reviewed to write this chapter, which will be detailed in the following section.

Review Methods

This review employed a systematic scoping process (Arksey & O'Malley, 2005). The initial search was conducted on Scopus, the largest abstract and citation database of peer-reviewed literature (http://www.scopus.com/), using the following compound search terms:

("online" OR "distance") AND "doctor*" AND ("program*" OR "course*" OR "stud*")

When conducted in March 2021 (without limiting the publication period), based on the title, abstract, and keyword of the literature, the initial search results included 1144 journal articles (written in English). Another search was undertaken on the Web of Science using the same search terms to ensure the completeness of the search outcomes. 623 journal articles were also included. All 1767 articles were imported to a reference management software, and 523 were excluded as duplicates.

The author screened the titles and abstracts based on the inclusion and exclusion criteria (Zawacki-Richter, Kerres, Bedenlier, Bond, & Buntins, 2020). To be included, filtered articles must demonstrate their focus on (i) an online doctoral program (the most part of the program should be conducted at a distance, except for a limited number of residentials), (ii) online pedagogical practice (rather than technological tools such as learning management systems), and (iii) an empirical case or existing doctoral program (rather than conceptual or theoretical discussions). That is, papers discussing doctoral students' experiences in a single online course or module in face-to-face doctoral programs were excluded alongside conceptual papers, including literature review articles. In addition, recent papers discussing online doctoral education practice during the COVID-19 pandemic were excluded to maintain the focus of the review on the contributing factors to the development of online doctoral education in normal circumstances. For this first step of the filtering process, sensitivity rather than specificity was adopted. For example, when the titles and abstracts did not include complete information required for the selection decision, the articles were included rather than excluded.

As the above flow chart (Fig. 1) suggests, after the first screening of 1244 articles, 148 papers were included for full-text screening. After the second round of inclusion and exclusion exercise, 53 papers were finally selected for the present systematic review. Additional six articles were excluded to avoid reviewing multiple papers describing the same doctoral program, with one exception. Kumar, Dawson, Black, Cavanaugh, and Sessums (2011), Kumar, Ochoa, and Edwards (2012), and Kumar and Dawson (2013) were all included in the present review despite their duplicated focus on the same online doctoral program. It was because each paper discusses a distinct aspect of the program, such as a theoretical underpinning of the overall design of the program (Kumar et al., 2011), the design of the specific information literacy and library instruction of the program (Kumar et al., 2012), and the impact of the program on the broader educational sector (Kumar & Dawson, 2013). Three research questions have guided the review process:

(i) What are the stated reasons for the development of online doctoral education?
(ii) What are the stated pedagogical concerns about online doctoral programs?
(iii) What are the stated theoretical approaches to conceptualizing online doctoral studies?

Taking a grounded theory approach (Charmaz, 2014), I conducted an inductive thematic analysis of the selected 47 journal articles. More specifically, three steps

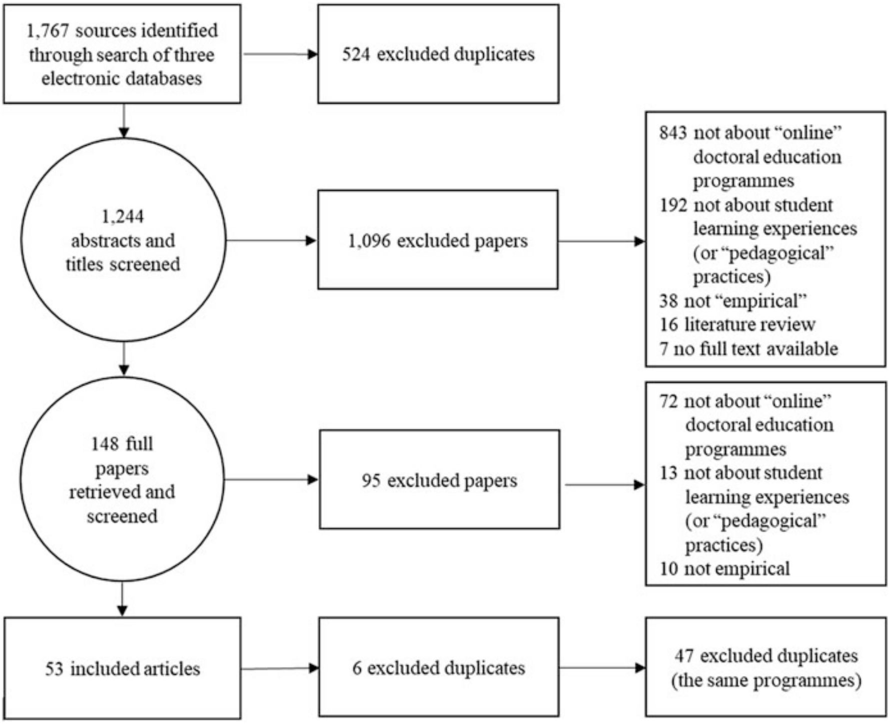


Fig. 1 Systematic review flow chart

of the coding process were employed as suggested by Corbin and Strauss (2014) – open coding, axial coding, and selective coding.

Firstly, I read through each article in print and highlighted sentences or paragraphs discussing the factors contributing to the development of online doctoral education, pedagogical problems observed in ODPs, and the theoretical underpinnings to design the programs. Abstracts were excluded from the coding since most statements in abstracts were repeated in the main texts. The literature review section of each article was also excluded since statements appearing in the section are often not aligned with the authors' broader arguments nor relevant to the particular doctoral programs concerned. Thus, coding and reading those statements in a decontextualized manner may reduce the accuracy and validity of the coding results. However, there were some exceptions. For example, Provident et al. (2015) utilize the literature review section to present their theoretical framework (i.e., transformative learning theory) and explain its implication for their online doctoral program. Jiang, Ballenger, and Holt (2019) also introduce their theoretical framework (i.e., Community of Inquiry) in the literature review section. In these cases, I selected and coded the relevant parts of the literature reviews.

Initial codes were identified and assigned to each of the highlighted meaning units – using critical notions in the research questions or the articles. Most articles presented multiple developmental factors and pedagogical strategies. I also made notes of potential categories emerging from the highlighted parts in the margins of the articles. These initial codes were all entered into a qualitative analysis tool (i.e., Atlas.ti).

The second round of reading (i.e., axial coding) was undertaken using the tool, with the codes more carefully examined and compared with and against each other. An attempt to answer the research questions was made by selecting the codes that were ascribed more weight (e.g., appeared more frequently) within and across the articles or directly relevant to the research questions. The other codes that were less weighted or not directly connected to the research questions were removed at this stage. Those selected codes were logically organized and grouped into independent categories. These categories were shared and discussed with three online doctoral students conducting their thesis projects on online education supervised by the present author. Based on the conversations–a mechanism of utilizing the concept of critical friends (Lincoln & Guba, 1985) to increase the trustworthiness of the qualitative research outcomes– the categories with representative codes were checked and validated.

The final stage of analysis (i.e., selective coding) focused on generating themes to answer the three research questions. As a result, 12 themes have been drawn from the reviewed articles, which will be presented in the following section of this chapter.

Findings and Discussions

What Are the Stated Reasons for the Development of Online Doctoral Education?

There are at least five different reasons stated in the reviewed articles. Each article positions its rationale for the development of ODPs in distinctive educational and research contexts such as distance education, doctoral education, professional education, and international education. The review results clearly suggest a dynamic, interdisciplinary, multi-focal nature of the scholarship and practice of online doctoral education. Each of the five reasons will appear below in turn with a selected excerpt that illustrates how the concerned rationale is presented and discussed in the reviewed papers.

Growth in Online Higher Education

The most frequently stated reason for developing ODPs is the fast growth in online education. Many authors open up their articles by describing the contextual background of the growing numbers of online programs offered by universities and online students registered in those programs. The below excerpt effectively demonstrates how the rationale for online doctoral education is typically argued.

> [W]e have witnessed the exponential growth of online education. According to Babson Survey Research Group, more than 6.3 million students in the U.S. took at least one online

> course in Fall 2016. . . Internet and digital technologies. . . have dramatically transformed the way education is delivered. . . Such new tools have enabled online delivery of course materials to students outside of brick-and-mortar classrooms in an asynchronous manner. . . students with full-time leadership positions in public education benefit from online programs as they provide self-paced flexibility. (Jiang et al., 2019, pp. 296–297)

The exponential growth in online higher education, enabled and facilitated by the educational use of advanced communication technologies, is set as a benchmark for doctoral-level educational practice. The flexibility of online education that allows adult learners (often professionals with full-time work) to access university education is the key to this argumentation, which is applicable and translatable to other educational contexts, including doctoral education. Most of the articles starting from this context tend not to have any statements specific about doctoral education or doctoral studies.

Growth in Professional Doctoral Education

The second frequently stated reason underlying the fast development of online doctoral education is situated in the context of professional doctoral education. A group of reviewed articles mention the recent changes in the doctoral education landscape, including the growing demand for a doctorate among professionals and the increasing diversity in doctoral provisions.

> In recent years, there has also been an increase in professional doctorate awards in the USA, the UK, and Australia, accompanied by studies and discourse about their design and impact. . . Professional doctorates are designed in many ways and are offered as pre-service or in-service degrees. They range from doctorates that structure coursework and a discipline-specific dissertation to doctorates that are designed in collaboration with employers and include research that is conducted in the workplace and supervised by university faculty. (Kumar & Dawson, 2013, p. 165)

This set of literature tends to perceive online doctoral education as an effective means for professional development, supporting professionals to acquire up-to-date knowledge and integrate it into their workplace to improve their practice. Such an approach has shifted a traditional view on the purpose of doctoral education – from knowledge creation to knowledge acquisition (and application). Thus, although both Jiang et al. (2019, in the previous section) and Kumar and Dawson (2013) mention the fact that ODPs allow adult students to remain in their workplace while pursuing a doctorate as a starting point, where and how those doctoral programs will bring their students to as an ending point can differ.

Demands in the Professional Field

Another frequently stated rationale for offering online doctoral education (more "academic" doctorates, including PhD) tends to be situated in urgent needs of specific professions and professional contexts such as nursing, educational leadership, and social work. Despite their apparent similarity with the previous point about the growing professional doctoral education, this set of selected statements provides an increased level of urgency and specificity to the discussion.

> Increased numbers of doctorally prepared nurses are needed due to a demand for faculty, administrators, researchers, and theorists who possess a nursing doctorate, a demand that exceeds the supply… However, when nurses make the decision to pursue a doctorate, they tend to be older than students in other disciplines, typically have established careers, have financial and family responsibilities, and unlike most other doctoral students, the majority of them work full-time and study part time… In the United States there are only 88 doctoral programs in nursing… finding one that is within commuting distance, not to mention consistent with the student's research interests, may be impossible. To address the barrier of proximity, nursing programs are offering distance learning options and they are becoming a common method of acquiring a nursing education. (Halter, Kleiner, & Hess, 2006, pp. 99–100)

As can be labeled as online "academic" doctoral education, the ultimate outcomes of the online doctoral education program in Halter et al. (2006) is meeting "a demand for faculty, administrators, researchers, and theorists." Thus, the focused aim of the program is rather academic, which is distinguishable from the practice-oriented purposes of professional doctorates that mainly target improving professional practices and technical performances in the fields. The differences are, however, not always explicitly stated but implicitly assumed.

Internationalization of Education

A few reviewed articles discuss the reason for online doctoral education within a dynamic interplay of the increase and decrease in international education (more specifically, internationalized education market). This line of argumentation tends to be merged into the marketization discourse, seeing online doctoral education as a competitive product which could attract a larger group of students worldwide. Authors with this perspective often explicitly refer to students as customers. For example, Combe (2005) argues:

> International education has grown into a substantial worldwide industry… However, there is some evidence to suggest that over the last three decades growth in international education has been slowing down… This slowing of overall market growth may reflect a maturing industry and is likely to increase the level of competition between education service providers seeking to operate in international markets… The development of e-learning technologies has presented providers with opportunities as well as challenges as they seek to positively enhance their educational value chain to effect lower costs, enhanced differentiation of products and reap the benefits of economies of scale and scope to create a competitive advantage. One way of achieving this is to target high value customers with access to advanced qualifications at Master's or Doctorate level. (p. 119)

Reading such statements as "the educational market has been saturated, and thus, educational providers need to find a niche market" may not be a total surprise given the neoliberal climate in the current higher education context. Internationalization discourse, providing a big picture, is compatible with other reasons mentioned earlier – the growth in online education and professional doctoral education. In fact, most of the reviewed articles stress the international nature of their focused ODPs where the diversity of students' ethnic and cultural backgrounds is apparent. Regardless of the fundamental financial interests in such internationalization among doctoral institutions and programs, the international cohort community seems to have pedagogical merits.

Social Justice-Oriented Rationale

The internationalization of education is not only (and always) driven by profit-oriented market principles. Despite the small number, several articles approach international online doctoral education with a social justice-oriented perspective from a vantage point of less developed countries (LDCs) lacking doctoral education opportunities available at the local level. In those articles, ODPs are usually offered by universities located in more developed countries, serving students located in LDCs. Syler and Venkatesh (2018) is a rare article that discusses doctoral education provisions in LDCs (i.e., Cameroon in Africa).

> LDCs face various complex problems and needs, such as the availability of potable drinking water, eradication of infectious diseases, elimination of poverty, and availability of healthcare, that require well-developed and sustainable solutions… [LDCs] urgently need to develop intellectual capital internally in the form of scholars, leaders, and technicians… Doctoral programs in LDCs, for example, allow [researchers] to expand their knowledge and insights throughout the global information systems (IS) community… Such endeavors require the support and contribution of scholars in developed countries. (p. 2)

Although the concerned doctoral program in Syler and Venkatesh (2018) is mainly operated face-to-face on multiple campuses in Cameroon, Ghana, Uganda, and Nigeria, it also serves online students from various places in Africa, using video conferencing tools. The article describes the authors' unique experience of coordinating an online doctoral course with other educators and experts dispersed across the world. One of the authors clearly articulates their social justice-oriented rationale for online doctoral education as: "I decided to take on the course for a simple reason: to give back to the community in any way I could, which I feel is my true calling" (p. 3). Given that the authors themselves are also located in the United States – distant from the doctoral program – such teaching efforts could be only feasible through being mediated by communication technologies.

What Are the Stated Pedagogical Concerns About Online Doctoral Programs?

There are multiple pedagogical concerns about online doctoral education discussed in the reviewed articles. Such concerns are primarily associated with the inherent nature of learning at a distance and the unique characteristics of adult students. The shared theme across those concerns is their double-edginess – those concerns are advantages and disadvantages of online doctoral education, at the same time. As discussed earlier, one of the rationales for developing ODPs is to meet the growing educational needs among adults with other responsibilities. A greater level of physical flexibility offered by ODPs enables those adults to begin their doctoral study in the first place; however, the same flexibility creates subsequent pedagogical challenges such as a sense of isolation that often threaten successful learner engagement in ODPs. In addition, adult learners themselves walk into the programs with their own difficulties caused by their personal and professional circumstances.

The distinctive features of doctoral "level" of studies add additional academic challenges to adult distance learning scenarios. The following excerpt effectively captures the combination of the three: distance learning, adult learners, and doctoral studies.

> Working students with families must balance career and home obligations with their academic responsibilities. Staying in contact with their doctoral advisor (chair) is more difficult for students at a distance. Another common problem for older students that have been away from school is the need to strengthen their academic writing and research skills. Weak writing skills result in more drafts, and poor research skills increase the time to complete the proposal and the data analysis. Students also find the transition from taking structured courses to writing the dissertation or doctoral study challenging because of the need to work independently. (Hogan & Devi, 2019, p. 61)

Previous research has attempted to address one or more of those challenges. There are at least four pedagogical concerns frequently addressed in the 47 reviewed articles.

Flexibility and Structure

While ODPs provide a significant level of physical flexibility at the entry point, they tend to employ a more structured approach to their pedagogical design. Given that most doctoral students are experienced professionals who are "seeking to enhance their skills in research, education, and leadership in their respective professions," ODPs tend to be structured "to improve the students' abilities to educate and conduct research in their disciplines" (Cotter, Welleford, & Drain, 2008, p. 262). Especially in the European context, where doctoral studies mainly involve individual students pursuing their thesis projects with supervisory support, ODPs are often called "taught" programs, including tutor-guided coursework. In North American and other contexts where it is common for doctoral students to take courses, ODPs are still more structured than face-to-face ones. ODPs tend to offer a limited range of "pre-selected" online courses to make the program more structured and guided.

Within the structured taught part, however, these programs also attempt to provide pedagogical flexibility to adult students regarding when and how they engage with learning. With a small number of exceptions, most learning activities in online doctoral education are organized asynchronously, using lecture videos, independent readings, discussion forums, research projects, and reflective writings. In addition, most programs support students' own choice of learning content and project topic, which are closely related to their personal interests and professional experiences:

> In the DPHRS [Doctoral Program in Health-Related Sciences], another issue was evident in the development stage—students would be experienced health professionals and health professional educators, who, within their respective disciplines, had more extensive

> knowledge than the instructors but were lacking in a formal didactic research and education framework… It becomes incumbent upon the DPHRS program and its instructors to facilitate the students' understanding of their respective learning styles, processes, and preferences. Thus, a learner-centered environment places the health professional student at the center of the course organization and processes. (Cotter et al., 2008, p. 264)

As Lee (2020a) observes, such part-timeness and practice-orientedness are the shared aspects of online doctoral studies, which are fundamentally grounded in the flexibility of ODPs. Martin and Noakes (2012) also report online doctoral students' appreciation of freedom of "learning by wandering" in their studies. At the same time, experienced professionals who begin their part-time doctoral studies after many years of a study break tend to lack study skills, habits, or time. Thus, an effective program structure with carefully designed learning activities and guidance is necessary for their successful doctoral journey. In a nutshell, online doctoral education literature focuses on finding and realizing an optimal balance between the seemingly contradictory principles of flexibility and structure.

Isolation and Community

While structured flexibility is a vital design principle underpinning most ODPs, many articles note the issue of students feeling isolated and disconnected from their university. Although a sense of isolation is a common emotion that may be experienced by any distance learner, Sunderland (2002) has provided an in-depth and sophisticated explanation of a psychological gap experienced by educational professionals enrolled in an online PhD program in applied linguistics:

> Together, these geographical and temporal gaps can be seen as creating "a psychological and communications gap, a space of potential misunderstanding between the inputs of instructor and those of the learner"… This suggests a consideration of the particular affective needs of the distance learner, as well as their pedagogic needs. However, the psychological gap may also be an effect of the complex identity of the distance student. They are likely, after all, to be working as a professional, possibly even doing the same sort of job as the teachers on their distance programme. And this psychological gap may not only be an effect of the relationship between student and the "distant" tutor, but also of the differences between the institution with which the student studies and that at which they work, the academic discourse practices by which they are characterized, and the political regimes which directly or indirectly govern these two institutions. (p. 234)

Many authors, including Sunderland (2002), perceive such a psychological gap as one of the major problems and drawbacks in online doctoral education, resulting in student mistrust and dissatisfaction with the program, loss of confidence and demotivation in their studies, and subsequently, poor academic progress and dropout. To address this problem, authors have employed diverse community-oriented remedies. Therefore, developing student support networks in ODPs appears to be the most frequently researched topic in the reviewed literature. Common strategies employed to improve the community-aspect of online doctoral education include i) establishing a cohort-based program structure (e.g., Kumar et al., 2011; Provident et al., 2015), ii) facilitating synchronous online interactions (e.g., Hogan & Devi, 2019; Myers, Singletary, Rogers, Ellor, & Barham, 2019), and iii) organizing short face-to-face residentials (Cotter et al., 2008; Halter et al., 2006). Most ODPs adopt more than one strategy (often all three), which is clearly demonstrated in the following description of an ODP:

> [W]ith a *cohort-based format* that includes online coursework and interactions with a one-week session on campus... We designed online courses in the program to include multiple forms of *synchronous and asynchronous interaction*... At the end of their first year, students took a summer seminar that consisted of online activities to prepare for the *one-week campus-based experience* and follow-up online assignments. Program faculty collaboratively led the campus experience, which was intended to help students get acquainted with the university through interactions with one another, faculty both in and outside the program, administrators, and librarians. (Kumar et al., 2011, p. 129)

Researchers have found that the sense of isolation and the sense of community are closely interlinked in online doctoral studies (Berry, 2017). It is critical to ensure that distance students feel that there is a strong academic community exists in their program and that they also belong to the community. The cohort-based program structure, where a group of 20 or 30 students start and progress through the program together at the same time, has proven effective – especially for the taught part of the program. Although having synchronous interactions (using telecommunication tools) and face-to-face residentials as mandatory components of ODPs may reduce the flexibility and accessibility of these programs, many students appreciate those community-building opportunities. Therefore, again, it comes down to the matter of finding the right balance between improving flexibility and a sense of community within a single ODP.

Technology Anxiety and Research Literacy

While most articles (e.g., Jiang et al., 2019; Martin & Noakes, 2012) emphasize the potential of advanced communication technology for enabling adult professionals to pursue a doctorate and increasing a sense of belonging among those students, it is crucial to notice that online doctoral students also experience a range of technology-related difficulties. Another set of pedagogical concerns that emerged in the reviewed articles is closely related to a lack of technology and research literacy among online doctoral students. For example, Bolliger and Halupa (2012) report that online doctoral students tend to experience a high level of technology anxiety, "negative emotions associated with computer use" (p. 83), especially at the beginning of their program, and such anxiety strongly influences their overall learning experiences.

In a similar vein, several articles (e.g., Kumar et al., 2012; Tuñón & Ramirez, 2010) focus on a lack of information literacy among online doctoral students, exploring how to design and deliver effective library training to those distance learners. The reviewed articles stress the importance of an early introduction to a library system and solid orientation on using information technology for research purposes, which is an essential part of research literacy required for the successful completion of doctoral studies. It is further suggested that library training needs to be effectively integrated into student coursework in an ongoing manner "beyond one-shot library training" (Tuñón & Ramirez, 2010, p. 989).

Of course, technology anxiety (or information illiteracy) is not always associated with particular learner groups or simply caused by a lack of technical skills. For example, online PhD students may experience a high level of technology anxiety at the beginning of their doctoral program even though they have technical skills required (Lee, 2020a). Encountering new people, new knowledge, and new practices at the same time "online" – such as engaging with a doctoral level of academic discussions online, whether synchronously or asynchronously, may cause a great sense of insecurity and anxiety among online doctoral students (also see Lee, 2021). That is, the notion of technology anxiety needs to be more holistically understood, which can be experienced when online doctoral students do not have a complete set of skills (online social and communication skills, academic and learning skills, etc.).

Nevertheless, some of the reviewed articles link those challenges to the particular characteristics of online doctoral students (Brahme & Walters, 2010). Bolliger and Halupa (2012) discuss the differences between doctoral students enrolled in online programs and those in traditional programs as:

> [M]ost students in online doctoral programs are nontraditional students – many are between 45 and 60 years of age... These students did not grow up using these types of technologies and many obtained their undergraduate degrees 25 or more years previously, before online programs were available. In contrast, the median age of individuals awarded doctoral degrees was 33.0 years in 2004–2005 and 32.7 years in 2005–2006 (Snyder & Dillow, 2010). Because this segment of the population typically consists of older individuals who are returning to higher education to obtain a doctoral degree after spending a considerable amount of time in the field, returning graduate students may be less comfortable with the online delivery format than their traditional counterparts. (p. 82)

Unfortunately, the present review has failed to find literature that offers more recent perspectives about online doctoral student populations; thus, it is difficult to know how the populations have been changed in more recent years. Alternatively, it may be a fortunate and welcoming result that suggests the maturity of the scholarship of online doctoral education, moving away from the simple representation of the populations and their experiences.

Diversity and Inequality

As discussed earlier, the internationalized education, often coupled with social justice-oriented agenda, is one of the stated reasons for the development of online doctoral education. Subsequently, there are a growing number of international students in ODPs, including those from less privileged backgrounds who cannot afford to the full-time doctoral studies on campus. Such a great diversity among online doctoral students in terms of their cultural and social backgrounds and professional and educational experiences presents both pedagogical advantages and challenges to online doctoral educators. For example, Roumell and Bolliger (2017) report the positive side of such diversity from the staff perspective as:

> The most-often satisfying aspect mentioned by faculty was that the distance environment provides students with access to doctoral education who otherwise would not have the opportunity to pursue a doctorate. Another perceived benefit is that distance programs include more diverse students in regard to educational and professional background (and subsequently a variety of research topics), making the student body more diverse in terms of gender, race, ethnicity, and ability. (p. 88)

The social justice-oriented argument is also evident in Williams, Wall, and Fish (2019) that shows online doctoral education is more accessible to underserved students where more than 30% of students are the first generation of college graduates than traditional doctoral education (the average percentage of those students in science and engineering doctoral programs is 17%).

Berg (2016) similarly notes the advantages from the student perspective as:

> Some [students] saw an advantage in the online format, especially for [underrepresented minority] students, as exemplified by one student: *As the majority of this educational journey has been online and therefore demographically blind, I do not believe my doctoral experience has been any different than most of my co-hort. I find that I am a student far more often than an "ethnic minority" student.* In a similar vein, students wrote about the large cultural diversity of the online classroom, which often includes international students, as a positive characteristic: *". . . meeting other learners from all nations."* (p. 231)

Nevertheless, the same authors also notice the unavoidable academic and socio-economic gap among the diverse population of online doctoral students. Williams et al. (2019) argue a high interrelationship between doctoral students' academic persistence and their parental educational level. Although there is no direct impact, the social and economic circumstances of the first-generation students my indirectly influence their learning abilities and attitudes – such that "the self-regulation behaviors learned early in life from the parents persist, apparently, even into mid-life" (p. 71). Berg (2016) also reports diverse academic and nonacademic challenges faced by the underrepresented minority students in ODPs and the crucial roles of academic supervisors in their degree completion. Beyond the problem of inequality among doctoral students, the diverse needs, learning preferences, personalities, and professional and personal situations of adult students all strongly impact their learning experiences and achievement in online doctoral education, which calls for more inclusive and sensitive pedagogical approaches of doctoral educators (see Lee, 2020b; Rovai and Grooms, 2004).

What Are the Stated Theoretical Approaches to Conceptualizing Online Doctoral Studies?

This final group of themes analyzed in the review project is about how previous researchers conceptualize online doctoral studies to better understand student experiences in ODPs and address different pedagogical concerns discussed in the above section. As the development of ODPs is primarily grounded in the existing practice and increasing demands in online higher education and professional doctoral education, there has been some theoretical resonance between online doctoral education and the two. In other words, the following three interlinked theoretical approaches, commonly appear in online higher educational and professional doctoral education literature, have been most frequently adopted by the authors of the reviewed articles. It is worth mentioning that a large number of these articles ($n = 24$) neither include a theoretical framework section nor name any particular learning theory.

Constructivist Learning Theories

Most articles with specific theoretical conceptualizations stress that online doctoral students are adult professionals who demand student-centered learning opportunities through which they are effectively guided to construct meaningful knowledge for their own professional practice and development. Thus, the authors of those articles have utilized different learner-centered learning and practice-oriented learning theories, which can be collectively called constructivist learning theories. The fundamental pedagogical principles drawn from constructivist learning theories underpin the design of several ODPs discussed in the literature. The following two excerpts clearly set the tone of such theorization.

> [A] learner-centered environment is one in which students are partners in the learning, have multiple options for learning, work collaboratively, and help define the objectives and methods of the course... In a learner-centered environment, the students' struggle is a process that leads to improved outcomes (McKeachie & Svinicki, 2006). Learner-centered programs are organized differently to stress the student's responsibility for learning and teaching along with the development of a faculty perspective that moves from didactic, lecture-discussion to a facilitative resource exchange. (Cotter et al., 2008, p. 258)
>
> Historically, a range of traditions related to progressive education and situated learning theories have contributed to research connecting learning and the workplace (Cobb, 2001; Kolb, 1984; Mezirow, 1991; Smith, 2003). Nevertheless, the literature suggests (Argyris & Schon, 1974) that workplaces and universities have traditionally been somewhat estranged though the emergence of student centred learning and the development of transferable skills has clearly kindled initiatives to seek common ground. (Crossman, 2005, p. 19)

Community of Inquiry and Community of Practice

Within the broader constructivist learning paradigm, some articles zoom into more specific social aspects of online learning or professional learning processes and outcomes. These articles have conceptualized online doctoral studies as a dynamic process of creating a community of inquiry or participating in a community of practice. Earlier in this chapter, two interconnected phenomenal aspects of online doctoral education – online doctoral students feeling a sense of isolation and a sense of community – have been discussed as one of the common pedagogical concerns that have received ongoing scholarly attention from online doctoral educators. Those authors concerned about building a sense of community among doctoral students have utilized a community-oriented approach to conceptualizing online doctoral studies. The Community of Inquiry (CoI) framework is, in fact, the most frequently used one among the community-oriented learning theories, providing valuable insights and guidance into ODP design.

> The CoI framework consists of three elements (social, cognitive, and teaching presence) that takes place in the interaction of individual learners and their instructor, as well as the categories and indicators that are to define each presence and to code the transcripts. The element of social presence was defined by Garrison et al. (2000) as "the ability of participants in a community of inquiry to project their personal characteristics into the community, thereby, presenting themselves to others as real people" (p. 89). Effective communication, open communication, and group cohesion are three major aspects of social presence. To achieve educational goals, online course design should create the environment for inquiry to allow quality, open educational communication between learners and the instructor. (Jiang et al., 2019, p. 298)

Another community-oriented theory, which appears several times in the reviewed articles, is Community of Practice (CoP). While the CoI framework has its root in online learning, CoP theory is initially developed in the context of professional learning – more specifically, the apprenticeship context where a novice trainee develops into an expert member of a specific professional community through interacting with other members in the community. Greene, Cote, Koperniak, and Stanley (2021) conceptualize online doctoral studies as a process of participating in moving between multiple CoPs. Thus, doctoral students develop their professional and academic identities as members of different CoPs in their doctoral programs and professional settings. This line of theoretical discussion is particularly relevant to the idea of a professional doctorate, highlighting the immediate impact of doctoral studies on students' professional development.

> As individuals engage in a [CoP], they move from legitimate peripheral participation to full participation. Wenger (1998) came to see this process as an important factor in identity development… Wenger-Trayner and Wenger-Trayner (2015) zoom out to view [CoPs] in multiplicity on a landscape of practice. Through this lens, they explore implications of negotiating identity while navigating boundaries between a range of communities… It is these key concepts of accountability to a community, boundary crossing between communities, and inexpressibility of identity within a particular community that frame and organize our study. (p. 94)

Transformative Learning Theory

Four articles focus on online doctoral students' transformative learning experiences. Mezirow's (1997) transformative learning theory, one of the prominent theoretical accounts of how adults learn and develop, is referenced in nine articles. ODPs provide structured opportunities for adult professionals to critically reflect on their "familiar" practices and systematically engage with relevant scholarship. The international nature of online doctoral communities also allows doctoral students to be exposed to diverse perspectives and rational discourses with students from different cultural and professional backgrounds. Through those intellectual and social engagements, doctoral students experience meaningful perspective transformations. Such perspective transformation is the ultimate goal of the professional learning process, which involves adults' active engagement with constructive learning activities in a supportive learning community. The following excerpt effectively captures the essence of transformative learning experiences in ODPs.

> [T]he student often experiences change as the result of a multiple step process frequently characterized by a disorienting dilemma, followed by the use of active learning, and reflection. The dilemma can serve as a catalyst for learners to examine their assumptions and beliefs through engagement in self-reflection and discourse with others related to changing their view. According to transformative learning theory, this process results in the reorganization of perspective with action to promote change (Santalucia & Johnson, 2010). The product is a learner who emerges with skills to effect broader change. The scientific literature includes outcome studies of *doctoral students' transformative learning experiences*... Trusting relationships and establishing support have been cited as important elements in facilitating *transformative learning processes in online environments.* (Provident et al., 2015, pp. 129–130)

Conclusion

Although the emergence of online doctoral education is often discussed in the context of the advancement of the Internet and communication technologies, the present review demonstrates that its development is firmly rooted in at least two seemingly separate educational phenomena – the growth in online higher education and the growth in professional doctoral education. As briefed in the introduction of this chapter, the growth in both online higher education and professional doctoral education has complex societal backdrops. In addition, internationalized education context has added another layer of complexity to the online doctoral education practice. Although the detailed discussion on those backdrops for the fast development of ODPs falls outside the scope of this review, the review results provide online doctoral educators with several useful recommendations:

- Online doctoral educators need to have a holistic understanding of online doctoral studies: Most authors of the reviewed articles have not brought the complexity to their writings, exclusively focusing on one aspect of online doctoral education (e.g., online education, professional doctorate, and internationalized education). Consequently, there has been an inevitable chasm within the scholarship of online doctoral education – one emerged in online higher education contexts, and the other originated in professional doctoral education contexts (with a few exceptions found in international education settings). Given that the experiences of online doctoral students are constructed by multiple social and pedagogical characteristics of online doctoral studies (Lee, 2020a), such separation in the academic discussion limits our view of online doctoral education. This calls for integrated research efforts to construct a more comprehensive understanding of online doctoral studies and students.
- The design of ODPs is to find the right balance between multiple conflicting needs of online doctoral students: The complexity of online doctoral education is

inevitably manifested in the pedagogical tensions in many ODPs, as observed by most authors in this review project. For example, there is an ongoing tension between providing flexible learning opportunities to adult students with different learning needs and situations and offering well-structured guidance to support their learning experiences. Finding the right balance in the design of an ODP is critical for online doctoral students' retention and success. Also, many online doctoral students appreciate the accessibility of online programs, which enables them to maintain their professional and personal lives; however, many also suffer from a sense of isolation and disconnection created by the physical and psychological distance from tutors and peers (Byrd, 2016). To address such tension (and increase a sense of community among distance students), most ODPs employ a cohort-based structure and diverse community-based pedagogical strategies. However, it is essential to remember that such strategies could, in turn, reduce the accessibility and flexibility of the ODPs.

- There are critical but often neglected research topics in online doctoral education literature: The aforementioned concerns are similar to the common pedagogical issues observed in online higher education or professional learning settings. Most of the reviewed articles focus on those concerns – the flexibility (or structure) of ODPs and the sense of isolation (or community) among online doctoral students. Meanwhile, a relatively small number of articles concern other problems that tend to stem from the particular characteristics of adult learners (e.g., a high level of technology anxiety), doctoral studies (e.g., a lack of research literacy), and international education (e.g., diversity and inequality). Despite the importance of those issues for successful online doctoral studies, there has not been enough scholarly attention to those problems in online doctoral education literature.
- The online doctoral education scholarship can benefit from an integrated theoretical approach: The same pattern emerges from the analysis of theoretical approaches employed in the reviewed articles. Most of the reviewed articles use either online learning theories or adult learning theories to conceptualize online doctoral studies – as demonstrated by the four most commonly employed theories (i.e., constructive learning theories, Community of Inquiry, Community of Practice, transformative learning theory). As the number of ODPs and students enrolled in those programs grows across the globe, the program design improves and pedagogical practices in those programs mature (Holmes & Rockinson-Szapkiw, 2020). It is timely to reflect on the maturity of the scholarship of online doctoral education and the rigor of the current scholarly understanding and practice. While the present review reveals valuable insights into online doctoral education research and practice, it also suggests that more research needs to be conducted using a holistic perspective to develop a comprehensive understanding of online doctoral studies.

References

Argyris, C., & Schön, D. (1974). *Theory in practice increasing professional effectiveness*. Jossey-Bass Publishers.

Arksey, H., & O'Malley, L. (2005). Scoping studies: Towards a methodological framework. *International Journal of Social Research Methodology, 8*(1), 19–32.

Berg, G. A. (2016). The dissertation process and mentor relationships for African American and Latina/o students in an online program. *American Journal of Distance Education, 30*(4), 225–236. https://doi.org/10.1080/08923647.2016.1227191.

Berry, S. (2017). Student support networks in online doctoral programs: Exploring nested communities. *International Journal of Doctoral Studies, 12*, 33–48.

Bolliger, D. U., & Halupa, C. (2012). Student perceptions of satisfaction and anxiety in an online doctoral program. *Distance Education, 33*(1), 81–98. https://doi.org/10.1080/01587919.2012.667961.

Brahme, M., & Walters, L. (2010). While technology poses as the great equalizer, distance still rules the experience. *Journal of Library Administration, 50*(5), 484–514. https://doi.org/10.1080/01930826.2010.488595.

Byrd, J. C. (2016). Understanding the online doctoral learning experience: Factors that contribute to students' sense of community. *Journal of Educators Online, 13*(2), 102–135.

Charmaz, K. (2014). *Constructing grounded theory*. London, England: Sage.

Cobb, J. (2001). Graduates of professional development of school programs: Perceptions of the teacher as change agent. *Teacher Education Quarterly, 28*(4), 89.

Combe, C. (2005). Developing and implementing an online doctoral programme. *International Journal of Educational Management, 19*(2), 118–127. https://doi.org/10.1108/09513540510582417.

Corbin, J., & Strauss, A. (2014). *Basics of qualitative research: Techniques and procedures for developing grounded theory*. Thousand Oaks, CA: Sage.

Cotter, J. J., Welleford, E. A., & Drain, C. B. (2008). Learner-centered online courses/programs in gerontology and geriatrics: New responses to changing needs of health professionals. *Gerontology and Geriatrics Education, 29*(3), 257–269. https://doi.org/10.1080/02701960802359508.

Crossman, J. (2005). Work and learning: The implications for Thai transnational distance learners. *International Education Journal, 6*(1), 18–29.

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education, 2*(2–3), 87–105.

Giroux, H. A. (2014). *Neoliberalism's war on higher education*. Chicago, IL: Haymarket Books.

Greene, J. L. R., Cote, H. K., Koperniak, M., & Stanley, L. M. (2021). A foot in both worlds: Navigating the landscapes of P–12 education postdoctorate. *Journal of Music Teacher Education, 30*(2), 93–107. https://doi.org/10.1177/1057083720983944.

Grooms, L. D. (2003). Computer-mediated communication: A vehicle for learning. *The International Review of Research in Open and Distance Learning, 4*(2), 1–16.

Halter, M. J., Kleiner, C., & Hess, R. F. (2006). The experience of nursing students in an online doctoral program in nursing: A phenomenological study. *International Journal of Nursing Studies, 43*(1), 99–105. https://doi.org/10.1016/j.ijnurstu.2005.03.001.

Hockey, J. (1991). The social science PhD: A literature review. *Studies in Higher Education, 16*(3), 319–332.

Hogan, R., & Devi, M. (2019). A synchronous pedagogy to improve online student success. *International Journal of Online Pedagogy and Course Design, 9*(3), 61–77. https://doi.org/10.4018/IJOPCD.2019070105.

Holmes, J. L., & Rockinson-Szapkiw, A. (2020). The development and validation of the distance doctoral program integration scale. *Online Learning Journal, 24*(4), 182–203. https://doi.org/10.24059/olj.v24i4.1951.

Jiang, M., Ballenger, J., & Holt, W. (2019). Educational leadership doctoral students' perceptions of the effectiveness of instructional strategies and course design in a fully online graduate statistics course. *Online Learning Journal, 23*(4), 296–312. https://doi.org/10.24059/olj.v23i4.1568.

Kolb, D. (1984). *Experiential learning. Experience as the source of learning and development*. Englewood Cliffs, NJ: Prentice Hall.
Kumar, S., & Dawson, K. (2013). Exploring the impact of a professional practice education doctorate in educational environments. *Studies in Continuing Education, 35*(2), 165–178. https://doi.org/10.1080/0158037X.2012.736380.
Kumar, S., & Dawson, K. (2018). *An online doctorate for researching professionals: Program design, implementation, and evaluation*. Edmonton, AB: Athabasca University Press.
Kumar, S., Dawson, K., Black, E. W., Cavanaugh, C., & Sessums, C. D. (2011). Applying the community of inquiry framework to an online professional practice doctoral program. *International Review of Research in Open and Distance Learning, 12*(6), 126–142. https://doi.org/10.19173/irrodl.v12i6.978.
Kumar, S., Ochoa, M., & Edwards, M. (2012). Considering information literacy skills and needs: Designing library instruction for the online learner. *Communications in Information Literacy, 6*(1), 91–106. https://doi.org/10.15760/comminfolit.2012.6.1.120.
Lee, A., & Danby, S. (Eds.). (2012). *Reshaping doctoral education: International approaches and pedagogies*. London, England: Routledge.
Lee, K. (2017). Rethinking the accessibility of online higher education: A historical review. *The Internet and Higher Education, 33*, 15–23.
Lee, K. (2020a). A phenomenological exploration of the student experience of online PhD studies. *International Journal of Doctoral Studies, 15*, 575–593. https://doi.org/10.28945/4645.
Lee, K. (2020b). Autoethnography as an authentic learning activity in online doctoral education: An integrated approach to authentic learning. *TechTrends, 64*, 570–580. https://doi.org/10.1007/s11528-020-00508-1.
Lee, K. (2021). Embracing vulnerability and authenticity in online PhD: The self and a community. In T. Fawns, G. Aitken, & D. Jones (Eds.), *Beyond technology: Online postgraduate education in a postdigital world*. Cham, Switzerland: Springer.
Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Newbury Park, CA: Sage.
Martin, M., & Noakes, M. (2012). Fostering a web 2.0 ethos in a traditional e-learning environment. *Electronic Journal of e-Learning, 10*(3), 283–292.
McKeachie, W. J., & Svinicki, M. (2006). *McKeachie's teaching tips: Strategies, research, and theory for college and university teachers*. Boston, MA: Houghton-Mifflin.
Mezirow, J. (1991). *Transformative dimensions of adult learning*. San Francisco, CA: Jossey-Bass.
Mezirow, J. (1997). Transformative learning: Theory to practice. *New Directions in Adult Continuing Education, 74*, 5–12.
Milstead, J. A., & Nelson, R. (1998). Preparation for an online asynchronous university doctoral course. Lessons learned. *Computers in Nursing, 16*(5), 247–258.
Myers, D., Singletary, J., Rogers, R., Ellor, J., & Barham, S. (2019). A synchronous online social work PhD program: Educational design and student/faculty response. *Journal of Teaching in Social Work, 39*(4–5), 323–343. https://doi.org/10.1080/08841233.2019.1659908.
Provident, I., Salls, J., Dolhi, C., Schreiber, J., Mattila, A., & Eckel, E. (2015). Design of an online curriculum promoting transformative learning in post professional doctoral students. *Journal of Asynchronous Learning Network, 19*(3). https://doi.org/10.24059/olj.v19i3.672.
Roumell, E. A. L., & Bolliger, D. U. (2017). Experiences of faculty with doctoral student supervision in programs delivered via distance. *Journal of Continuing Higher Education, 65*(2), 82–93. https://doi.org/10.1080/07377363.2017.1320179.
Rovai, A. P., & Grooms, L. D. (2004). The relationship of personality-based learning style preferences and learning among online graduate students. *Journal of Computing in Higher Education, 16*(1), 30–47.
Santalucia, S., & Johnson, C. R. (2010). Transformative learning: Facilitating growth and change through fieldwork. *OT Practice, 15*(19), CE1–CE7.
Smith, P. (2003). Workplace learning and flexible delivery. *Review of Educational Research, 73*(1), 53–88.

Snyder, T. D., & Dillow, S. A. (2010). *Digest of education statistics, 2009 (NCES Publication No. 2010-013)*. National Center for Education Statistics. Retrieved from http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2010013

Studyportals (2022, September). *PhD programmes from all around the world*. Retrieved from https://www.phdportal.com/search/phd?utm_source=studyportalsweb&utm_medium=organic

Sunderland, J. (2002). New communication practices, identity and the psychological gap: The affective function of e-mail on a distance doctoral programme. *Studies in Higher Education, 27*(2), 233–246. https://doi.org/10.1080/03075070220120047.

Syler, R. A., & Venkatesh, V. (2018). Growing doctoral education in Africa: The story of an online course at ICT university in Cameroon. *Communications of the Association for Information Systems, 43*(1), 1–21, Article 1. https://doi.org/10.17705/1CAIS.04301.

Tuñón, J., & Ramirez, L. (2010). ABD or EdD? A model of library training for distance doctoral students. *Journal of Library Administration, 50*(7), 989–996. https://doi.org/10.1080/01930826.2010.489004.

Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge, UK: Cambridge University Press.

Wenger-Trayner, E., & Wenger-Trayner, B. (2015). Learning in a landscape of practice: A framework. In E. Wenger-Trayner, M. Fenton-O'Creevy, S. Hutchinson, C. Kubiak, & B. Wenger-Trayner (Eds.), *Learning in landscapes of practice: Boundaries, identity, and knowledgeability in practice-based learning* (pp. 13–30). New York, NY: Routledge.

Williams, P. E., Wall, N., & Fish, W. W. (2019). Mid-career adult learners in an online doctoral program and the drivers of their academic self-regulation: The importance of social support and parent education level. *International Review of Research in Open and Distance Learning, 20*(1), 64–78.

Zawacki-Richter, O., Kerres, M., Bedenlier, S., Bond, M., & Buntins, K. (Eds.). (2020). *Systematic reviews in educational research: Methodology, perspectives and application*. Wiesbaden, Germany: Springer. http://link.springer.com/10.1007/978-3-658-27602-7

Part VII

Design, Delivery, and Assessment

Introduction to Design, Delivery, and Assessment in ODDE

66

Theories, Research, and Practices to Guide ODDE Design and Assessment

Richard E. West

Contents

Abstract

This chapter overviews the 14 chapters in Part 7 of the *handbook,* which are focused on the design, delivery, and assessment of open, online, and digital learning. While the chapters address a wide variety of factors relevant to ODDE, I discuss several common themes, including evidence for the effectiveness of ODDE, standards to guide effective ODDE design, assessment and credentialing of ODDE learning, and the need for future research to move beyond studying individual factors (micro level) in higher education. Finally, I conclude with a call to how we can design the future of ODDE, including first, seeking to understand systemic nature of learning; second, embracing the sociocultural nature of learning, and third, utilizing the full repertoire of diverse scholarship methods to develop knowledge in our field.

R. E. West (✉)
Brigham Young University, Provo, UT, USA
e-mail: rickwest@byu.edu

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_89

Keywords

Online learning · Distance education · Hybrid education · Instructional design · Assessment · Open education

Introduction

A major challenge in the field of open, distance, and digital-based education (ODDE) has been the overemphasis of the role of technology in learning versus pedagogy, strategy, and design. To be certain, new technologies provide new affordances that can anchor new approaches to teaching and learning, and oftentimes, technological innovation precedes pedagogical creativity. However, when we focus too much on the technology implementation, we may miss the bigger concerns with how to design the context to benefit from the technology. In doing so, we may make the error of putting "new wine in old bottles" by resurrecting the "media vs. methods" errors of the 1980s/1990s in the new flasks of online and open education (Lockee, Moore, & Burton, 2001).

In fact, Honebein and Reigeluth (in press) have found that we often do exactly that – and may be going backwards as a discipline. In their analysis, they found that there is research to *improve* learning by focusing on strategy and research to *prove* one media-based approach is better than another through media comparison research. From 2010 to 2019, in their analysis of educational technology journals, they found "a significant rise of experimental, research-to-prove papers. These papers appeared to (1) confound media and instructional methods, (2) not include sufficient information about the instructional objective, (3) omit one or more of the effectiveness, efficiency, and appeal outcomes, and (4) not report whether or not the researchers conducted formative evaluation" (para. 35).

Because of the tempting siren song toward media comparison research, it is especially critical that scholars of open, distance, and digital learning focus on research to *improve* by emphasizing how we design, develop, and assess effective learning in these digital spaces. For this reason, this section of the *handbook* is the largest of the book, and focuses on the design, development, and assessment of learning in ODDE spaces.

Organization of Section 7

Topics for this section of the *handbook* were developed in consultation with the overall *handbook* editors and were an attempt to represent major theoretical thrusts in the discipline. Authors were encouraged to focus on the design, development, and assessment issues related to these topics, rather than on technological developments.

An attempt was made to find some of the most highly cited and respected authors in these areas while representing global diversity. In addition, an attempt was made to represent diversity by seeking some authors that were established experts as well as some rising stars in their areas. I believe that the following chapters represent some of the best thinking and current practices that can guide the effective design of ODDE learning.

The section includes several chapters that overview the design of different kinds of distance learning. First, Graham and Halverson provide guidance on designing blended and flexible learning environments. Meanwhile, Martin and Bollinger lend their considerable expertise to understanding the design of online learning in higher education. In contrast, Borup and Archambault, former editors of the *Journal of Online Learning Research*, describe the effective design of online learning for children and youth. Similar overview chapters are also provided by Schrader on game-based learning and Ge and Huang on problem-based/inquiry-based learning.

After these more general chapters, there are additional chapters the probe strategies for the effective design of specific technology-afforded learning environments such as flipped classrooms (Lee), online learning communities (Cleveland-Innes & Hawryluk), MOOCs (Stracke et al.), and computer-supported collaborative learning environments (Hmelo-Silver & Jeong). Dron and Anderson, and Bozkurt et al. each provided valuable perspectives on informal learning and social media-based learning, respectively, while Bond and Bergdahl shares strategies for addressing one of the most often discussed challenges in ODDE (and any) learning environment – improving student engagement. Finally, assessment within ODDE environments is then discussed by Hickey et al. generally, and by West and Cheng more specifically in the area of open micro/alternative credentials.

Even though this section of the *handbook* is large, it is unfortunately not large enough. An entire handbook could be produced, and often has been, on each of these topics, and by limiting ourselves to only 14 chapters, there were many worthy topics that were excluded. Still, the authors in this section have provided, in my view, enough powerful and useful strategies and frameworks to improve the effective practice of ODDE learning by any scholar/practitioner who reads their chapters.

Overarching Themes

While these chapters are individually diverse, there were a few interesting cross-cutting themes.

Originary Theory to Guide ODDE Design

Graham and Halverson cited McDonald and Yanchar's (2020) description of two types of theory available to ODDE scholars/practitioners. The first is imported theory, transferred from other disciplines and applied to ODDE environments. Examples of imported theory could be the application of Flow theory, Self-determination Theory, Control-Value Theory, and the Player Experience of Need Satisfaction model, all of which Schrader demonstrated can effectively describe and inform game-based learning. Another helpful example is in Hickey et al.'s chapter, where they describe how four main paradigms on learning theory (differential, cognitive-associationist, cognitive-constructivist, and situative-sociocultural) affect our understanding of effective and efficient online assessment. Finally, Bond and Bergdahl described how Astin's (1984) theory of community has helped to characterizes a student's involvement, or engagement, in learning.

The second type of theory is originary theory, developed within a research discipline and specific to that discipline. Because ODDE learning is, and has been, changing rapidly, originary theory in our discipline is still more rare and underdeveloped. However, the authors of these chapters in this section identified several existing originary theory frameworks that can guide effective ODDE design. These include:

- The Community of Inquiry framework, cited by Graham and Halverson as the most referenced theory in blended learning and then discussed extensively by Cleveland-Innes and Hawryluk, as well as Bond and Bergdahl and Hickey et al. This theory illuminates the types of interactions and presence that members of an online environment can achieve.
- The Academic Communities of Engagement framework, cited by Borup, Graham, West, Archambault, and Spring (2020) and Graham and Halverson, which adapts ideas from the COI theory, as well as ideas from research into social learning and student engagement, to describe how personal and course communities interact to support student engagement, particularly for adolescents.
- Cognitive Theory of Multimedia Learning, cited by Schrader to explain how game-based learning affects cognitive processing, as well as by Lee.
- Czerkawski and Lyman's (2016) e-learning engagement design framework, Gao and Ji's (2019) Five-Star Teaching Cycle Framework of Online Courses, and Conole's (2014) 7Cs of Learning Design Framework, all cited by Martin and Bolliger.

In addition, several authors in this section proposed new originary theories, or at least descriptive frameworks, that provide new perspective to guide designers of ODDE learning. Among these new ideas include the following:

- Bond and Bergdahl's bioecological model of engagement, which places the student at the center of engagement, but affected by a microsystem, mesosystem, exosystem, and macrosystem of affecting factors. In addition, these authors described student engagement at the micro level as not only including the traditional descriptions of affective, behavioral, and cognitive dimensions, but also a social dimension – representing the important sociocultural perspective on learning that also affects students' engagement and motivation to learn.
- Dron and Anderson's conceptualization of dimensions of learning, including informal/formal, intentional/incidental, and self-directed/dependent – dimensions that can be helpful in defining and better conceptualizing informal learning.
- Ge and Huang's pedagogical framework that summarizes the four key aspects to designing online problem-based learning as preparation/planning for the PBL,

design and development, implementation and facilitation, and assessment (along with strategies and suggestions for each phase).

- Hickey et al.'s helpful organizing of assessment practices as assessment *of* learning, *for* learning, *as* learning, and then even how assessment is sometimes used *as compliance* or *as sabotage* – and then framing these assessment practices around various learning theories and assessment levels and formats.
- Hmelo-Silver and Jeong's organizing of the computer-supported collaborative learning literature into four different clusters representing different design approaches to CSCL learning, based on technologies, pedagogies, and collaboration modes used.
- Martin and Bolliger's support framework, which identified four types of support (based on a previous paper) that instructors need to be effective online: administrator, personnel, pedagogical, and technological support.
- West and Cheng's description of an open education infrastructure that focuses on open content, open practices, and open recognition (synthesizing previous ideas from Wiley, 2018).

The Need for Research to Expand Beyond Study of Individuals in Higher Education

This *handbook* has adopted a 3M framework for considering research, first discussed by Zawacki-Richter (2009). West and Cheng further develop this framework in the area of open credentials by describing how the micro level of research focuses on individuals, while the meso level represents research on institutional impacts and macro level research studies impacts at the societal level. Authors in this section of the *handbook* identified several new areas for necessary research exploration, which can be organized within this 3M framework. For example,

- Bond and Bergdahl argued that student engagement includes a largely unresearched social dimension, particularly in ODDE settings, as well as the relationship between the bioecological levels in their model of engagement. In addition, they called for more research into disengagement as a separate construct from engagement itself.
- Graham and Halverson argued that blended learning research to date has focused on the individual, micro, level, and research at other levels is needed. They cite several emerging frameworks for understanding institutional adoption of blended learning that can guide future research, including suggestions about necessary blended learning competencies and professional development.
- West and Cheng similarly found that the research on the impacts of open credentials is focused at the micro/individual level, and is despairingly scant at other levels.
- Lee documented explosive growth in research into flipped learning, but mostly these studies have focused on university learners.

- Hickey et al. argued that while online learning has embraced situative/sociocultural perspectives on learning, there is little research consideration of how this theory affects assessment practices. They also caution against throwing out traditional assessment practices in favor of "authentic" assessment, when research is still needed into how all these manners of assessment can be useful in ODDE teaching.
- Martin and Bolliger stated that of Moore's (1989) three types of interaction, learner-content interaction is surprisingly under-studied. Moving towards the meso-level of the 3 M research framework, they argued that the interaction between instructors and instructional designers within institutions is under-studied.

ODDE Learning Can Be Effective

All learning environments can be either effective or ineffective depending on a slew of other variables such as personal investment, social learning factors, the design of the experience, and the learning strategies employed. However, the authors in this section were still able to document many positive effects from including that ODDE learning, including the following:

- **Provides more effective learning** (e.g., Hmelo-Silver & Jeong, Lee, Schrader).
- **Improves student communication/collaboration** (Bozkurt, Hmelo-Silver & Jeong). Similarly, Schrader explained the relationship in reverse, that student collaboration promoted the strongest learning in game-based environments.
- **Promotes student engagement** (e.g., Bond & Bergdahl, Bozkurt, Graham & Halverson, Hmelo-Silver & Jeong, Lee, Schrader).
- **Incorporates more active student learning** (e.g., Hmelo-Silver & Jeong, Lee).
- **Improves flexibility and individualized learning as well as more flexible teaching** (e.g., Bozkurt, Lee, Stracke et al., West & Cheng).
- **Improves student autonomy** (e.g., Schrader, West & Cheng).
- **Supports feedback to learners on performance** (e.g., Hickey et al., Hmelo-Silver & Jeong, Schrader, West & Cheng).

However, these effects, unsurprisingly, were very nuanced, and results varied depending on many variables including effectively matching the ODDE learning model with individual learners who would most benefit, utilizing effective design/teaching strategies, and employing strong learning activities.

Standards to Guide ODDE Design

Several authors identified helpful standards frameworks that can guide our effective design and implementation of ODDE environments. For example,

- Florence and Bolliger identified eight different online course development rubrics or standards frameworks, both within the United States and internationally, for designing higher education online learning. They then synthesized these standards and rubrics to create the Online Course Design Elements instrument that identifies five categories of design elements that should be attended to in creating effective distance education courses.
- Similarly, Stracke et al. presented the Quality Reference Framework as synthesis of international standards in the form of seven dimensions for creating effective online learning, and in the case of their chapter, MOOCs.

How Assessment Supports Learning

Three chapters in particular argue that rather than simply assuming that assessment follows the teaching/learning process, that effective and innovative approaches to assessment and credentialing can restructure and prompt changes in how we teach and "do" education. This is particularly true for ODDE environments where, as Hickey et al. argued, learning assessment takes on wholly new meaning because the signals for what we value are different. For example, as delivering content and participating in learning interactions became more flexible due to online technologies, instructional designers are increasingly moving away from seat time and credit hours as evidence of "learning" and focusing more on skills, performance, and abilities. But this requires new thinking when it comes to how we assess learning. In addition, the amount of time required for individual feedback in online interactions can be overly strenuous – again requiring creativity in how to provide feedback and assessment in efficient ways.

Similarly, Dron and Anderson argued that assessment and digital credentialing can be especially powerful in supporting informal learning, by providing a mechanism for recognizing the value of skills/knowledge gained in informal learning. This system benefits from the use of challenge assessments, decoupled from the learning itself, to allow for more learner flexibility. In addition, technological systems are developing – but need to develop more – to improve how we store, recognize, and share these credentials.

Finally, West and Cheng offered definitions to the complicated world of micro/open/alternative credentials, and review research findings about the impacts of these credentials at the micro/meso/macro levels of education. While acknowledging that the research on these types of credentials is small and emerging, the authors argued that the core ideas of transparency, openness, learner agency, and clear data representation are sticky ideas that will continue to impact education in one form or another.

Designing the Future of Open, Distance, and Digital Education

During the COVID-19 pandemic, the world learned the value of instructional designers. As schools closed and laptops opened; parents, teachers, and students learned quickly the difference between well designed instruction and emergency teaching (Hodges & Fowler, 2020). Instructional designers around the world were highly sought after to help soften the blow. This affirmed the value the discipline needs to play on the world stage, and the growth and maturity of the field over the last century.

The chapters in this section describe well this maturity. We have a solid foundation of theory and research to describe precisely how effective learning can be designed and assessed in many situations, levels, and subject areas. But once the foundation of a home is established, it is not the time to sit down in the recliner, but rather to continue building the walls upward.

So what are the next steps that will enable the field of open, distance, and digital learning to build upon its strong foundation? The chapters in this section suggest many ideas, and I conclude with the following overarching observations.

First, we understand well how to design and develop an effective product, curriculum, or training, but we need greater focus on understanding the systemic nature of learning. Much of the research in the field focuses, as mentioned above, on the micro level of the 3M framework. In addition, research tends to study single variables, and designs often hyperfocus on a single theory for explaining learning, and in both cases the complexity of the learning environment can be ignored. It is difficult to conduct studies sophisticated enough to understand the complex interconnection between all of the levels of the 3M framework. But we need to research and design the systems, in order to best affect the individuals.

Second, but similarly, we need research and design to fully embrace the sociocultural nature of learning. Social relationships affect how people learn (Cleveland-Innes & Hawryluk), how they collaborate (Hmelo-Silver & Jeong), how they get engaged in education (Borup et al., 2020) and how they should be assessed (Hickey et al.). When we talk about a systemic view of learning, a major and critical part of that system are the relationships learners have with each other, their teachers, and even their personal support systems (see Borup et al., 2020).

Third, we need research methods as rich and varied as the humans we study. While educational methodologists have developed increasingly more sophisticated methods for studying the complex process that is human interaction and learning, our research journals tend to remain unbalanced. Far too many published research studies re-examine research questions we already know the answer to, using methods we have already seen before. Other disciplines have pushed the edge of their expertise developing a wide variety of approaches to research, and we need similar variety in ODDE scholarship.

As I described in another article (West, 2020) there are different ways of creating knowledge and legitimate scholarship, and we need to appreciate and encourage, in our journals, publication of all these ways of knowing, including:

- Review scholarship that rigorously summarize what other studies have found.
- Conceptual scholarship that identifies and qualifies key concepts that characterize a phenomenon and model the relationships between items in a system.

- Theoretical scholarship that critiques existing ideas, establishes the boundaries of existing theory, and develops new paradigms that create possibilities for new thinking.
- Exploratory research that develops theory by exploring variables and their relationships through empirical observation and often bottom-up inductive thinking.
- Explanatory research that tests theory by objectively validating its generalizability.
- Critical research that explores what ideas and experiences mean to various groups, and how we can productively put theory into action.
- Design-based research and design cases that develop local and generalized theory by designing interventions for real learners in real contexts.

In the last 20 years, the world of open, distance, and digital learning has evolved dramatically, as social media (Bozkurt et al.), microlearning (West & Cheng), complex educational games (Schrader), MOOCs (Stracke et al.), and other technological innovations have changed the way we can teach and learn. It cannot be known what new technologies will be developed in the future to meet the needs of future learners, but only through a *systematic* understanding of learning, and especially the rich *sociocultural* layers that affect education, gained via a *variety of research methodologies* will we be prepared for this future. The chapters in this section provide the foundation, but now we need to push forward to finish the building.

Cross-References

► Blended Learning Research and Practice
► Designing Online Learning Communities
► Designing Online Learning in Higher Education
► Digital Credential Evolution
► Dimensions of Assessment in Online and Open Education in Terms of Purpose, Function and Theory
► Flipped Learning
► Instructional Quality and Learning Design of Massive Open Online Courses
► Serious Games and Game-Based Learning
► Student Engagement in Open, Distance, and Digital Education
► Synergies Among the Pillars
► Using Social Media in Open, Distance, and Digital Education

References

Astin, A. W. (1984). Student involvement: A developmental theory for higher education. *Journal of College Student Development, 25*(4), 297–308.

Borup, J., Graham, C. R., West, R. E., Archambault, L., & Spring, K. J. (2020). Academic communities of engagement: An expansive lens for examining support structures in blended and online learning. *Educational Technology Research and Development, 68*(2), 807–832.
Conole, G. (2014). The 7Cs of learning design – A new approach to rethinking design practice. In S. Bayne, C. Jones, M. de Laat, T. Ryberg, & C. Sinclair (Eds.), *Proceedings of the 9th international conference on networked learning 2014* (pp. 502–509). Edinburgh: University of Edinburgh. Retrieved from https://www.lancaster.ac.uk/fss/organisations/netlc/past/nlc2014/abstracts/pdf/conole.pdf
Czerkawski, B. C., & Lyman, E. W. I. I. I. (2016). An instructional design framework for fostering student engagement in online learning environments. *TechTrends, 60*, 532–539. https://doi.org/10.1007/s11528-016-0110-z.
Gao, D., & Ji, Y. (2019). Research on the framework of online course design based on "First Principles of Instruction". In *2nd Conference on education and cognition, behavior, neuroscience* (ESSP proceedings series, pp. 30–38). https://doi.org/10.25236/icecbn.2019.006.
Hodges, C. B., & Fowler, D. J. (2020). The COVID-19 crisis and faculty members in higher education: From emergency remote teaching to better teaching through reflection. *International Journal of Multidisciplinary Perspectives in Higher Education, 5*(1), 118–122.
Honebein, P. C., & Reigeluth, C. M. (in press). How do we solve a problem like media and methods? In R. E. West, & H. Leary (Eds.), *Foundations of learning and instructional design technology*. https://edtechbooks.org/
Lockee, B., Moore, M., & Burton, J. (2001). Old concerns with new distance education research. *Educause Quarterly, 24*(2), 60–68.
McDonald, J. K., & Yanchar, S. C. (2020). Towards a view of originary theory in instructional design. *Educational Technology Research and Development, 68*(2), 633–651.
Moore, M. G. (1989). Editorial: Three types of interaction. *The American Journal of Distance Education, 3*(2), 1–7. https://doi.org/10.1080/08923648909526659.
West, R. (2020). The role of conceptual and theoretical scholarship in understanding research in digital learning. *Revista de Educación a Distancia (RED), 20*(64).
Zawacki-Richter, O. (2009). Research areas in distance education: A Delphi study. *International Review of Research in Open and Distance Learning, 10*(3), 1–17.

Blended Learning Research and Practice

67

Charles R. Graham and Lisa R. Halverson

Contents

Abstract

The strategic integration of online and in-person learning modalities (referred to as blended learning) is becoming increasingly popular in primary, secondary, post-secondary, and corporate contexts. Some have even called blended learning (BL) the "new normal" in education. This chapter addresses five important questions for scholars interested in contributing to research in this domain. First, how are scholars defining BL? Second, what are some of the common models of BL being used in higher education and K-12 learning environments? Third, what is happening with BL research and practice in different regions of the world? Fourth, what research frameworks have been developed by BL scholars and what are other common frameworks that scholars have borrowed from other

C. R. Graham (✉)
Brigham Young University, Provo, UT, USA
e-mail: Charles.Graham@byu.edu

L. R. Halverson
Utah Valley University, Orem, USA
e-mail: lisa.halverson@uvu.edu

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_68

domains? Finally, the chapter overviews some of the current BL research around institutional, faculty, and student issues. The global pandemic from 2019 to 2021 has increased administrator, instructor, and student awareness and familiarity with many online learning options. It is likely that blended practices that combine both online and in-person instruction will become increasingly prevalent. Scholars will need to better understand how different blended models and pedagogical practices within those models work to improve learning outcomes, increase access and flexibility for learners, and impact cost efficiencies.

Keywords

Blended learning · Hybrid learning · Mixed modalities · Online and in-person instruction

Introduction

The purpose of this chapter is to introduce you to current research and practice in the area of blended learning (BL), which has become widespread in secondary schools, higher education, and corporate training environments. Attempts to accurately quantify the growth of BL were frustrating because institutions lacked formal mechanisms for labeling and tracking BL in addition to the fact that much of the BL was being implemented by individual instructors without institutional oversight (Graham, 2019; Graham et al., 2007). However, some institutions like the University of Central Florida were early adopters of BL and have been tracking its growth and impact on student learning and satisfaction for decades (Dziuban, Graham, Moskal, Norberg, & Sicilia, 2018; Dziuban, Hartman, Juge, Moskal, & Sorg, 2006; Dziuban, Hartman, & Moskal, 2004; Dziuban & Moskal, 2011; Moskal, Dziuban, & Hartman, 2013). Despite the challenges with accurately quantifying all of the BL that is happening, it is clear that the combination of online and in-person learning is becoming the norm for many institutions. Therefore, it is important to understand the research being done in this area and where it intersects with and differs from research related to fully online and fully in-person learning contexts.

The chapter content will be organized around the following questions of interest to researchers who want to study BL contexts.

1. What is blended learning?
2. What are common models of blended learning?
3. What is happening with blended learning internationally?
4. What blended learning frameworks are being used by researchers?
5. What are some important areas of research in blended learning?

What Is Blended Learning?

The term blended learning (sometimes also called hybrid learning) was popularized in the early 2000s. Since then, there have been many commentaries and academic discussions about how to define the term. In particular, a group of interested scholars associated with the Alfred P. Sloan Consortium (now the Online Learning Consortium) met repeatedly with the specific intent of creating a working definition that would help institutions of higher education and researchers navigate this new space between fully online learning and the in-person learning typically happening on campuses (Picciano, 2011). Definitional issues were complex because each institution seemed to have a slightly different model of what they felt was important for their own context and environment. At the same time, researchers trying to study this emerging phenomenon were interested in less ambiguity and clear definitions and descriptions of the boundaries of blended learning. Yet many were frustrated (Oliver & Trigwell, 2005). Many of the most popular definitions focused on issues related to the modality, media, and method of different blends (see Table 1).

Despite the conceptual fuzziness, the term "blended learning" continued to grow in popularity, but with a slightly different meaning for each institution. Hrastinski (2019) referred to it as an "umbrella term" while Dziuban and colleagues (Dziuban, Shea, & Moskal, 2020; Norberg et al., 2011) referred to the term as a "boundary object" that is "plastic enough to adapt to local needs and constraints of the several parties employing them, yet robust enough to maintain a common identity across sites . . . weakly structured in common use . . . strongly structured in individual site-use" (Star & Griesemer, 1989, p. 393). In previous publications, Graham (2006, 2013, 2019, 2021) argued for a broad definition of BL focused primarily on

Table 1 Blended learning definitions media, method, and modality

3 Ms	Description	Examples
Modality	The physical instructional setting or environment	Definitions focused on a mix of online and in-person instruction. Often definitions tried to define percentage thresholds that would change an environment from "fully online" to "blended" in order to meet institutional needs (Allen & Seaman, 2007; Watson et al., 2010).
Media	Physical tools or technology used to deliver or mediate instruction	Definitions focused on using a combination of different technology tools like "the combination of different training 'media' (technologies, activities, and types of events) to create an optimum training program for a specific audience" (Bersin & Associates, 2003, p. xv).
Method	Teaching strategies and practices used in instruction	Definitions included pedagogical requirements by including things like "integrating . . . in a planned, pedagogically valuable manner" (Picciano, 2009, p. 10).

Definition: Blended Learning is the strategic combination of online and in-person learning.

Fig. 1 Parsimonious definition of blended learning

combining modalities and allowing innovations in method and media to distinguish between the models and quality of the blends. Figure 1 shows this broad definition that will be used throughout the chapter.

What Are Common Models of Blended Learning?

Early researchers in K-12, higher education, and corporate training sought to categorize and classify BL models that were observed in practice. Twigg (2003) identified higher education models such as supplemental, replacement, emporium, and buffet. Staker and Horn (2012) identified rotation, self-blend, enriched virtual, and flex models among others that have become popular in K-12 environments. Many of these classification models emphasize the physical features of the blend rather than the pedagogical features (Graham, 2021). For example, blends might focus on rotating between online and in-person instruction (rotation models) or providing both online and in-person instructional choices to students (buffet model) without specifying the pedagogical practices to be used in each modality.

More recent models developed have provided design guidance related to relevant pedagogical practices. For example, the Multimodal Model (Picciano, 2009, 2017) matches instructional approaches in different modalities with a range of pedagogical objectives, and Farmer (2020) recently identified six common models in higher education that add some high level pedagogical descriptions to the typical structural description of blends. In a recent research-driven planning guide for educators, Joosten et al. (2021), emphasized pedagogy as one of four important dimensions to consider in creating effective blends.

The 2019 global pandemic increased the number and variety of blends being explored at all educational levels. In order to keep operating, many K-12 schools and universities implemented technology-mediated forms of instruction with very limited faculty training and resources. Commonly referred to as *emergency remote teaching* (Hodges, Moore, Lockee, Trust, & Bond, 2020), many of the online practices attempted to preserve the more familiar synchronous nature of traditional teaching through the use of online conferencing systems. Therefore, in the last couple of years we have seen an increase in a unique form of BL sometimes referred to as blended synchronous instruction (Bower et al., 2015) or HyFlex (Beatty, 2019) that concurrently involves both synchronous online and in-person students in learning experiences (Irvine, 2020; Osguthorpe and Graham 2003). Additionally, the term "bichronous" online learning has surfaced as the combination of synchronous/asynchronous instruction (Martin, Polly, & Ritzhaupt, 2020). This is a form of *online learning* when both synchronous and asynchronous elements are fully online and considered *blended learning* when the synchronous element takes place in-person.

Within the larger umbrella of BL, we see that there is a wide range of blended models that varies in *physical* and *pedagogical* dimensions. It is important for researchers to clearly specify both the *physical* structure and *pedagogical* elements of a blended model or design. Research that just looks at the physical structure of the blend as a treatment effect without considering the pedagogical dimension of the blend will have limited usefulness because there is a significant body of research that suggests pedagogy (method) is more influential than modality or media in terms of student learning (Dziuban et al., 2020; Clark, 1983; Clark, 1986; Cunningham, 1986; Kozma, 1991; Clark, 1994a, b; Kozma 1994).

What Is Happening with Blended Learning Internationally?

Research published in 2012 (Halverson et al.) and 2013 (Drysdale et al.) showed very little international focus in the most frequently cited articles discussing BL, and in the theses and dissertations on the topic. In order to learn more about BL outside of North America, Spring and Graham (2017) investigated the most frequently cited articles on BL in each region of the world. They determined which articles from each region were the most cited, how the regions compare in terms of citations and which journals publish these highly cited articles. One of the authors' findings was a large disparity in citation patterns of BL research around the world, "a gap that was greater than expected" (p. 35): "North America exceeds the others, with twice as many citations than the next highest, Europe. Oceania (3rd) and Asia (4th) each garnered about half as many as Europe" (p. 31). The authors called for more in-depth research to be done in every region.

In the intervening years, BL research has advanced internationally. Galvis (2018a, 2018b) studied how Latin American universities were strategically developing virtual and BL environments. Using case studies of five countries, Galvis explored the challenges that institutions of higher education encounter when trying to adopt and specified guidelines for adoption, particularly in Latin American settings.

Research from the Asian and Pacific areas has particularly flourished. Tham and Tham (2013) investigated challenges to BL adoption and implementation in the countries of China, Japan, Singapore, and South Korea. Supported by UNESCO Bangkok, Lim and Wang (2016) gathered case studies throughout the Asia-Pacific region to "explore the potential of blended learning, including its impact on the role of teachers, the relationship between teachers and students, and the nature of educational institutions themselves" (p. xiii). UNESCO gave a regionally specific explanation for the view that BL was a valuable approach to promoting inclusive education: "especially important in Asia-Pacific – the world's most populous and most disaster-prone region – so that learners can continue to study without a physical classroom or campus" (p. xiii).

Lim and Graham's (2021) *Blended Learning for Inclusive and Quality Higher Education in Asia* expands upon the work done in Lim and Wang (2016). Motivated by the importance of equitable access to quality higher education for all, they argued that "institution-supported rapid innovation is more critical than ever" (p. v) and see blended and online learning as "a fundamental principle for action" (p. vi) in enabling this access. Using research from six Asian countries – Cambodia, China, Hong Kong, Korea, Malaysia, and Sri Lanka – they examined both university-level initiatives (examining the support mechanism for successful BL in Asian universities) and disciplinary-level practices (documenting promising practices and lessons learned). Disciplines included general education, English language, visual arts, linguistics, STEM, and teacher education, and topics researched included learning design, academic integrity, interactive BL, professional development, and augmented reality.

In the final chapter of *Blended Learning for Inclusive and Quality Higher Education in Asia*, Zaugg, Graham, Lim, and Wang (2021) evaluated the previous chapters according to a framework devised to guide higher education institutional strategic planning when driving, sustaining, and scaling up BL practices (Lim, Wang, & Graham, 2019). The framework itself is the result of collaboration across higher education institutions in the Asia-Pacific regions, and proposes seven strategic dimensions to be considered in institutional strategic planning, namely (1) curriculum; (2) vision and policy alignment; (3) infrastructure, facilities, resources, hardware and support; (4) professional development; (5) student learning support; (6) partnerships; and (7) research and evaluation. The authors synthesized the discussions of each previous chapter as they related to the dimensions of the framework. Finally, the authors identified gaps in the synthesis and made six key recommendations for universities in Asia to develop their capacity for BL. First, they argued, while Asian HEIs can learn from other BL research, many issues may be unique to the learning culture in Asia. Second, programs would benefit from better alignment between BL and current theories of learning. Third, HEI leadership and BL practitioners must together make concerted efforts to build congruence between institutional shared vision and individual practices of BL. Fourth, HEI's capacity building will benefit from prioritizing pedagogy and teacher professional development. Fifth, libraries can support the advancement of BL if HEIs re-envision their roles as support hubs and resources. And finally, sixth, HEIs can learn from the expansion of BL in and lessons learned from the K-12 sector while also providing resources for students, while still in high school, to earn advanced university credit or take apprenticeship instruction through blended opportunities.

What Blended Learning Frameworks Are Being Used by Researchers?

McDonald and Yanchar (2020) identified two types of research frameworks: *originary* and *imported*. Imported frameworks are borrowed from other domains (say psychology) for use within the domain. Originary frameworks are developed within or adapted for use within a specific research domain. Because BL as a domain is fairly young, there are a limited number of originary research frameworks available for researchers to use. BL models presented earlier in the chapter are a few examples of originary frameworks within BL. A recent model that has received significant attention during COVID has been the HyFlex model (Beatty, 2014, 2019) that provides design guidance for supporting student-directed learning paths across multiple modalities. Shea (2010) built on the "how people learn" framework (Bransford et al., 2000) to identify elements that influence decisions in a blended environment in order to provide design guidance for developing instructional strategies for particular learners in particular contexts. This section of the chapter will share a few additional originary frameworks used in BL. A more extensive coverage of BL research frameworks can be found in Graham (2021, in press).

By far, the most referenced framework in current BL research is the Community of Inquiry framework (COI; Garrison, Anderson, & Archer, 2000). The COI framework emphasizes the importance of cognitive, teaching, and social presence in building a powerful educational experience. Though this framework evolved from online work with text-based computer conferencing, it was quickly adapted to a BL environment (Garrison & Kanuka, 2004; Garrison & Vaughan, 2008; Vaughan, Cleveland-Innes, & Garrison, 2013). Hundreds of studies, including foundational work on the COI framework, are being archived by Athabasca University at https://coi.athabascau.ca/. Another framework related to blended teaching competencies is the Blended Teaching Readiness framework (Graham et al., 2019). This framework was developed initially to support primary/secondary education blended teaching professional development. It identifies and elaborates on four core blended teaching competency areas: (a) online integration, (b) data practices, (c) personalization, and (d) online interaction (Archibald, Graham, & Larsen, 2021; Graham et al., 2019; Pulham & Graham, 2018; Pulham, Graham, & Short, 2018).

One of the early areas where BL researchers have developed frameworks is related to institutional adoption and/or transition to BL. Many researchers have used imported frameworks such as Everett Roger's Diffusion of Innovations (1962) or the Technology Acceptance Model (Davis, 1989). Others have tried to create frameworks more specific to institutional adoption of BL. The Framework for Institutional Adoption of Blended Learning (Graham, Woodfield, & Harrison, 2013) identifies three stages of institutional adoption: (a) awareness/exploration, (b) adoption/early implementation, and (c) mature implementation/growth. Indicators for each of the stages related to institutional strategy, structure, and support are described. The Framework for Transition to Enhanced Blended Learning (Adekola, Dale, & Gardiner, 2017) characterizes stakeholder roles, organizational preparedness areas, institutional considerations, and change agents to help institutions manage the transition to BL. Two other originary frameworks were developed at the systems level to help institutions plan for transitions to BL: the Framework for Strategic Planning of BL in Institutions of Higher Education (Lim et al., 2019) and the Framework of Complex Adaptive Blended Learning Systems (Wang, Han, & Yang, 2015).

Finally, student engagement has been an important area of research for traditional learning environments. It is natural that researchers would try to import and adapt frameworks from educational psychology research to blended contexts. Halverson and Graham (2019) developed a conceptual framework for blended environments with constructs and indicators for cognitive and emotional engagement. Borup et al. (Borup, Graham, West, Archambault, & Spring, 2020; Borup, Jensen, Archambault, Short, & Graham, 2020) recently developed the Academic Communities of Engagement framework intended specifically for looking at affective, behavioral, and cognitive dimensions of student engagement in blended and online learning environments. The framework posits that students have a zone of independent engagement that is extended through support from actors in personal and course communities. Support elements for each dimension of engagement can be distributed across different community actors and communities that mix virtual and in-person support.

What Are Some Important Areas of Research in Blended Learning?

This section addresses some of the BL research related to institutional issues, faculty issues, and student issues.

Institutional Issues

According to Smith and Hill (2019), BL research and practice has been, to this point, "predominantly an individual rather than an institutional endeavour," with projects that are small in scale that provide a "snap-shot in time evaluation" (p. 391). This "methodological individualism" (Brown, 2016, p. 5) means that researchers are missing the "network of socio-technical interactions in higher education organizations [which] would get us closer to unpacking the black box of situated faculty decision-making" (p. 7). We need more research being done at the institutional level to unpack this "black box."

Research on the nature of institutional BL adoption has begun to be done. Graham, Woodfield, and Harrison (2013) developed a framework (the Blended Learning Adoption Framework) identifying the three stages of institutional BL adoption, namely (1) awareness/exploration, (2) adoption/early implementation, and (3) mature implementation/growth. Later, Porter and Graham (2016) applied that framework to examine how institutional *strategy*, *structure*, and *support* decisions facilitate or impede BL adoption among higher education faculty. They found that faculty adoption was most influenced by the availability of sufficient infrastructure, technological and pedagogical support, evaluation data, and the alignment of faculty and administrators' purpose for adopting BL. They followed this quantitative research with qualitative analysis in Porter, Graham, Bodily, and Sandberg (2016), where the authors explored how higher education faculty's innovation adoption category affected which measures facilitate or impede BL adoption. Additional research into institutional adoption of BL can complement what we are beginning to understand.

Research is also being done into the institutional support necessary for adoption of BL practices. Rasheed, Kamsin, and Abdullah (2020) noted that the biggest institutional challenges to adopting BL were technological provision challenges – the high cost of producing electronic content, the cost of online learning technologies, overly complex technology causing distractions to students, the creation of tools that are flexible and compatible with other systems, the complexity of technology, and the implementation of LMSs to suit student learning styles – as well as the need to train faculty in effective online and blended practices.

However, when focusing on low-budget institutions, Abusalim, Rayyan, Jarrah, and Sharab (2020) found that faculty training had a significantly higher influence on satisfaction with blending practices than did IT infrastructure. “Therefore,” the authors argued, “low-budget institutions should focus first on helping instructors shift to student-centred styles of pedagogies before making large investments in IT infrastructure” (p. 1203). Such training support was also deemed important by McGee, Windes, and Torres (2017), who found three kinds of support to be most influential to the development of the online expertise that is necessary to BL: Formal training of the instructor (including skills-based training, training in best practices, and course rubric strategies), provision of external supporting mechanisms (including instructional design help, external course review before implementation, opportunities to consult with others about online instruction, help desk availability for just-in-time support, and institutional recognition and/or rewards), and prolonged experience (including recognition and rewards for that experience). Further research into how to best support faculty in blended instruction can enrich our understanding of this important area.

Faculty Issues

The expansion of technology’s usage in K-12 and higher education classrooms, whether through planned blended and online learning programs, or emergency remote teaching during the COVID-19 pandemic, has created new teacher training and professional development (PD) needs (Cavanaugh & Deweese, 2020; Philipsen, Tondeur, Roblin, Vanslambrouck, & Zhu, 2019; Short, Graham, Holmes, Oviatt, & Bateman, 2021). This is particularly true because teaching online requires new attitudes, knowledge, and skills for success (Salmon, 2011). Thus the 2016 National Education Technology Plan (U.S. Department of Education, 2016) noted that “effective use of technology is not an optional add-on or a skill that we simply can expect teachers to pick up once they get into the classroom. . . . Schools should be able to rely on teacher preparation programs to ensure that new teachers come to them prepared to use technology in meaningful ways” (p. 32). The 2017 National Educational Technology Plan (U.S. Department of Education, 2017) added that faculty need “continuous, just-in-time support that includes professional development, mentors, and informal collaborations" (p. 28). Below we review some of the current research into teacher training and professional development for blended instruction.

Short, Graham, Holmes, et al. (2021) found few articles (7 of the 58 initially reviewed) and no systematic reviews of current peer-reviewed research on PD or training for blended learning teachers for primary/secondary age children. To fill this gap, their research reviewed works that focused on intentionally preparing these teachers for blended teaching. Articles on the topic proliferated in 2016 and thereafter. A significant portion of the results (40.9%) came from international contexts, an improvement from the finding in Halverson, Graham, Spring, Drysdale, and Henrie (2014) that BL research originating from regions other than North America and Europe were underrepresented in the most impactful BL publications. Short et al. (2021) also identified the most impactful articles and authors according to citation count, the most prolific journals publishing such research, and the most common research methods used in the studies. They also determined broad themes based on the articles' research questions and findings. Those themes included articles which were reviews, models, and theories; articles focused on training through university coursework and PD; articles proposing competencies for blended teaching; and articles that provided metrics to evaluate readiness for blended teaching.

Practitioners and administrators seeking insights into what will help most in the classroom can look to Philipsen et al. (2019), who used a meta-aggregative approach to analyze qualitative research into faculty PD in blended and partially online settings. The authors identified six broad areas for creating successful PD. First, such PD should be crafted so that teachers receive just-in-time support, feedback, and clear pedagogical rationale across the entire professional development process. Second, faculty want training that takes into account their unique institutional context, through planning that acknowledges the institutional characteristics, existing programs, and any financial components. Third, successful PD for blended instruction recognizes and gives participants time to reflect upon the psychological or mental changes that these nontraditional methods of instruction can have upon one's professional identity and educational beliefs. Fourth, faculty need clarity about the specific goals and procedures of the PD, and the relevance of that training to teachers' own personal and professional goals. Fifth, successful PD uses strategies for reaching their overall goals, including encouraging teacher reflection, enabling teachers to experience blended and online instruction in an active way, inspiring teachers' confidence and motivation, and facilitating peer support. Finally, PD should encourage knowledge-sharing within the institution as well as continuous evaluation of processes to best tailor further initiatives to existing contexts and needs.

Another important element for practitioners is to understand which competencies must be mastered for effective blended teaching. Short, Graham, Holmes, et al. (2021) found few peer-reviewed articles on the competencies in blended teaching (4 of the 58 reviewed) and mentioned the need to look beyond peer-reviewed articles to online resources and white papers from professional organizations in their analysis (Pulham et al., 2018; Pulham & Graham, 2018). Among the pertinent articles, there does not appear to be agreement on what should constitute BT competencies. Some competencies adapted existing frameworks (Huett, Huett, & Ringlaben, 2011; Pulham & Graham, 2018), while others created entirely or partly new frameworks (Al-Doseri, Elgazzar, & Nouby, 2016; Bjekic, Krneta, & Milosevic, 2010; Foulger, Graziano, Schmidt-Crawford, & Slykhuis, 2017). Research can be done to test the efficacy of these competencies in improving student learning in blended settings.

In addition to competencies, new research is emerging on how to evaluate teacher readiness for blended teaching. Graham, Borup, Pulham, and Larsen (2018, 2019) created and empirically validated instruments to measure K-12 Blended Teaching Readiness. Archibald and colleagues (2021) took the instrument one step further, validating its ability to show that the blended teaching readiness model and accompanying instrument are reliable for use with teacher candidates both before and after going through a blended teaching course. Graham, Borup, Short, and Archambault (2019) created a professional development guidebook organized around the K-12 Blended Teaching Readiness model. Short and colleagues have done further validation research around the readiness model with analysis of hundreds of artifacts used for K-12 blended teaching professional development as well as dozens of interviews with experienced teachers using blended approaches (Short, Graham, & Sabey, 2021; Short, Hanny, Jensen, Arnesen, & Graham, 2021).

Student Issues

Many issues face students participating in BL, including motivation, self-direction, and time management as well as preparation in basic digital skills and sufficient internet service. But one of the most researched (Azevedo, 2015) relates to student engagement. Student engagement, or the involvement of the student's cognitive and emotional energy to accomplish a learning task (Halverson & Graham, 2019; Schunk & Mullen, 2012), correlates with important educational outcomes (Conrad, 2010; Wang & Degol, 2014). Such correlations have led some to refer to learner engagement as "the holy grail of learning" (Sinatra, Heddy, & Lombardi, 2015, p. 1). Spring, Graham, and Ikahihifo (2018) give a good introduction to the issues in the field.

Halverson and Graham (2019) reviewed models, definitions, and constructs of learner engagement, delineating challenges with prior research, including lack of clarity surrounding definitions (Fredricks, Blumenfeld, & Paris, 2004; Henrie, Halverson, & Graham, 2015), muddling of indicators and facilitators of engagement (Skinner, Furrer, Marchand, & Kindermann, 2008), and a focus on institutional rather than activity or course-level factors (Ainley, 2012; Wang, Bergin, & Bergin, 2014). The authors then suggested factors for a conceptual framework grounded in existing engagement literature and contextualized for blended settings, specifying cognitive indicators of engagement (attention, time on task, effort and persistence, cognitive and metacognitive strategy use, deep concentration or absorption, and individual interest or curiosity) and emotional indicators (enjoyment, happiness, confidence or self-efficacy, confusion, boredom, frustration, and anxiety). Follow-up research (Halverson, 2016) operationalized and tested this model of BL engagement using exploratory and confirmatory factor analysis and developed a new instrument, the Blended Learning Course Engagement Survey, to take into account context (online or face-to-face) and the cognitive and emotional aspects of learner engagement in such settings. Results showed the related yet distinct nature of face-to-face and online engagement and that indicators of engagement considered behavioral in some alternative models of engagement are empirically indistinguishable from cognitive indicators.

Another attempt to expand the theory base in BL research includes Borup, Graham, West, Archambault, and Spring's (2020) investigation of the Academic Communities of Engagement (ACE) framework. The ACE framework suggests that a student's ability to engage is facilitated by support from both personal and course communities, which must function together to increase students' affective, behavioral, and cognitive engagement (Fredricks et al., 2004). Just as in Vygotsky's (1978) zone of proximal development, ACE proposes that a student's zone of independent engagement can be extended with support from the personal and course communities. The authors identify actors from these communities that provide such support. Martin and colleagues have also investigated the relationship between facilitators and student perception of engagement (Martin & Bolliger, 2018; Martin, Wang, & Sadaf, 2020).

Conclusion

The 2019 global pandemic has increased the number and variety of blends being explored at all educational levels. By April 2020 some 190 countries across the globe closed their schools and universities. This forced an estimated approximately 90% of the world's learners (almost 1.6 billion) to stay at home (UNESCO, 2020). A year later, close to half the world's students still faced partial or full school closures (UNESCO, 2021). In order to keep operating, many primary/secondary schools and higher education institutions implemented technology-mediated forms of instruction with very limited faculty training and resources.

In the best cases, quarantine situations were accompanied by quality online learning and an excitement for the changes underway. As British professor of the philosophy of higher education Ronald Barnett stated in regard to the impact of the pandemic on higher education institutions, "Perhaps no-one institution is so interconnected with the world as the contemporary university," whose powers of self-reflection he felt would create of this interconnectivity a new emphasis on cross-disciplinary and even cross-national work. For Barnett, this result would be "nothing short of a completely new theory of the university" (Barnett, 2020).

Many, however, felt unprepared for the challenges, including but not limited to "creating content for online spaces, learning new delivery tools, understanding online pedagogy, engaging parents, addressing student mental health issues, and attempting various pedagogical strategies to address both synchronous and asynchronous teaching and learning" (Hartshorne, Baumgartner, Kaplan-Rakowski, Mouza, & Ferdig, 2020). As schools scrambled to adapt to the new situation, teachers experienced “appreciably different learning and performance contexts” (Lockee, 2021, p. 17) depending on each nation’s, state’s, district’s, and school’s unique responses and solutions.

Cavanaugh and Deweese (2020) examined educators’ search terms and their use of support content during the initial weeks of the pandemic. From February to March 2020, they found, total content views on the educator support website http://support.office.com/education increased from 640,000 to 4,145,000 (a sixfold growth) while video views changed from 4000 to 120,000 (a 30-fold increase). Clearly educators were embarking on a learning curve. The authors feel that the preference for synchronous video “signals that educators sought quick and authentic instruction and demonstration of the skills they wanted to apply immediately in their teaching” (p. 235).

Nonetheless, the strategic blending of face-to-face and online that is seen as “the best of both worlds” (Bele & Rugelj, 2007) sometimes went missing during the pandemic’s emergency remote teaching (Hodges et al., 2020). One group of researchers described a particularly dystopian view of the “rushed online migration” (Watermeyer, Crick, Knight, & Goodall, 2021, 638). Their survey of 1148 academics working in universities in the United Kingdom reported that the COVID-induced changes to online education resulted in “a depressing abundance of afflictions” (639) exacted upon the educators. Their descriptors included: “hesitancy and suspicion,” “trauma,” “profound professional and personal disruption,” “vulnerability and helplessness,” “disempowerment, displacement and marginalisation,” and educators feeling “bruised” and “distrustful” (p. 637–638). “Overall, [their findings] suggest that online migration is engendering significant dysfunctionality and disturbance to their pedagogical roles and their personal lives.”

But there is an abundance of new research coming out of the vastly varied experiences of educators during COVID, and most research findings are not anywhere near as bleak. Ferdig, Baumgartner, Hartshorne, Kaplan-Rakowski, and Mouza (2020) published an e-book of 133 chapters and over 850 pages, divided into seven sections that address pedagogy, collaboration, field experiences, preservice education methods, professional development, digital tools, and equity issues. Journals published special issues devoted to the issues of teaching during the pandemic (see, for example, Reynolds & Chu, 2020). Borup et al. (2020) investigated how the Academic Communities of Engagement framework might be particularly relevant during the pandemic. Two of the four major findings in Gillis and Krull (2020) focused on the importance of how instructional strategies and digital tools were implemented – in other words, on the pedagogical nuances – in determining whether students found those strategies to be effective, accessible, and enjoyable (p. 296). Oyarzun et al. (2019) similarly found that methods were more important than media.

Despite the wide variance in experiences with emergency remote teaching, it is likely that blended practices that combine both online and in-person instruction will become increasingly prevalent across all educational sectors. Scholars have an opportunity to help institutions, instructors, and learners to understand research that can guide and improve blended learning practices. Additionally, there is still much research to do as we need to better understand how different blended models and pedagogical practices within those models work to improve learning outcomes, increase access and flexibility for learners, and impact cost efficiencies.

References

Abusalim, N., Rayyan, M., Jarrah, M., & Sharab, M. (2020). Institutional adoption of blended learning on a budget. *International Journal of Educational Management, 34*(7), 1203–1220. https://doi.org/10.1108/IJEM-08-2019-0326.

Adekola, J., Dale, V. H. M., & Gardiner, K. (2017). Development of an institutional framework to guide transitions into enhanced blended learning in higher education. *Research in Learning Technology, 25*(1063519), 1–16. https://doi.org/10.25304/rlt.v25.1973.

Ainley, M. (2012). Students' interest and engagement in classroom activities. In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 283–302). New York, NY: Springer. https://doi.org/10.1007/978-1-4614-2018-7.

Al-Doseri, M., Elgazzar, A., & Nouby, A. (2016). A strategy for managing e-training environment's activities and its effectiveness in developing blended learning design competencies of Bahraini secondary stage female teachers. *International Journal of Arts & Sciences, 9*(2), 1–16.

Allen, I. E., & Seaman, J. (2007). Online nation: Five years of growth in online learning. Online Learning Consortium report. https://onlinelearningconsortium.org/survey_report/2007-online-nation-five-years-growth-online-learning.

Anderson, L. W., Krathwohl, D. R., & Bloom, B. S. (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives*. New York, NY: Longman.

Archambault, L., & Barnett, J. (2010). Revisiting technological pedagogical content knowledge: Exploring the TPACK framework. *Computers & Education, 55*(4), 1656–1662.

Archambault, L., & Crippen, K. (2009). Examining TPACK among K-12 online distance educators in the United States. *Contemporary Issues in Technology and Teacher Education, 9*(1), 71–88.

Archibald, D. E., Graham, C. R., & Larsen, R. (2021). Validating a blended teaching readiness instrument for primary/secondary preservice teachers. *British Journal of Educational Technology, 52*(2), 535–551. https://doi.org/10.1111/bjet.13060.

Azevedo, R. (2015). Defining and measuring engagement and learning in science: Conceptual, theoretical, methodological, and analytical issues. *Educational Psychologist, 50*, 84–94. https://doi.org/10.1080/00461520.2015.1004069.

Barnett, R. (2020, May 11). *BC and AC, and higher education*. Professor Ronald Barnett: My Blog. https://ronaldbarnett.co.uk/my_blog.php

Beatty, B. J. (2014). Hybrid courses with flexible participation—The HyFlex course design. In L. Kyei-Blankson & E. Ntuli (Eds.), *Practical applications and experiences in k-20 blended learning environments* (pp. 153–177). IGI Global.

Beatty, B. J. (Ed.). (2019). *Hybrid-flexible course design: Implementing student-directed hybrid classes*. EdTech Books. https://edtechbooks.org/hyflex.

Bele, J. L., & Rugelj, J. (2007). Blended learning—An opportunity to take the best of both worlds. *International Journal of Emerging Technologies in Learning, 2*(3). https://doi.org/10.3991/2Fijet.v2i3.133.

Bersin & Associates. (2003). *Blended learning: What works? An industry study of the strategy, implementation, and impact of blended learning*. Oakland, CA: Bersin & Associates.

Bjekic, D., Krneta, R., & Milosevic, D. (2010). Teacher education from e-learner to e-teacher: Master curriculum. *Turkish Online Journal of Educational Technology-TOJET, 9*(1), 202–212.

Borup, J., Graham, C. R., West, R. E., Archambault, L., & Spring, K. J. (2020). Academic communities of engagement: An expansive lens for examining support structures in blended and online learning. *Educational Technology Research and Development, 68*(2), 807–832. https://doi.org/10.1007/s11423-020-09744-x.

Borup, J., Jensen, M., Archambault, L., Short, C. R., & Graham, C. R. (2020). Supporting students during COVID-19: Developing and leveraging academic communities of engagement in a time of crisis. *Journal of Technology and Teacher Education, 28*(2), 161–169. Waynesville, NC: Society for Information Technology & Teacher Education. Retrieved May 18, 2021 from https://www.learntechlib.org/primary/p/216288/.

Bower, M., Dalgarno, B., Kennedy, G. E., Lee, M. J. W., & Kenney, J. (2015). Design and implementation factors in blended synchronous learning environments: Outcomes from a cross-case analysis. *Computers and Education, 86*, 1–17. https://doi.org/10.1016/j.compedu.2015.03.006.

Bransford, J., Brown, A. L., Cocking, R. R., & National Research Council (U.S.). (2000). *How people learn: Brain, mind, experience, and school*. Washington, D.C: National Academy Press.

Brown, M. G. (2016). Blended instructional practice: A review of the empirical literature on instructors' adoption and use of online tools in face-to-face teaching. *Internet and Higher Education, 31*, 1–10. https://doi.org/10.1016/j.iheduc.2016.05.001.

Cavanaugh, C., & Deweese, A. (2020). Understanding the professional learning and support needs of educators during the initial weeks of pandemic school closures through search terms and content use. *Journal of Technology and Teacher Education, 28*(2), 233–238.

Clark, R. E. (1983). Reconsidering research on learning from media. *Review of Educational Research, 53*(4), 445–459.

Clark, R. E. (1986). Absolutes and angst in educational technology research: A reply to Don Cunningham. *Educational Communication and Technology Journal, 34*(1), 8–10.

Clark, R. E. (1994a). Media will never influence learning. *Educational Technology Research & Development, 42*(2), 21–29.

Clark, R. E. (1994b). Media and method. *Educational Technology Research & Development, 42*(3), 7–10.

Conrad, D. L. (2010). Engagement, excitement, anxiety, and fear: Learners' experiences of starting an online course. *The American Journal of Distance Education, 16*(4), 205–226. https://doi.org/10.1207/S15389286AJDE1604.

Cunningham, D. J. (1986). Good guys and bad guys. *Educational Communication and Technology Journal, 34*(1), 3–7.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly: Management Information Systems, 13*(3), 319–339. https://doi.org/10.2307/249008.

Drysdale, J. S., Graham, C. R., Spring, K. J., & Halverson, L. R. (2013). Analysis of research trends in dissertations and theses studying blended learning. *Internet and Higher Education, 17*(1), 90–100. https://doi.org/10.1016/j/iheduc.2012.11.003.

Dziuban, C., Graham, C. R., Moskal, P., Norberg, A., & Sicilia, N. (2018). Blended learning: The new normal and emerging technologies. *International Journal of Educational Technology in Higher Education, 15*(3). https://doi.org/10.1186/s41239-017-0087-5.

Dziuban, C., Hartman, J., Juge, F., Moskal, P., & Sorg, S. (2006). Blended learning enters the mainstream. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning: Global perspectives, local designs* (pp. 195–208). San Francisco, CA: Pfeiffer Publishing.

Dziuban, C., & Moskal, P. (2011). A course is a course is a course: Factor invariance in student evaluation of online, blended and face-to-face learning environments. *The Internet and Higher Education, 14*(4), 236–241. https://doi.org/10.1016/j.iheduc.2011.05.003.

Dziuban, C., Shea, P., & Moskal, P. (2020). A question of blended learning: Treatment effect or boundary object? *EDUCAUSE Review*, 1–9. Retrieved from https://er.educause.edu/articles/2020/4/a-question-of-blended-learning-treatment-effect-or-boundary-object.

Dziuban, C. D., Hartman, J. L., & Moskal, P. D. (2004). Blended learning. *Educause Research Bulletin, 2004*(7), 12. https://doi.org/10.1093/geront/gnr015.

Farmer, H. (2020). 6 models for blended synchronous and asynchronous online course delivery. *EDUCAUSE Review*. Retrieved from: https://er.educause.edu/blogs/2020/8/6-models-for-blended-synchronous-and-asynchronous-online-course-delivery.

Ferdig, R. E., Baumgartner, E., Hartshorne, R., Kaplan-Rakowski, R. & Mouza, C. (Eds). (2020). *Teaching, technology, and teacher education during the COVID-19 pandemic: Stories from the feld*. Association for the Advancement of Computing in Education (AACE). Retrieved from https://www.learntechlib.org/p/216903/.

Foulger, T. S., Graziano, K. J., Schmidt-Crawford, D. A., & Slykhuis, D. A. (2017). Teacher educator technology competencies. *Journal of Technology and Teacher Education, 25*(4), 413–448.

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research, 74*(1), 59–109. Retrieved from http://rer.sagepub.com/content/74/1/59.short.

Galvis, Á. H. (2018a). Supporting decision-making processes on blended learning in higher education: Literature and good practices review. *International Journal of Educational Technology in Higher Education, 15*(1), 1–38. https://doi.org/10.1186/s41239-018-0106-1.

Galvis, Á. H. (2018b). *Direccionamiento estratégico de la modalidad híbrida en educación superior: Conceptos, métodos y casos para apoyar toma de decisiones*. Bogotá, Colombia: Ediciones Uniandes.

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education, 2*(2–3), 87–105. https://doi.org/10.1016/S1096-7516(00)00016-6.

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education, 7*(2), 95–105. https://doi.org/10.1016/j.iheduc.2004.02.001.

Garrison, D. R., & Vaughan, N. D. (2008). *Blended learning in higher education: Framework, principles, and guidelines*. Jossey-Bass.

Gillis, A., & Krull, L. M. (2020). COVID-19 remote learning transition in Spring 2020: Class structures, student perceptions, and inequality in college courses. *Teaching Sociology, 48*(4), 283–299. https://doi.org/10.1177/0092055X20954263.

Graham, C. R. (2006). Blended learning systems: Definition, current trends, and future directions. In C. J. Bonk & C. R. Graham (Eds.), *Handbook of blended learning: Global perspectives, local designs* (pp. 3–21). San Francisco, CA: Pfeiffer Publishing.

Graham, C. R. (2013). Emerging practice and research in blended learning. In M. G. Moore (Ed.), *Handbook of distance education* (3rd ed., pp. 333–350). New York, NY: Routledge.

Graham, C. R. (2019). Current research in blended learning. In M. G. Moore & W. C. Diehl (Eds.), *Handbook of distance education* (4th ed., pp. 173–188). New York, NY: Routledge.

Graham, C. R. (2021). Exploring definitions, models, frameworks, and theory for blended learning research. In A. G. Picciano, C. D. Dziuban, C. R. Graham, & P. D. Moskal (Eds.), *Blended learning: Research perspectives*, Volume 3 (pp. 10–30).

Graham, C. R., & Robison, R. (2007). Realizing the transformational potential of blended learning: Comparing cases of transforming blends and enhancing blends in higher education. In Anthony G. Picciano & Charles D. Dziuban (Eds.), *Blended learning: Research perspectives* (pp. 83–110). Needham, MA: The Sloan Consortium.

Graham, C. R., Borup, J., Pulham, E., & Larsen, R. (2018). *K-12 blended teaching readiness: Phase 2 – Instrument development*. Lansing, MI: Michigan Virtual University. Retrieved from https://mvlri.org/research/publications/blended-teaching-readiness-phase-2-instrument-development/.

Graham, C. R., Borup, J., Pulham, E. B., & Larsen, R. (2019). K-12 blended teaching readiness: Model and instrument development. *Journal of Research on Technology in Education, 51*(3), 239–258. https://edtechbooks.org/-Pbg.

Graham, C. R., Borup, J., Short, C. R., & Archambault, L. (2019). *K-12 blended teaching: A guide to personalized learning and online integration*. Provo, UT: EdTechBooks.org. Retrieved from http://edtechbooks.org/k12blended.

Graham, C. R., Woodfield, W., & Harrison, J. B. (2013). A framework for institutional adoption and implementation of blended learning in higher education. *Internet and Higher Education*. https://doi.org/10.1016/j.iheduc.2012.09.003.

Halverson, L. R. (2016). *Conceptualizing blended learning engagement* (Doctoral dissertation). Retrieved from BYU Scholars Archive, All Theses and Dissertations. (Paper 5981). https://scholarsarchive.byu.edu/etd/5981/

Halverson, L. R., & Graham, C. R. (2019). Learner engagement in blended learning environments: A conceptual framework. *Online Learning, 23*(2), 145–178. https://doi.org/10.24059/olj.v23i2.1481.

Halverson, L. R., Graham, C. R., Spring, K. J., & Drysdale, J. S. (2012). An analysis of high impact scholarship and publication trends in blended learning. *Distance Education, 33*(3), 381–413. https://doi.org/10.1080/01587919.2012.723166.

Halverson, L. R., Graham, C. R., Spring, K. J., Drysdale, J. S., & Henrie, C. R. (2014). A thematic analysis of the most highly cited scholarship in the first decade of blended learning research. *Internet and Higher Education, 20*, 20–34. https://doi.org/10.1016/j.iheduc.2013.09.004.

Hartshorne, R., Baumgartner, E., Kaplan-Rakowski, R., Mouza, C., & Ferdig, R. E. (2020). Special issue editorial: Preservice and inservice professional development during the COVID-19 pandemic. *Journal of Technology and Teacher Education, 28*(2), 137–147.

Henrie, C. R., Halverson, L. R., & Graham, C. R. (2015). Measuring student engagement in technology-mediated learning: A review. *Computers & Education, 90*, 36–53. https://doi.org/10.1016/j.compedu.2015.09.005.

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). *The difference between emergency remote teaching and online learning. EDUCAUSE review report*. Retrieved 4 June 2021, from https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning

Hrastinski, S. (2019). What do we mean by blended learning? *TechTrends, 63*(5), 564–569. https://doi.org/10.1007/s11528-019-00375-5

Huett, K. C., Huett, J. B., & Ringlaben, R. (2011). From bricks to clicks: Building quality K–12 online classes through an innovative course review project. *Online Journal of Distance Learning Administration, 14*(5).

Irvine, V. (2020). The landscape of merging modalities. *Educause Review, 4*, 40–58.

Joosten, T., Weber, N. L., & McGuire, A. (2021). The blended institution of higher education: A model for a sustainable institution. Every Learner Everywhere. https://www.everylearnereverywhere.org/resources.

Kozma, R. (1991). Learning with media. *Review of Educational Research, 61*(2), 179–211.

Kozma, R. (1994). Will media influence learning? Reframing the debate. *Educational Technology Research & Development, 42*(2), 21–29.

Ladd, G. W., & Dinella, L. M. (2009). Continuity and change in early school engagement: Predictive of children's achievement trajectories from first to eighth grade? *Journal of Educational Psychology, 101*(1), 190–206. https://doi.org/10.1037/a0013153.

Lim, C. P., & Graham, C. R. (Eds.). (2021). Blended learning for inclusive and quality higher education in Asia. *Springer*. https://doi.org/10.1007/978-981-33-4106-7.

Lim, C. P., & Wang, L. B. (Eds.). (2016). *Blended learning for quality higher education: Selected case studies on implementation from Asia-Pacific*. Paris, France: UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000246851.

Lim, C. P., Wang, T., & Graham, C. (2019). Driving, sustaining and scaling up blended learning practices in higher education institutions: A proposed framework. *Innovation and Education, 1*(1), 1–12. https://doi.org/10.1186/s42862-019-0002-0.

Lockee, B. B. (2021). Shifting digital, shifting context: (re)considering teacher professional development for online and blended learning in the COVID-19 era. *Educational Technology Research and Development, 69*, 17–20. https://doi.org/10.1007/s11423-020-09836-8.

Martin, F., & Bolliger, D. U. (2018). Engagement matters: Student perceptions on the importance of engagement strategies in the online learning environment. *Online Learning Journal, 22*(1), 205–222.
Martin, F., Polly, D., & Ritzhaupt, A. (2020). Bichronous online learning: Blending asynchronous and synchronous online learning. *EDUCAUSE Review*. Retrieved from: https://er.educause.edu/articles/2020/9/bichronous-online-learning-blending-asynchronous-and-synchronous-online-learning
Martin, F., Wang, C., & Sadaf, A. (2020). Facilitation matters: Instructor perception of helpfulness of facilitation strategies in online courses. *Online Learning, 24*(1), 28–49. https://doi.org/10.24059/olj.v24i1.1980.
McDonald, J. K., & Yanchar, S. C. (2020). Towards a view of originary theory in instructional design. *Educational Technology Research and Development, 68*(2), 633–651. https://doi.org/10.1007/s11423-019-09734-8.
McGee, P., Windes, D., & Torres, M. (2017). Experienced online instructors: Beliefs and preferred supports regarding online teaching. *Journal of Computing in Higher Education, 29*, 331–352. https://doi.org/10.1007/s12528-017-9140-6.
Moskal, P., Dziuban, C., & Hartman, J. (2013). Blended learning: A dangerous idea? *The Internet and Higher Education, 18*, 15–23. https://doi.org/10.1016/j.iheduc.2012.12.001.
Norberg, A., Dziuban, C. D., & Moskal, P. D. (2011). A time-based blended learning model. *On the Horizon, 19*(3), 207–216. https://doi.org/10.1108/10748121111163913.
Oliver, M., & Trigwell, K. (2005). Can "blended learning" be redeemed? *E-Learning, 2*(1), 17–26. https://doi.org/10.2304/elea.2005.2.1.2.
Osguthorpe, R. T., & Graham, C. R. (2003). Blended learning environments: Definitions and directions. *Quarterly Review of Distance Education, 4*(3), 227–234.
Oyarzun, B., Hancock, C., Salas, S., & Martin, F. (2019, Online First). Synchronous meetings, Community of Inquiry, COVID-19, and online graduate teacher education. *Journal of Digital Learning in Teacher Education*
Philipsen, B., Tondeur, J., Roblin, N. P., Vanslambrouck, S., & Zhu, C. (2019). Improving teacher professional development for online and blended learning: A systematic meta-aggregative review. *Educational Technology Research and Development, 67*, 1145–1174. https://doi.org/10.1007/s11423-019-09645-8.
Picciano, A. G. (2009). Blending with purpose: The mutimodal model. *Journal of Asynchronous Learning Networks, 13*(1), 7–18. http://www.rcetj.org/index.php/rcetj/article/view/11/14.
Picciano, A. G. (2011). Introduction to the special issue on transitioning to blended learning. *Journal of Asynchronous Learning Networks, 15*(1), 3–7.
Picciano, A. G. (2017). Theories and frameworks for online education: Seeking an integrated model. *Online Learning, 21*(3), 166–190. https://doi.org/10.24059/olj.v21i3.1225.
Porter, W. W., & Graham, C. (2016). Institutional drivers and barriers to faculty adoption of blended learning in higher education. *British Journal of Educational Technology, 47*(4), 748–762. https://doi.org/10.1111/bjet.12269.
Porter, W. W., Graham, C. R., Bodily, R., & Sandberg, D. (2016). A qualitative analysis of institutional drivers and barriers to blended learning adoption in higher education. *Internet and Higher Education, 28*(1), 17–27. https://doi.org/10.1016/j.iheduc.2015.08.003.
Pulham, E., Graham, C. R., & Short, C. R. (2018). Generic vs. modality-specific competencies for K-12 online and blended teaching. *Journal of Online Learning Research, 4*(1), 33–52. Retrieved from https://edtechbooks.org/-rXmo.
Pulham, E. B., & Graham, C. R. (2018). Comparing K-12 online and blended teaching competencies: A literature review. *Distance Education, 39*(3), 411–432. https://edtechbooks.org/-Noyv.
Rasheed, R. A., Kamsin, A., & Abdullah, N. A. (2020). Challenges in the online component of blended learning: A systematic review. *Computers & Education, 144*, 1–17. https://doi.org/10.1016/j.compedu.2019.103701.
Reynolds, R., & Chu, S. K. W. (2020). Guest editorial. *Information and Learning Sciences, 121*(5–6), 233–239. https://doi.org/10.1108/ILS-05-2020-144.

Rogers, E. M. (1962). *Diffusion of innovations*. New York: Free Press of Glencoe.

Salmon, G. (2011). *E-moderating: The key to teaching and learning online*. New York, NY: Routledge.

Schunk, D. H., & Mullen, C. A. (2012). Self-efficacy as an engaged learner. In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 219–235). New York, NY: Springer. https://doi.org/10.1007/978-1-4614-2018-7.

Shea, P., & Bidjerano, T. (2010). Learning presence: Towards a theory of self-efficacy, self-regulation, and the development of a communities of inquiry in online and blended learning environments. *Computers and Education, 55*(4), 1721–1731. https://doi.org/10.1016/j.compedu.2010.07.017.

Short, C. R., Graham, C. R., Holmes, T., Oviatt, L., & Bateman, H. (2021, in press). Preparing teachers to teach in k-12 blended environments: A systematic review of research trends, impact, and themes. *Tech Trends.*

Short, C. R., Graham, C. R., & Sabey, E. (2021). K-12 blended teaching skills and abilities: An analysis of blended teaching artifacts. *Journal of Online Learning Research, 7*(1), 5–33. Retrieved from https://www-learntechlib-org.erl.lib.byu.edu/primary/p/217689/.

Short, C. R., Hanny, C., Jensen, M., Arnesen, K. T., & Graham, C. R. (2021, in press). Competencies and practices for guiding k-12 blended teacher readiness. In A. G. Picciano, C. D. Dziuban, C. R. Graham, & P. D. Moskal (Eds.), *Blended learning: Research perspectives* (Vol. 3). Routledge.

Sinatra, G. M., Heddy, B. C., & Lombardi, D. (2015). The challenges of defining and measuring student engagement. *Educational Psychologist, 50*(1), 1–13. https://doi.org/10.1080/00461520.2014.1002924.

Skinner, E., Furrer, C., Marchand, G., & Kindermann, T. (2008). Engagement and disaffection in the classroom: Part of a larger motivational dynamic? *Journal of Educational Psychology, 100*(4), 765–781. https://doi.org/10.1037/a0012840.

Smith, K., & Hill, J. (2019). Defining the nature of blended learning through its depiction in current research. *Higher Education Research and Development, 38*(2), 383–397. https://doi.org/10.1080/07294360.2018.1517732.

Spring, K. J., & Graham, C. R. (2017). Blended learning citation patterns and publication networks across seven worldwide regions. *Australasian Journal of Educational Technology, 33*(2). https://doi.org/10.14742/ajet.2632.

Spring, K. J., Graham, C. R., & Ikahihifo, T. B. (2018). Learner engagement in blended learning. In M. Khosrow-Pour (Ed.), *Encyclopedia of information science and technology* (4th ed., pp. 1487–1498). Hershey, PA: IGI Global. https://doi.org/10.4018/978-1-5225-2255-3.ch128.

Staker, H., & Horn, M. B. (2012). Classifying K – 12 Blended learning. Christensen Institute. https://www.christenseninstitute.org/wp-content/uploads/2013/04/Classifying-K-12-blended-learning.pdf.

Star, S. L., & Griesemer, J. R. (1989). Institutional ecology, 'translations' and boundary objects: Amateurs and professionals in Berkeley's Museum of Vertebrate Zoology, 1907–39. *Social Studies of Science, 19*(3), 387–420. https://doi.org/10.1177/030631289019003001.

Tham, R., & Tham, L. (2013). Challenges facing blended learning in higher education in Asia. *International Journal on E-Learning, 12*(2), 209–219.

Twigg, C. A. (2003). Improving learning and reducing costs: New models for online learning. *Educause Review, 38*(5), 28–38.

U.S. Department of Education. (2017, January). *Reimagining the role of technology in education: 2017* national education technology plan update. Washington, DC. https://tech.ed.gov/files/2017/01/NETP17.pdf

U.S. Department of Education, Office of Educational Technology. (2016, Jan). Future ready learning*: Reimagining the role of technology in education.* Washington, DC. http://tech.ed.gov/netp/teaching/

UNESCO. (2020). *COVID-19: How the UNESCO Global Education Coalition is tackling the biggest learning disruption in history*. https://en.unesco.org/news/covid-19-how-unesco-global-education-coalition-tackling-biggest-learning-disruption-history

UNESCO. (2021). *Education: From disruption to recovery*. https://en.unesco.org/covid19/educationresponse

Vaughan, N. D., Cleveland-Innes, M., & Garrison, R. D. (2013). *Teaching in blended learning environments: Creating and sustaining communities of inquiry*. Edmonton, AB: Athabasca University Press.

Vygotsky, L. S., & Cole, M. (1978). *Mind in society: Development of higher psychological processes*. Harvard university press.

Wang, M. T., & Degol, J. (2014). Staying engaged: Knowledge and research needs in student engagement. *Child Development Perspectives, 8*(3), 137–143.

Wang, Y., Han, X., & Yang, J. (2015). International forum of educational technology & society revisiting the blended learning literature: Using a complex adaptive systems framework. *Journal of Educational Technology & Society, 18*(2), 380–393. https://doi.org/10.2307/jeductechsoci.18.2.380.

Wang, Z., Bergin, C., & Bergin, D. A. (2014). Measuring engagement in fourth to twelfth grade classrooms: The classroom engagement inventory. *School Psychology Quarterly, 29*(4), 517–535. https://doi.org/10.1037/spq0000050.

Watermeyer, R., Crick, T., Knight, C., & Goodall, J. (2021). COVID-19 and digital disruption in UK universities: Afflictions and affordances of emergency online migration. *Higher Education, 81*, 623–641. https://doi.org/10.1007/s10734-020-00561-y.

Watson, J., Murin, A., Vashaw, L., Gemin, B., & Rapp, C. (2010). Keeping pace with K-12 online learning: An annual review of policy and practice. Evergreen Education Group report. https://www.evergreenedgroup.com/keeping-pace-reports.

Zaugg, H., Graham, C. R., Lim, C. P., & Wang, T. A. (2021). Current and future directions of blended learning and teaching in Asia. In C. P. Lim & C. R. Graham (Eds.), *Blended learning for inclusive and quality higher education in Asia* (pp. 301–327). Springer.

Flipped Learning

68

Jihyun Lee

Contents

Abstract

Flipped learning (FL) began as a local trial strategy in a US high school in 2012 and in less than 10 years has exploded in popularity, among both educational practitioners and researchers, and has now been extensively recognized and implemented at all levels of education across the world. This chapter will discuss what is known from current FL literature, what the practical implications are from this literature, what gaps exist within FL research and between FL research and practices, and how those gaps should be addressed. This chapter begins with the definition and continues discussing history and supporting theories of flipped learning and its effectiveness, affecting factors, challenges, and possible solutions

Supplementary Information: The online version contains supplementary material available at [https://doi.org/10.1007/978-981-19-2080-6_69].

J. Lee (✉)
Department of Dental Education, School of Dentistry, Seoul National University, Seoul, South Korea
e-mail: leeji1@snu.ac.kr

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_69

from current literature. In addition, as a modified version of traditional flipped learning, a fully online flipped learning model, bichronous online learning, and HyFlex learning are introduced. This chapter concludes with future research directions.

Keywords

Flipped learning · Fully online flipped learning · Bichronous online learning · HyFlex learning

Introduction

Flipped Learning (FL) practice and research has recently grown extensively at all levels of education, prompting active discourse among researchers and practitioners. Although there still exist learners left behind by a lack of technological access, FL has certainly benefited from increasing access to digital technologies, resources, and broadband connectivity along with open course ware, open educational resources, massive open online courses, or YouTube clips, which has led to the easier and wider implementation of FL. Another reason for its increasing popularity is the movement by many educational institutions to improve the quality of education by incorporating FL to bring about learners' active engagement coupled with positive learning outcomes (Lee & Choi, 2019). This chapter will discuss the research into FL: what is known from current FL literature, what the practical implications are from the literature, what the gaps within FL research and between FL research and practices are, and how those gaps should be addressed. This chapter will begin by discussing the definitions, history, and theories underpinning FL followed by the effectiveness of FL, its affecting factors, challenges, and possible solutions and introduce a set of extended versions of FL model and future research directions.

What Is Flipped Learning? The Definitions of Flipped Learning

Flipped classroom, flipped learning, inverted classroom, or inverted learning are all terms used in connection with this instructional model. Originally called flipped or inverted classroom, these terms are being replaced by *flipped learning*, which will be used throughout this chapter with the abbreviation FL.

When defining FL, researchers have slightly differing perspectives regarding what is flipped and whether to include video-based pre-class learning. FL has been referred to as both flipping traditional teaching and flipping early forms of blended learning. Bergmann and Sams (2012) defined FL as an instructional strategy "where work that was traditionally done in the class is now done at home, and what was traditionally homework is now completed in class" (p. 13). An earlier definition by Lage, Platt, and Treglia (2000) similarly defined FL as happening when "events that have traditionally taken place inside the classroom now take place outside the classroom and vice versa" (p. 32). Other definitions are to gain foundational knowledge before class and then actively apply it in the collaborative classroom (Brewer & Movahedazarhouligh, 2018), individual learning as homework outside the classroom, and interactive group-based learning inside the classroom (Bishop & Verleger, 2013). With students learning and reviewing concepts at home, class time can then be freed up for active, collaborative activities within the group space and increased time with the teacher (Bond, 2020; Lo & Hew, 2017).

Some other definitions posit FL as flipping the early version of blended learning, i.e., a combination of face-to-face synchronous classroom lecture and online asynchronous text-based activities (Garrison & Kanuka, 2004). Incorporating the concept of online and offline learning, Lee, Lim, and Kim (2017) defined FL as "a newly emerging form of blended learning, where students individually watch online lectures prior to class and then engage in classroom learning activities interacting with peers and instructors" (p. 427). Chen et al. (2018) also defined FL as a hybrid approach, combining online learning and face-to-face classroom activities where, during online learning, students engage in content learning before class and thereby during face-to-face classroom activities students engage in maximized active learning.

There is yet another lack of consensus among researchers and practitioners on learning materials with different modalities for FL pre-class. Some use a broader definition of FL that includes not only video but also reading assignments, homework problems, and PowerPoint presentations as pre-class learning materials (Giannakos, Krogstie, & Sampson, 2018; Lai & Hwang, 2016; Lee & Choi, 2019). More cutting-edge materials like interactive simulations, animated readings, and intelligent tutoring systems were also reported as pre-class learning (Davies, Dean & Ball, 2013). The FL definition of Bergmann and Sams (2012) allowed videos and other forms of media for pre-class learning materials, and Brewer and Movahedazarhouligh (2018) also delineated resources such as modules, videos, or readings.

Other researchers take a stricter approach to defining FL as only utilizing online video lectures as pre-class learning materials. Lo and Hew (2017), for example, defined FL as an instructional approach combining video-based learning outside the classroom and interactive group learning activities inside the classroom. In addition, Bishop and Verleger (2013) excluded from their definition implementations that did not employ pre-class lecture videos. A systematic review of 37 FL studies published during 4 years by Giannakos et al. (2018) revealed that over 80% of reported cases employed video lectures in practice. The reasons of this stricter FL approach can be summarized as follows: firstly, many believe students learn better with video lectures than reading assignments (Akçayır & Akçayır, 2017; Lo, 2020). Video lectures are believed to function better because it is easier to repeat, pause, fast-forward, or slow down the instruction to match the learner's pace and make content accessible at any time (Bush, 2013); secondly, the emphasis on video may be because the original version of FL that Sams and Bergman tried in their high-school chemistry course and launched into the spotlight exclusively utilized prerecorded video lectures.

However, many educators are questioning whether video lectures can flexibly be replaced with reading assignments for FL pre-class learning (Lo, Hew, & Chen, 2017). This is related to the evolving nature of FL's definition as well as the effectiveness of learning resources with different modalities. The value of FL lies in enabling in-depth, learner-centered learning experiences by offloading content delivery onto pre-class online learning (Lee & Choi, 2019). Thus, despite the popularity of video lectures, other solutions for providing pre-class learning could also be valuable components of FL. One example could be, in a problem-based learning situation, having students explore and study out the situation individually before class, which may allow for more constructivist learning in-class within groups as they derive solutions to the problem (West, Tawfik, Gishbaugher, & Gatewood, 2020).

Synthesizing two approaches of its definition, FL can be defined as an instructional strategy or model that combines online pre-class self-paced learning for foundational knowledge acquisition with video lectures together with other equivalent solutions and offline in-class interactive learning activities for knowledge application facilitated by instructors.

The History of Flipped Learning Practice

There are disagreements regarding when and where FL originated. Some point to Harvard's Eric Mazur, who, in the late 1990s, implemented a peer instruction method in his undergraduate physics course, having students prepare to learn outside class by doing pre-class readings and answering questions about those readings and then in class engaging students in discussing their answers with peers coached by instructors. He found that students learned better when instructors coached students' learning rather than directly instructing them. Although it resembles FL, it seems unwarranted to regard it as the origin of FL since it was not similarly named.

The term "classroom flipped" and "flipped class" then was initiated by Wesley Baker at Cedarville College in 2000. He had practiced FL in his graphic design course since 1995 using web course management software, where lectures were uploaded and asynchronous threaded discussions were hosted. In 2000, he mentioned FL made it possible for faculty to move from "sage on the stage" into "guide on the side" (Baker, 2000, p. 11). The term "inverted classroom" was then used by Maureen Lage, Glenn Platt, and Michael Treglia, who, in 2000 at Miami University, implemented FL in their economics course, putting a high value on the individualized approach of FL for accommodating different student learning styles.

While the concept and practices of FL had existed since 2000, sporadic reports and anecdotes were shared among limited groups of educators in the form of conference papers. The research contained limited empirical evidence on implementation and effectiveness (Cheng, Ritzhaupt, & Antonenko, 2019). Full-fledged implementation and development were then pioneered by high-school chemistry teachers John Bergmann and Aeron Sams. From 2007 and 2008, they recorded lectures for students who had missed their classes. Later, these teachers prerecorded all of their chemistry lectures and utilized them in assigning student's homework, subsequently finding that students engaged in problem-solving and experiments during class more actively. After reflecting on questions like "when are students struggling and seeking help from their instructor or peers?" and "how can instructors help them while optimizing the technological benefits of an online learning environment and the in-person benefits of human interactions in the classroom?" (Lee et al., 2017, p. 428), the two then formulated their instructional strategy into the FL model and shared their experiences in a series of publications (Bergmann & Sams, 2012; Bergmann & Sams, 2014).

Since 2012, FL has gained widespread popularity, becoming extensively recognized and implemented at all levels of education across the world. In 2012, Sams and Bergmann started the nonprofit Flipped Learning Network™ (FLN) to provide educators with the knowledge, skills, and resources for successful FL implementation. From 2016, international and coalitional support for effective implementation of FL began to emerge (Birgili, Nevra Seggie, & Oğuz, 2021). In 2016, an FL global coalition, Flipped Learning Global Initiative (FLGI), was formed by researchers, practitioners, and technologists from 49 countries. In 2018, higher education institutions such as Harvard and Stanford and MEF University in Turkey, the first fully flipped university, took the initiative for the FL global movement and collaborated in publishing Flipped Learning 3.0 Global Standards that were curated from 187 FL best practices worldwide (Flipped Learning 3.0 Global Standards Summit, 2018).

Theories and Research Evidence Supporting Flipped Learning

With its widespread implementations and reported anecdotal success, researchers have sought to stipulate theoretical rationales or evidences for FL and provide FL practitioners with suggestions for best practices. Related theories can be the didactical 3C model of Kerres and de Witt (2003) in the area of blended learning theories; the media synchronicity theory of Dennis, Fuller, and Valacich (2008) in the area of media and communication theories; the cognitive load theory from a group of studies initiated by Sweller, Merrienboer, and Paas (1998), and the schema theory of Bartlett (1995) and subsequent studies in the area of cognitive psychology theories.

Since FL is under the big umbrella of blended learning, designing FL entails designing the optimal blend between two modes of learning, i.e., online pre-class and offline in-class learning. Blended learning (BL) integrates classroom face-to-face learning experiences with online learning experiences (Garrison & Kanuka, 2004; Garrison & Vaughan, 2008). Within this framework, BL practitioners have sought to design a better blend, one of the theoretical endeavors being the didactical 3C model of Kerres and de Witt (2003). The model specifies three components that all types of BL should have: Content, Communication, and Constructive components. In this model, educators designate the relative proportion of each component and then decide a corresponding delivery format. The Content component is factual learning content that needs to be available to learners; the Communication component is interpersonal interactions between instructor and learners or among learners for more arguable learning tasks; and the Constructive component is activities that facilitate learners' more cognitive engagement in most complex learning tasks. In FL contexts, the theory supports FL having all of the 3C components: the Content component for factual learning, which is implemented with FL pre-class, and the Communication and Constructive components for more cognitively engaging learning interacting with instructor and peers, which are implemented with FL in-class. The model suggests the proportion of components should be designed considering learning objectives and learning contexts. Once the proportion of each of three Cs has been decided, the delivery method is then chosen from the variety of technologies and communication tools offering different affordances.

Several media and communication theories inform how the components of the 3C model can best be arranged using available media. Media synchronicity theory (MST) is one of the theories informing FL design, which argues that the fit between information processing needs and the affordances of the media used to support synchronous communication determines the quality of communication performance (Dennis & Valacich, 1999; Dennis et al., 2008). MST views communication as a series of tasks to achieve shared understanding, where a task consists of two cognitive processes – conveyance and convergence. Conveyance focuses on transmitting large amounts of new information followed by receivers internalizing that information to construct their own mental models. Convergence focuses on verifying, adjusting, or negotiating participants' mental models, enabling shared understanding. MST proposes that tasks with conveyance focus can be better supported by synchronous media, whereas tasks with convergence focus may be supported by asynchronous media. In FL contexts, pre-class learning aims at conveyance, i.e., transmitting new information and the learner internalizing that information to construct his/her mental model, for which asynchronous media such as learning materials posted online should be selected. In-class learning aims at convergence, i.e., approaching to shared understanding by interacting with instructor and peers, for which synchronous media such as face-to-face class should be selected.

The importance of FL pre-class learning and pre-class mini-lectures is supported by cognitive load theory and schema theory, which concern the role of prior knowledge or expertise of learners. Cognitive load theory (CLT) states that learning can be hindered if learner's cognitive resources and working memory are overburdened, and learning should be designed so that learner's cognitive load is reduced, saving capacity for more meaningful and higher-order learning tasks. CLT classifies the load into three types: intrinsic cognitive load, which is the inherent difficulty of the learning content; extraneous cognitive load, which is the load caused by the way the content is presented; and germane cognitive load, which is efforts required for integrating new information, the creation and modification of schema (Sweller et al., 1998).

Leaving extraneous cognitive load that is associated with learning materials aside, one way to reduce cognitive load is constructing and making accessible one's cognitive schemas, for which the learner's level of prior knowledge or expertise is a critical factor (Bartlett, 1995). A learner's level of prior knowledge or expertise relating to the topic can determine the comfort with which complicated learning tasks can be processed simultaneously in working memory without burdening cognitive overload. Learners with more prior knowledge can have more cognitive resources available to actively process learning tasks at hand, whereas learners with less prior knowledge need more cognitive resources and thus can choose superficial learning strategies. In the context of FL, locating individualized pre-class learning that can provide background knowledge for collaborative in-depth in-class learning activities prior to FL in-class is for activating cognitive schemas to reduce intrinsic cognitive load prior to FL in-class. Ultimately this allows more resources for germane load that require more complex schema constructions during FL in-class learning.

Growth of Flipped Learning Research

With the popularity of FL practice, FL research has grown exponentially. A systematic search, as of June 26, 2021, using the keywords "flipped learning" or "flipped class*" or "inverted learning" or "inverted class*" in titles of peer-reviewed journal articles throughout the four databases of ERIC, Scopus, Web of Science, and Medline, found in total 1,629 publications. As shown in Fig. 1, the volume of FL peer-reviewed journal articles jumped significantly from 5 in 2012 to 372 in 2020. In less than 10 years, FL research has achieved tremendous quantitative growth, and this trend is expected to continue.

FL literature is presently dominated by investigated FL cases and FL effectiveness (Lundin et al. 2020). As Lundin et al. (2020) found, in the initial years of FL research, descriptive case reports on FL implementation were dominant, but these studies were mainly limited to reporting the experimental process and results of adopting FL in individual courses or subjects at individual schools. There have also been studies with reflection or opinion-based arguments around FL and with a theoretical approach discussing relevant educational theories supporting FL (Lundin

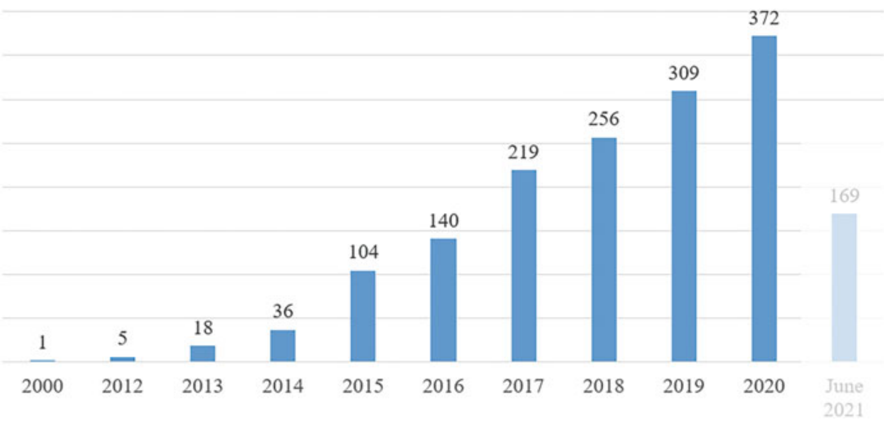


Fig. 1 The quantity of FL publications since 2012 as of June 25, 2021 ($n = 1629$)

et al., 2020). For this reason, the study design lacked rigor with lower levels of evidence. As educators and researchers asked for compelling evidence on the effectiveness of FL, studies have tried to assess its effectiveness with higher levels of evidence – mostly done through meta-analyses.

This exploding body of empirical literature has also led to an increasing number of review studies such as systematic reviews, scoping reviews, and meta-analyses (Birgili et al., 2021; Hew et al., 2021). Systematic syntheses of the state of research can provide researchers and practitioners with knowledge on the integrative effectiveness of a certain approach of learning design (Zawacki-Richter, 2020). With the systematically synthesizing endeavor, we can "look at the body of evidence rather than looking at any study in isolation" (Nordenbo, 2010, p. 22) and stay reflective about future research, education practices, and policies. The growing number of FL review studies reflects a scholarly and practical need to understand the FL outcomes across studies.

Effectiveness research investigates the learning outcomes achieved by FL, by either comparing FL to traditional lecture-based learning or comparing the start and end of FL using pre-post designs. The learning outcomes analyzed have been mostly academic achievement, measured by score or grade, and occasionally motivational or attitudinal outcomes such as engagement, perceptional change, and satisfaction (Brewer & Movahedazarhouligh, 2018; McLaughlin et al., 2014). Among the 25 meta-analyses, all reported that FL had higher learning outcomes, among which 24 were statistically significant and 18 reported with medium to large effect sizes. The full list of FL meta-analysis studies can be accessed in Data 1. The full list of FL review studies can be accessed in Data 2.

According to recent systematic review studies on FL, the greatest proportion of FL studies have been conducted with undergraduate students in higher education institutions, with a far smaller proportion with K-12 contexts (Akçayır & Akçayır, 2017; Cheng et al., 2019; Lundin et al., 2020). The areas reported as having implemented FL were diverse, but higher education and STEM education were two main areas (Bond, 2020). Asia and the USA were geographically dominant in FL research (Lundin et al., 2020). In this chapter, I will now discuss the practical implications from the literature, including the gaps within FL research and between FL research and practices.

Flipped Learning Benefits

The majority of studies investigating the effectiveness and benefits of FL have reported that FL promotes improvements in student academic performance mainly measured by test scores or course grades. The systematic reviews and meta-analyses synthesized this dominant cognitive outcome of FL. Recent meta-analyses with relatively large samples of studies— for example, a meta-analysis of 203 studies published between 2012 and 2019 (Tutal & Yazar, 2021), of 95 studies published between 2013 and 2019 (Zheng, Bhagat, Zhen, & Zhang, 2020), and of 198 studies published between 2012 and 2018 (Strelan, Osborn, & Palmer, 2020) — reported positive cognitive learning outcomes, i.e., growth in academic performance or outperformance by FL over traditional approaches. Twenty-four of the 25 FL meta-analysis studies in Data 1 investigated either academic performance or cognitive achievement.

The next most commonly investigated outcome of FL is student motivation or engagement, measured, for example, by the amount of discussion participation. Related outcomes were positive attitudes or perception toward FL, which were measured usually by self-report survey. Other outcomes investigated include a self-regulated learning or study habit, competency in problem-solving and social or collaborative learning, digital competency, academic efficacy and changes in behaviors, changes in professional practice, or changes in actual outcome such as patient recovery. Four out of 25 studies reported course satisfaction or motivation as FL outcomes (Data 1).

There are many other potential positive benefits of FL that have been explored. One is that it can enable flexible, individualized learning with pre-class resources at students' own pace at any time, and they can repeat or learn additional content as they want (Birgili et al., 2021; Brewer & Movahedazarhouligh, 2018; Cheng et al., 2019; Hew et al., 2021; Lo & Hew, 2017). The benefit of flexible individualized learning can lead to learners' self-regulated and self-directed learning by properly scheduling their time to learn pre-class assignment and ultimately being accountable for their learning (Lee, Park, & Davis, 2022). Kostaris, Sergis, Sampson, Giannakos, and Pelliccione (2017) showed that FL brought learners' growth in their digital competencies while accessing and managing digital learning resources.

Another compelling benefit of FL is that it facilitates learner's active and interactive learning. FL design is ultimately for securing active learning time by offloading knowledge delivery pre-class, allowing in-class time to be utilized in engaging learners in interaction between instructor and students and between peers (Birgili et al., 2021; Bond, 2020). FL can benefit large college courses such as introductory basic science courses, where learner engagement is traditionally minimal (Brewer & Movahedazarhouligh, 2018) and where the benefit of active and interactive learning leads to enhanced engagement.

Lastly and most critically, most FL studies have agreed that FL can promote meaningful and constructivist learning by involving learners in knowledge construction assignments and activities both in and out of the classroom, thereby developing higher-order thinking competencies such as critical thinking or problem-solving skills (Brewer & Movahedazarhouligh, 2018).

Factors Affecting Flipped Learning Effectiveness

While the majority of studies have trumpeted positive benefits of FL, some studies have reported no significant difference between FL groups and non-FL groups. A few further studies reported FL impaired student learning. One possible solution to the muddy picture of FL effectiveness is to explore factors affecting FL's effectiveness and investigate into what context and in what ways FL can be effective, as intended. FL is not a panacea and might not be effective in certain contexts or for a particular learner group. Educators' decision-making would benefit greatly from knowing how and where FL should be implemented and which particular groups would gain maximum benefit.

Educational level has a bearing on the effectiveness of FL. According to Cheng et al. (2019), 55 publications, published from 2000 to 2016, reported the overall effects of FL on K-12 and college undergraduate students' learning outcomes and its moderating variables and concluded that FL outperformed the traditional lecture method. However, for graduate students, the traditional way of teaching and learning was more effective than FL, which was explained by the fact that the usual format of graduate education is already similar to FL and discussing and analyzing scholarly works are their main activities.

The subject or area of learning can influence the effectiveness of FL. Arts and humanities courses benefited more from FL than did mathematics courses, perhaps because some subject areas are difficult to learn independently and students could be overwhelmed by the FL pre-class learning (Cheng et al., 2019). Learning objectives and assessment method also can be affecting factors. In the course for skill acquisition assessed by OSCE (Objective Structured Clinical Examination) or knowledge retention/comprehension assessed by multiple-choice questions (MCQs) (Chen et al., 2018; Hughes & Lyons, 2017), FL showed mixed result or no significant advantage over a non-FL approach.

One of the most critical affecting factors is learner's pre-class learning. The influence of pre-class learning on final FL success has been empirically shown to be both significant and strong. As the proportion of students who do not complete the assigned pre-class work is reported as quite substantial (Heitz, Prusakowski, Willis, & Franck, 2015) and pre-class is the opening move to the benefits of FL, completion of pre-class assignments has a drastic effect on the differential effectiveness of FL. Typically video materials induce higher academic performance than reading materials (Lee & Choi, 2019), but the quality of video materials can be also crucial to the success of FL, implying a need to produce or prepare high-quality video materials that are attractive and not overly long. Although video materials certainly have unique and optimal features for FL pre-class, it is the quality of learning content and instructional design that those video materials deliver that matters, as explained in the classic debate raised between Richard Clark and Robert Kozma on the role of media in learning in the early 1990s. As an instructional strategy to promote students pre-class learning, quizzes at the start of an in-class session can be employed. Hew and Lo (2018) found that the use of verification quizzes for testing learner's understanding on pre-class learning significantly influenced the effect of FL.

Learner factors, academic capability, attitudes toward FL, and their technology competency also can be significant factors as shown in Table 1. As educator factors, their pedagogical approach, such as their recognition of FL as a learner-centered approach, their empowering, engaging and encouraging students and commitment can be a critical affecting factor in the effective implementation of FL (Brewer & Movahedazarhouligh, 2018; Shi et al., 2020). Institutional support and professional

Table 1 Factors potentially affecting FL effectiveness

Factors	Sub-factors	References
School or course factors	Educational level	Cheng et al., 2019; Lundin et al., 2020
	Subject area	Birgili et al., 2021; Cheng et al., 2019
	Learning objective	Chen et al., 2018
	Assessment method	Chen et al., 2018
Fl implementation factors	Students' completion of pre-class learning assignment	Lee & Choi, 2019
	Kinds of learning material	Lee & Choi, 2019
	The quality of video materials	Moraros et al., 2015; Akçayır & Akçayır, 2017
	The use of the verification quizzes	Hew & Lo, 2018
Learner factors	Learners' academic capability	Cheng et al., 2019
	Attitudes toward FL	Akçayır & Akçayır, 2017; Lee et al., 2022
	Technology competency	Akçayır & Akçayır, 2017
Educator factors	Pedagogical approach	Brewer & Movahedazarhouligh, 2018; Shi et al., 2020
	Institutional support	Brewer & Movahedazarhouligh, 2018
	Professional development	Brewer & Movahedazarhouligh, 2018

development may be another factor in the same vein (Brewer & Movahedazarhouligh, 2018).

Remaining Challenges and Possible Solutions

FL research conducted so far has provided practical implications for FL implementations, but there remain challenges that research has not yet fully addressed. Lo and Hew (2017) classified those challenges into three: student challenges, educator challenges, and technical challenges.

Challenges related to students are mostly related to their pre-class learning issues and also general unfamiliarity and an unreceptive attitude toward a new approach to learning. Student unpreparedness of pre-class assignments is seen as the biggest challenge of FL due to lack of either motivation or of self-regulation, and overcoming this is critical because FL pre-class learning is positively and strongly correlated with FL learning outcome and nearly twice that of in-class learning (Lee & Choi, 2019). Underprepared learners are clearly an obstacle to the intended benefits of FL. Students' disengagement from the pre-class learning, due to their natural vulnerability to distraction while watching online lectures, and helplessness during pre-class learning when they are unable to understand the materials and want to ask questions during the pre-class can be also pre-class-related challenges. The general unfamiliarity and unreceptive attitude toward FL can be another type of challenge. Students can feel uncomfortable and nervous in the new format and further resist FL in the initial stage of implementation (Brewer & Movahedazarhouligh, 2018; Giannakos et al., 2018), which can be even worse for older learners (Birgili et al., 2021).

Student challenges naturally become educators' challenges. Significant start-up effort is required to design both pre-class and in-class sessions, tightly linking the two. Pre-class video requires levels of instructional and technical qualities attractive enough to engage reluctant students in self-regulated learning and prevent distractions. The length and load must also be appropriate. The production of a 10-min video is known to require nearly 2–3 h work, and according to McLaughlin et al. (2014), an FL educator has to spend 1.27 times more time in developing and managing an FL course as compared to a traditional course. Preparing in-class session also requires great deliberation in order to provide the necessary active learning experiences. Educators whose courses were mostly lecture-based may be bewildered as to what to prepare for the in-class time. Most importantly, educators need to create a tight link between pre- and in-class learning so that the two complement each other, which may ultimately involve redesigning a course (Lee & Choi, 2019).

Another fundamental educator challenge is the need to shift their pedagogy and philosophy about teaching and learning to minimize the knowledge deliverer's role and maximize the facilitator's role. However, in reality many educators resist this change and prefer traditional lecture-based teaching (Hew et al., 2021). Since FL requires a fundamental conceptual shift in thinking about teaching and learning, this challenge must be tackled strenuously.

Lastly, there are technical challenges in terms of infrastructure, devices, and technology skills, for both students and educators. Educators must constantly be aware of any learner left behind by such issues.

Research has provided some possible solutions to these challenges, as shown in Table 2. For student pre-class learning issues, strategies such as the checking of students' pre-class learning written notes, online quizzes or video-embedded quizzes, pre-class assignments, in-class quizzes, and study schedule can be provided to support student self-regulation (Cheng et al., 2019). Educators must help students recognize that FL pre-class learning is a crucial component of FL, not a supplementary task. Regarding unfamiliarity and unreceptive attitude toward FL, course orientation with clear explanations about the FL concept and teacher's expectations of students' responsibility can be provided (Lee et al., 2017). For the educators' video production challenge, educators can deliberately select and use the vast number of preexisting video learning materials (e.g., OER, MOOCs) provided by institutions and refer to production guidance on how to create high-quality video.

For educators who usually deliver knowledge during class and do not know what to do during FL in-class, designing in-class learning activities can be a big challenge. Studies suggested a set of in-class activities such as discussion, small

Table 2 FL challenges and possible solutions

FL challenges		Possible solutions
Student challenges	Unpreparedness for pre-class assignment Disengagement from the pre-class learning Helplessness during pre-class learning	✓ Checking students' written notes of pre-class learning ✓ Online quizzes ✓ Video-embedded quizzes ✓ Pre-class assignments ✓ In-class quizzes ✓ Provide study schedule ✓ Help student see the importance of pre-class learning
	Unfamiliarity and unreceptive attitude toward FL	✓ Course orientation ✓ Reflection on opportunities to reinforce FL concept throughout the course
Educator challenges	Significant effort for pre-class video production	✓ Use preexisting resources (e.g., OER) ✓ Provide guidance on how to create high-quality video
	Significant effort for in-class activity preparation	✓ Adopt TBL or PI ✓ Discussion, small group activities, feedback, problem-solving, Q&A
	Resistance against shifting their pedagogy and philosophy about teaching and learning	✓ Professional development ✓ Educator community peer consulting
Technical challenges	Technical accessibility in terms of infrastructure, devices, and technology skills	✓ Institutional support ✓ Professional development

group activities, feedback, problem-solving, Q&A or exercises, group projects, gaming activities, personal projects, and peer assessment. Other instructional model such as team-based learning (TBL) (Michaelsen, Knight, & Fink, 2004) or peer instruction (PI) (Mazur, 1997) can also be implemented, each of which has a structured procedure. For example, TBL starts with (1) individual readiness assurance test (IRAT), followed by (2) team readiness assurance test (TRAT), (3) appeal (the opportunity to appeal that their answer choice is better), and (4) instructor feedback, and finally ends with (5) application-focused exercises. These steps can guide FL educators when designing and implementing FL in-class learning.

Fully Online Flipped Learning, Bichronous Online Learning, and HyFlex Learning

The COVID-19 pandemic, causing offline in-class sessions to be cancelled, has naturally called for a modified FL model implemented in fully online contexts. A few studies (e.g., Stöhr, Demazière, & Adawi, 2020; Jia, Hew, Bai, & Huang,

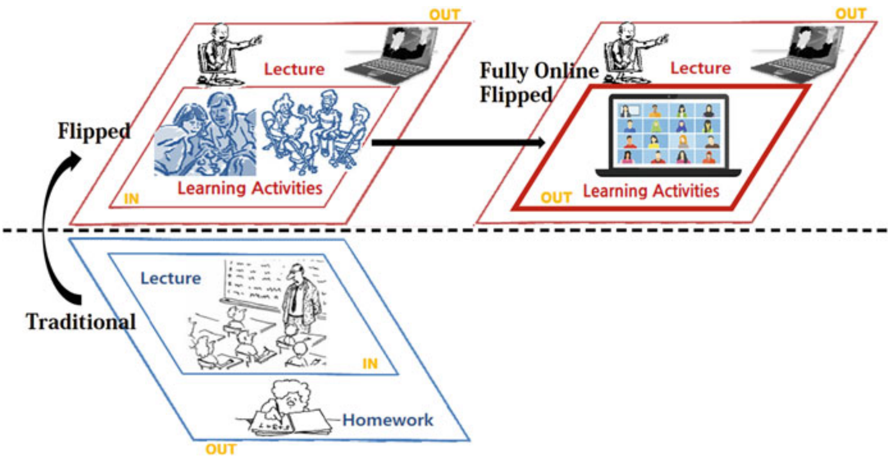


Fig. 2 Fully online FL in comparison with original FL and traditional learning

2021) reported the experiences when implementing the fully online FL model. The fully online flipped learning converts offline in-class learning into online in-class learning using video conferencing tools. Face-to-face classroom learning is replaced by synchronous virtual class learning as in Fig. 2. Video conferencing enables real-time interaction with nonverbal communication cues, such as facial expressions and body language, which offer high levels of immediacy and student engagement (Jia et al., 2021). Stöhr et al. (2020) and Jia et al. (2021) investigated whether fully online FL is as effective as the original FL and found no statistically significant difference in average academic performance between the two. However, Stöhr et al. (2020) cautioned that fully online FL led to a polarized larger spread in performance, indicating some students perform better, while others struggle even more.

Although no specific prescriptions for what should be done during each mode of learning exist, the blending of both asynchronous and synchronous online learning has recently been christened with the name of bichronous online learning by Martin, Polly, and Ritzhaupt (2020). Bichronous online learning can be a broader concept than the fully online flipped learning model. In the former model, students participate in their learning anytime, anywhere, during the asynchronous parts of the course but then participate in real-time activities for the synchronous sessions, whereas in the latter model, the way of blending both asynchronous and synchronous online learning is the same, but it specifies that knowledge delivery should be done during the asynchronous part, and collaborative constructive learning activities should be conducted during the synchronous part. Further variation is the hybrid flexible (HyFlex) approach suggested by Abdelmalak and Parra (2016), where students choose how to participate in the course or session, either online or offline, synchronously or asynchronously, over the course and from session to session, depending on which works best for them.

Future of Flipped Learning Practices and Research

In this chapter, I have reviewed the definition, history, supporting theories, research status quo, modified versions, and future research issues of FL.

FL review studies have given many recommendations for future research, with the following four being most often mentioned. Firstly, while some FL studies have provided rich accounts of design features and associated implementation, more have not. Future studies should provide details on specific course design, materials used, pedagogical strategies, learning environment, and context for both pre-class and in-class learning. In addition, there have been calls for the research to be more rigorous and theoretically grounded. Secondly, research should explore the contexts in which FL works best, i.e., for whom, when, under what circumstances, and in what ways. Thirdly, although most meta-analyses show that FL is better than the traditional approach in terms of academic performance, studies comparing the two in terms of higher-order learning outcomes are limited.

Fourthly, a small number of studies into long-term implementation of FL have been conducted. In addition, as some studies stressed that FL involves a shift in thinking about teaching and roles of teachers, and its successful implementation requires cultural shifts, further studies on cases of a whole FL school or multiyear FL implementation would reveal whether such a pedagogical or cultural shift was induced by FL.

FL started as a local trial strategy in a US high school and in less than 10 years exploded in popularity, having been extensively recognized and implemented at all levels of education across the world by researchers. Behind this popularity is a global desire to improve the quality of education through putting learners in the center of their learning. The contributions of FL in improving educational practices thus far cannot be ignored. However, in practice, educators have to remember that flipping, per se, cannot guarantee its effectiveness but can be the catalyst to reflecting and redesigning the entire learning experience. FL research should rigorously listen to and support practical needs in order to have the FL model properly and effectively implemented and further extended.

References

Abdelmalak, M. M. M., & Parra, J. L. (2016). Expanding learning opportunities for graduate students with HyFlex course design. *International Journal of Online Pedagogy and Course Design (IJOPCD), 6*(4), 19–37.

Akcayir, M., & Akcayir, G. (2017). Advantages and challenges associated with augmented reality for education: A systematic review of the literature. *Educational Research Review, 20*, 1–11.

Baker, J. W. (2000). *The classroom flipped: Using web course management tools to become the guide on the side.* Paper presented at the 11th International Conference on College Teaching and Learning, Jacksonville, FL.

Bartlett, F. C. (1995). *Remembering. A study in experimental and social psychology.* Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511759185.

Bergmann, J., & Sams, A. (2012). *Flip your classroom*. Eugene, OR: International Society for Technology in Education.

Bergmann, J., & Sams, A. (2014). Flipping for mastery. *Educational Leadership, 71*(4), 24–29.

Birgili, B., Nevra Seggie, F., & Oğuz, E. (2021). The trends and outcomes of flipped learning research between 2012 and 2018: A descriptive content analysis. *Journal of Computers in Education 8*(3), 365–394.

Bishop, J. L., & Verleger, M. A. (2013). *The flipped classroom: A survey of the research*. Paper presented at 120th ASEE Annual Conference & Exposition, Atlanta, GA.

Bond, M. (2020). Facilitating student engagement through the flipped learning approach in K-12: A systematic review. *Computers & Education, 151*, 1–36.

Brewer, R., & Movahedazarhouligh, S. (2018). Successful stories and conflicts: A literature review on the effectiveness of flipped learning in higher education. *Journal of Computer Assisted Learning, 34*(4), 409–416.

Bush, M. D. (2013). Educational technology points of inflection: what MOOCs, flipped classrooms, and OLPC teach us about individualization of learning. *Educational Technology, 53*, 60–63.

Chen, K. S., Monrouxe, L., Lu, Y. H., Jenq, C. C., Chang, Y. J., & Chang, Y. C. (2018). Academic outcomes of flipped classroom learning: A meta-analysis. *Medical Education, 52*(9), 910–924.

Cheng, L., Ritzhaupt, A. D., & Antonenko, P. (2019). Effects of the flipped classroom instructional strategy on students' learning outcomes: A meta-analysis. *Educational Technology Research & Development, 67*, 793–824.

Davies, R. S., Dean, D. L., & Ball, N. (2013). Flipping the classroom and instructional technology integration in a college-level information systems spreadsheet course. *Educational Technology Research and Development, 61*(4), 563–580.

Dennis, A., & Valacich, J. (1999). *Rethinking media richness: Towards a theory of media synchronicity.* Paper presented at the 32th Hawaii International Conference of Systems Sciences, Maui, HI.

Dennis, A.R., Fuller, R.M., and Valacich, J.S. (2008). Media, tasks, and communication processes: A theory of media synchronicity. *MIS Quarterly, 32*(3), 575–600.

Flipped Learning 3.0 Global Standards Summit. (2018). *Flipped learning 3.0 global standards*. Available from https://aalasinternational.org/flipped-learning-global-standards-summit/

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *Internet and Higher Education, 7*(2), 95–105.

Garrison, D. R., & Vaughan, N. D. (2008). *Blended learning in higher education: Framework, principles, and guidelines*. San Francisco, CA: Wiley.

Giannakos M. N., Krogstie J., Sampson D. (2018) Putting Flipped classroom into practice: A comprehensive review of empirical research. In: Sampson D., Ifenthaler D., Spector J., Isaías P. (eds) *Digital Technologies: Sustainable Innovations for Improving Teaching and Learning*. Springer, Cham. https://doi.org/10.1007/978-3-319-73417-0_2.

Heitz, C., Prusakowski, M., Willis, G., & Franck, C. (2015). Does the concept of the "Flipped Classroom" extend to the emergency medicine clinical clerkship? *The Western Journal of Emergency Medicine, 16*(6), 851–855.

Hew, K. F., & Lo, C. K. (2018). Flipped Classroom Improves Student Learning in Health Professions Education: A Meta-Analysis. *BMC Medical Education, 18*, 38.

Hew, K. F., Bai, S., Dawson, P., & Lo, C. K. (2021). Meta-analyses of flipped classroom studies: A review of methodology. *Educational Research Review, 33*, 100393.

Hughes, Y., & Lyons, N. (2017). Does the flipped classroom improve exam performance in medical education? A systematic review. *MedEdPublish, 6*(2), 38.

Kerres, M., & de Witt, C. (2003). A didactical framework for the design of blended learning arrangements. *Journal of Educational Media, 28*(2–3), 101–113.

Kostaris, C., Sergis, S., Sampson, D. G., Giannakos, M. N., & Pelliccione, L. (2017). Investigating the potential of the flipped classroom model in K-12 ICT teaching and learning: An action research study. *Educational Technology & Society, 20*(1), 261–273.

Jia, C., Hew, K., Bai, S., & Huang, W. (2021). Adaptation of a conventional flipped course to an online flipped format during the Covid-19 pandemic: Student learning performance and

engagement. *Journal of Research on Technology in Education*, Early Release. https://doi.org/10.1080/15391523.2020.1847220.
Lage, M. J., Platt, G. J., & Treglia, M. (2000). Inverting the classroom: A gateway to creating an inclusive learning environment. *The Journal of Economic Education, 31*(1), 30–43.
Lai, C. & Hwang, G. (2016). A self-regulated flipped classroom approach to improving students' learning performance in a mathematics course. *Computers & Education*, 100, 126–140.
Lee, J., & Choi, H. (2019). Rethinking the flipped learning pre-class: Its influence on the success of flipped learning and related factors. *British Journal of Educational Technology, 50*(2), 934–945.
Lee, J., Lim, C., & Kim, H. (2017). Development of an instructional design model for flipped learning in higher education. *Educational Technology Research & Development, 65*, 427–453.
Lee, J., Park, T. & Davis, R. O. (2022). What affects learner engagement in flipped learning and what predicts its outcomes? *British Journal of Educational Technology, 53*(2), 211–228.
Lo, C. K. (2020). Systematic reviews on flipped learning in various education contexts. In O. Zawacki-Richter, M. Kerres, S. Bedenlier, M. Bond, & K. Buntins (Eds.), *Systematic reviews in educational research: Methodology, perspectives and application* (pp. 129–143). Wiesbaden: Springer VS.
Lo, C. K., & Hew, K. F. (2017). A critical review of flipped classroom challenges in K-12 education: Possible solutions and recommendations for future research. *Research and Practice in Technology Enhanced Learning, 12*(1), 1–22.
Lo, C. K., Hew, K. F. & Chen, G. (2017). Toward a set of design principles for mathematics flipped classrooms: A synthesis of research in mathematics education. *Educational Research Review, 22* (1), 50–73.
Lundin, M., Lantz-Andersson, A., & Hillman, T. (2020). Teachers' identity work in a professional Facebook group. *Journal of Information Technology Education: Research, 19*, 205–222.
Martin, F., Polly, D., & Ritzhaupt, A.D. (2020). Bichronous online learning: Blending asynchronous and synchronous online learning. *Educause Review*. Retrieved from: https://er.educause.edu/articles/2020/9/bichronous-online-learning-blending-asynchronous-andsynchronous-online-learning
Mazur, E. (1997). *Peer instruction: A user's manual*. Upper Saddle River, NJ: Prentice Hall.
McLaughlin, J. E., Roth, M. T., Glatt, D. M., Gharkholonarehe, N., Davidson, C. A., Griffin, L. M., et al. (2014). The flipped classroom: A course redesign to foster learning and engagement in a health professions school. *Academic Medicine, 89*(2), 236–243.
Michaelsen, L. K., Knight, A. B., & Fink, L. D. (Eds.). (2004). *Team-based learning: A transformative use of small groups in college teaching*. Sterling, VA: Stylus Publishing.
Moraros, J., Islam, A., Yu, S., Banow, R., & Schindelka, B. (2015). Flipping for success: evaluating the effectiveness of a novel teaching approach in a graduate level setting. *BMC medical education*, 15(1), 1–10.
Nordenbo, S. E. (2010). Evidence and synthesis: A new paradigm in educational research. In The Research Council of Norway (Ed.), *Rigour and relevance in educational research* (pp. 21–27). St. Hanshaugen, Norway: The Research Council of Norway.
Shi, Y., Ma, Y., MacLeod, J. & Yang, H.H. (2020). College students' cognitive learning outcomes in flipped classroom instruction: a meta-analysis of the empirical literature. *Journal of Computers in Education*, 7(1), 79–103.
Stöhr, C., Demazière, C., & Adawi, T. (2020). The polarizing effect of the online flipped classroom. *Computers & Education, 147*, 103789.
Strelan, P., Osborn, A., & Palmer, E. (2020) The flipped classroom: A meta-analysis of effects on student performance across disciplines and education levels. *Educational Research Review, 30*, 1–22.
Sweller, J., van Merrienboer, J. J. G., & Paas, F. G. W. C. (1998). Cognitive architecture and instructional design. *Educational Psychology Review, 10*, 251–296.

Tutal, Ö., & Yazar, T. (2021). Flipped classroom improves academic achievement, learning retention and attitude towards course: A meta-analysis. *Asia Pacific Education Review, 22*(4), 655–673.
West, R. E., Tawfik, A. A., Gishbaugher, J. J., & Gatewood, J. (2020). Guardrails to constructing learning: The potential of open microcredentials to support inquiry-based learning. *TechTrends, 64*(6), 828–838.
Zawacki-Richter, O. (2020). Introduction: Systematic reviews in educational research. In O. Zawacki-Richter, M. Kerres, S. Bedenlier, M. Bond, & K. Buntins (Eds.), *Systematic reviews in educational research* (pp. v–xiv). Wiesbaden, Germany: Springer VS.
Zheng, L., Bhagat, K. K., Zhen, Y., & Zhang, X. (2020). The effectiveness of the flipped classroom on students' learning achievement and learning motivation. *Journal of Educational Technology & Society, 23*(1), 1-1.

Digital Credential Evolution

69

How Open Microcredentials/Badges Support Learning in Micro-, Meso-, and Macro-levels

Richard E. West and Zui Cheng

Contents

Abstract

In this chapter, we discuss open recognition as a key part of the digital learning/open education revolution, and open microcredentials a method for open recognition to disrupt traditional educational practices surrounding how we recognize and certify learning. We begin with definitions of open microcredentials, badges, verifiable credentials, and similar concepts. Then, we discuss the potential of open microcredentials to impact teaching and learning at the micro-, meso-, and macrolevels. We then conclude with recommendations for practice and the suggestion of a framework to guide research.

Keywords

OER · Microcredentials · Badges · Open badges · Open education · Verifiable credentials · Open recognition · Assessment

R. E. West (✉)
Brigham Young University, Provo, UT, USA
e-mail: rickwest@byu.edu

Z. Cheng
Shenzhen University, Shenzhen, China
e-mail: zuicheng@szu.edu.cn

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_71

Introduction

A benefit of the twenty-first century digital education revolution has been the increased access to education provided by digital technologies. This interest in improving access has led to the growth of the open educational movement and an explosion of openly accessible and/or openly licensed resources for education such as Massively Open Online Courses (MOOCs), textbooks, and other open educational resources. However, learning is more than content, and consequently open education must include more than just open educational resources (OER). As Wiley (2018) has argued, we need to talk about an open education *infrastructure* that includes open content, competencies, assessments, credentials, and even pedagogy. We further synthesize Wiley's ideas and propose that an open education infrastructure for the twenty-first century should include methods, technologies, and plans for:

1. Open practices (e.g., open pedagogy, open research, and open sharing/collaboration of ideas).
2. Open content (e.g., MOOCs, OER, open textbooks)
3. Open recognition of learning (e.g., open assessments, data, standards, credentials, transparency of trust around recognizing learning)

While open content has been discussed for 30 years and is the most well-known, open practices and recognition have been largely ignored. However, new technologies have emerged to support open recognition and practices in the last 8 years. In particular, technologies supporting how we assess and recognize acquired knowledge, skills, and abilities are becoming increasingly popular.

One emerging innovation to support how we assess and recognize learning is digital microcredentials, also known as open microcredentials, open badges, or alternative digital credentials. While there are nuances in how these terms are used, they are often used interchangeably in the literature. These credentials have exploded in popularity in recent years with 45 million open badge credentials having been issued since their creation in 2012 (source: IMS Global). While some are concerned that breaking education down into microbits appropriate for microlearning would be detrimental, others argue that they instead present an enticing opportunity for educational innovation by playing a complementary role, creating the building blocks for more affordable degree programs, and promoting greater transparency for educational outcomes (Gallagher, 2019).

> Rather than sweeping away degrees, new types of online credentials — various certificates, MicroMasters, badges, and the like — are instead playing a complementary role, creating the building blocks for newer, more affordable degree programs.... The growing digitization of credentials also heralds a new era of greater transparency for educational outcomes — providing more and better data on which corporate leaders can make hiring decisions. (para 9, 14)

In this chapter, we will focus on open recognition as one aspect of the open education infrastructure, and in particular open microcredentials due to their ability to disrupt traditional educational practices surrounding how we recognize and certify learning. In keeping with the spirit of the handbook, we will discuss the potential of open microcredentials to impact teaching and learning at the micro-, meso-, and macro-levels, concluding with recommendations for both practice and research.

Definitions

One challenge in discussing the literature on open badges/microcredentials is that the terms have been used very differently by different professionals and overlaps with other, similarly micro, open recognition technologies. For that reason, we begin our chapter by briefly defining the terms.

First, it is important to distinguish between *open* and *controlled* credentials. Open credentials use technology that openly distributes the role of assessing and credentialing learners among various institutions and persons. Meanwhile, controlled credentials are issued and controlled by a small group of persons or institutions. For example, the number of institutions that can issue a university degree is relatively small – only 3700 such institutions in the United States (National Center for Education Statistics, 2020).

In contrast, an open credential, by nature of the technology supporting it, cannot be controlled but could be issued by anyone. Because open credentials are based on common, open technology (such as the Open Badge Infrastructure, maintained by IMS Global, see https://www.imsglobal.org/activity/digital-badges), these credentials can be exported and imported freely between institutions – putting the learner in control. In this way, open credentials, as Hickey and Chartrand (2020) argued move us away from accrediting institutions towards endorsing actual learning.

Second, we distinguish between micro- and macrocredentials. Macrocredentials, such as degrees, diplomas, and professional learning certificates, represent a culminating recognition of program completion – such as the end of a university degree. Microcredentials, instead, do not signal the end of learning, but rather small steps on a learning trajectory, representing acquisition of a single skill, ability, or bounded set of knowledge. Because these credentials represent smaller pieces of education, they can be combined to form unique learning pathways.

The terms *open badges* and *open microcredentials* can describe either the same thing, or sometimes very different things – often with open badges representing smaller pieces of learning, or with microcredentials representing traditional university credit options but on a microscale, while badges represent noncredit, informal learning. Sometimes, however, the difference could be as simple as a difference in culture – for example, whether a particular society has a history of boy or girl scout merit badges for youth learning. However, in the end, both terms represent credentials supported by the Open Badge Infrastructure and are thus equivalent technologies. We will refer to these both as *open microcredentials* when talking about them generally, and in reviewing the work of others, we will use whatever specific term the authors use.

Key affordances of open microcredentials that we identify include their capabilities to: (1) recognize accomplishments at more granular level, (2) demonstrate mastery in a particular area, (3) provide verified and endorsed certifications, (4) serve as a lifelong portfolio that captures both formal and informal learning, (5) store rich formats of metadata to serve different purposes, and (6) be shared among different stakeholders.

Finally, there are other emerging credential technologies that use different open technology standards but share similar affordances. For example, *verifiable credentials* use open source technology maintained by the World Wide Web Consortium (https://www.w3.org/TR/vc-data-model/) and *comprehensive learner records* (or *extended transcripts*) which are a comprehensive record of all of a learner's accomplishments in school, on the job, or within communities – a record that can follow the learner wherever they go. This technology standard is also maintained by IMS Global (https://www.imsglobal.org/introduction-extended-transcript-et).

We believe that this concurrent push to develop comprehensive learner records, verifiable credentials, and open microcredentials is representative of the same underlying desire to create credentials that can be openly shared among institutions, controlled by learners, and representative of both small and large pieces of learning.

What Research on Open Microcredentials Has Taught Us

We will divide our discussion of the research findings into those related to micro-levels of education (effects on teachers and learners and their perceptions of open microcredentials), mesolevels (effects on institutions), and macrolevels (effects on society), in keeping with the theme of this handbook.

How Do Open Microcredentials Affect Learning in the Microlevel?

Learner Perceptions on Open Microcredentials

Most learners hold positive attitudes towards the use of microcredentials (Başal & Kaynak, 2020; Malczyk, 2019). These learners suggested that the use of digital badges provides several advantages, such as promoting learning engagement and motivation, providing external rewards, providing feedback (Santos-Díaz, Hensiek, Owings, & Towns, 2019), triggering a sense of enjoyment or accomplishment, enhancing learner autonomy (Iwata, Wang, & Clayton, 2019), developing positive attitudes towards learning (Watson, Ann, Arabia, & Watson, 2020), and enhancing learner autonomy (Iwata et al., 2019). However, these perceptions can be heavily influenced by their perceptions of the course and engagement in it (Higashi & Schunn, 2020).

In contrast, other research showed that microcredential users may hold mixed perceptions on the adoption of this technology. For example, freshmen education majors have held some mixed attitudes (Beilstein et al., 2019) and considered microcredentials less prestigious than a certificate of completion (Dyjur &

Lindstrom, 2017) despite being an innovative idea. Also, students with prior experiences earning a microcredential have perceived microcredentials as more beneficial compared to students with no prior experiences before (Hartman & Andzulis, 2019).

While these studies looked at the perceptions of learners using open microcredentials, other studies have looked at their actual impacts in various areas, including student motivation, learning performance, personalization of learning, and self-regulated learning.

Open Microcredentials and Student Motivation

Open microcredentials can promote motivation, encouraging participation, and engagement (Facey-Shaw, Specht, van Rosmalen, & Bartley-Bryan, 2020; Delello, Hawley, McWhorter, Gipson, & Deal, 2018; Başal and Kaynak, 2020). Learners given the opportunity to earn microcredentials find it motivating because credits were given to recognize their efforts and devoted time. With rich metadata, microcredentials can communicate different types of learning data, such as interactive activities and multimedia instructional materials. For example, digital badges can motivate online tutors to improve their online tutoring skills, monitor the quality of their work, and encourage them to reflect on their tutoring process (Hrastinski, Cleveland-Innes, & Stenbom, 2018). Skills-based digital badges helped middle and high school learners ($N = 72$) become more motivated, as evidenced by significantly higher self-efficacy and self-regulation ratings (Elkordy, 2014). Moreover, learners who worked with digital badges at a secondary special education school in North Holland ($N = 34$) showed a significant increase in their intrinsic motivation (Bareño, 2021).

However, this research on the potential impact on motivation from using microcredentials has been mixed (Roy & Clark, 2018), with some studies finding they can decrease motivation (Chou & He, 2017; Reid, Paster, & Abramovich, 2015; Tomić et al., 2019). Contradictory results can even be found in different methodological sections within the same study. For example, in a quasi-experimental study conducted in an introductory programming course ($N = 362$), the survey results suggested no impact of digital badges on learners' intrinsic motivation, while in the focus groups and interviews, learners using digital badges expressed motivation to learn programming (Facey-Shaw et al., 2020). Other research showed that the use of microcredentials had different impacts on different types of learning, improving motivation for extrinsic learners but not intrinsic ones (Sullivan, 2013).

Open Microcredentials and Student Learning

While the effects on learner motivation are mixed, and to date still uncertain, it has been argued that microcredentials can influence learning performance and skill development. For example, Newby and Cheng (2019) found that preservice teachers who learned with digital badges outperformed those who learned with traditional projects in an undergraduate-level educational technology course. Also, the preservice teachers in the badge group reported more gains in their technology integration ability than those in the nonbadge group. Similarly, researchers found that the elementary students who earned digital badges for reading outperformed those who did not earn badges in reading acquisition tasks (Collins, Grroff, Mathena, & Kupczynski, 2019).

Microcredentials have also helped K-12 educators learn twenty-first century skills of collaboration, communication, critical thinking, and creativity. Microcrendentials help them become more goal-oriented and reflective on their learning and effectively communicate their conceptual understanding of the learned skills with each other (Yanek, 2021). Theoretically, microcredentials can also support inquiry-based learning through outlining prerequisite knowledge, chunking the problem into manageable subproblems for novices, and providing criteria and evidence for flexible assessment (West, Tawfik, Gishbaugher, & Gatewood, 2020). In addition, student achievement in reading and writing about literature was found to be positively correlated with their engagement in a course embedding soft skills badging (Naimark, 2021).

Open Microcredentials and Personalized Learning

Microcredentials may also support personalized learning, or instructional and learning approaches based on the needs of individual learners, which can spark curiosity of students through active engagement with the learning environment (Hughey, 2020). Microcredentials can support this personalized learning by first breaking content into small modular units, so learners can create their own learning pathways (Erickson, 2020; McGovern & Gogan, 2021).

Second, open microcredentials are typically associated with individualized portfolios, documenting earned skills and knowledge for lifelong learning (Amano et al., 2019) and recognizing accomplishments (Wolfenden et al., 2020; Leaser, Jona, & Gallagher, 2020; Zhou, Chen, Fan, & Ji, 2019) so that learners can “use the terminology and examples that the gatekeepers of higher education would recognize and value” (Martin, Gutierrez, & Muldoon, 2020, p. 20). With microcredentials, learners can easily communicate their accomplished skills and knowledge in a more granular level and gain the flexibility to hop on and off “the formal education bus” when needed (Ryken, 2006). For example, in the CHAMPIONS NETWork program, Chicago high school students could earn seven digital badges of online experiences on health advocacy to prepare them for future health professionals. Students could then share earned badges with employers and colleges (Heinert, Quasim, Ollmann, Socarras, & Suarez, 2020). In this way they could take better advantage of employment opportunities at current skill levels and resume the degree completion path when new skills and knowledge are needed (Pearea, 2020).

Third, microcredentials can support personalized learning by providing specific and prompt feedback (Besser & Newby, 2020) as well as instructions with details, explanation, hints, and examples (Besser & Newby, 2019; Hensiek, 2018). While digital badges may serve as a fine-grained and an informational feedback tool, they only become effective when students acknowledge the value of using this type of feedback and show an expectancy for learning, as Reid et al. (2015) argued.

Open Microcredentials and Self-regulated Learning

Finally, research about how microcredentials might affect learners has also explored the impact on self-directed or self-regulated learning. For example, in a study of college graduates studying self-directed e-learning content, researchers found that the badge group reported higher levels of autonomous regulation than the nonbadge group, indicating that the use of digital badges had a positive impact on learners' self-regulation (Agola, 2020).

As widely acknowledged, self-regulated learning is a goal-oriented process, that is, self-regulated learners are intentional about information needed and take steps to master this information to achieve a desirable goal using strategies and responsive feedback (Zimmerman, 1990). Microcredentials can support learners' goal-setting process to enhance self-regulated and self-directed learning (Cheng et al., 2020; Cheng, Watson, & Newby, 2018) via a couple of mechanisms – for example, by helping to set explicit goals. In two studies conducted by Morris, Dragovich, Todaro, Balci, and Dalton (2019), no difference was found on learning performance across four groups, badges only, goal only, badge+goal, and control group, indicating that badges serve a similar role as goals in supporting learning.

Second, open microcredentials could theoretically help in establishing the necessary background knowledge and pathways. With microcredentials, learners could earn prerequisite credentials that prepare them to enter a complex problem-solving realm with sufficient background knowledge (West et al., 2020).

Third, these credentials help in optimizing goal-effects on learning (Cheng et al., 2018, 2019). Four specific functions of digital badges had been found in prior research on facilitating learners' goal setting process: connecting multiple goals, affecting goal commitment, scaffolding complex tasks, and providing personalized feedback. With the support of digital badges, learners can more easily connect learning goals, professional goals, and lifelong learning goals to optimize the effect of goal-setting on learning and professional development. Digital badges also influence learners' commitment to a goal as learners may devote more time and effort to achieving a badge (goal). Many digital badges not only serve as a pure extrinsic reward or recognition of accomplishment, but also bear different metadata including interactive instructional strategies and activities. Each digital badge also serves as a steppingstone that scaffolds a learning process towards achieving a complex objective. In addition, both the badge visual itself and the embedded feedback could provide learners with both summative and formative personalized feedback (Cheng, Richardson, & Newby, 2019).

How Can Open Microcredentials Support Learning in the Mesolevel?

Thus far, most research on open microcredentials has focused on the microlevel of individual learners, teachers, and experiences. Adoption of an innovation at the level of an institution, organization, or system is much more difficult, requiring policies and practices to be rewritten. Perhaps because of this, Borrelli and Tateo (2021) observed that it has been difficult to fully evaluate the benefit of open micro-credentialing compared to traditional credentials as limited pedagogical models are available to consider. In this section, we review existing research, organized into a few common themes.

Microcredentials Can Communicate Pathways Towards End Goals

Some organizations have explored how to organize microcredentials into pathways, stacks, or playlists that represent an educational journey. Communicating these feasible pathways of learning is especially important for community colleges and other institutions working with students who may feel disoriented or less confident in their educational goals. Perea (2020) argued that stacking microcredentials allows learners, especially underrepresented population and individuals who are vulnerable, in persisting in ambiguous and poorly designed degree programs, to be able to "have multiple on and off ramps at certain milestones in a pathway towards degree completion and take advantage of employment opportunities at their current skill levels, and then later resume the degree completion pathway without starting anew" (p. 23). Perea then shared three case studies of community colleges stacking microcredentials in ways that guided students towards degrees while also recognizing their progress along the way and empowering them with credentials that could benefit them in the short and long term (see Table 1).

Microcredentials Can Communicate Their Value and Make Organizational Goals Visible

While at the individual level, this helps students "see a pathway toward higher level credentials, toward progressively higher levels of workforce skills" (Perea, 2020, p. 23), at the institution-level, this can help with establishing shared expectations, vision, and goals. For example, digital badges can make library learning goals visible (Ekordy, 2014) or provide a record of granular and traditionally undocumented teaching skills (Spencer & Bussi, 2020).

In fact, Carey and Stefaniak (2018) found that this visibility and transparency of organizational goals is not only a great benefit, but a necessary precondition for using open microcredentials. They further argued in a different paper that microcredentialing systems must effectively communicate their value to learners for the system itself to be adopted successfully, because most learners will not be motivated to pursue these credentials without understanding their value. As Stefaniak and Carey (2019) stated, "badge participants emphasized the importance of creating badges with internal and external value to maximize buy-in. The recommendations also emphasized the importance of a comprehensible purpose for the badges" (p. 15).

It is also important to communicate the value of open microcredentials to employers and other end consumers of these credentials. For example, Randall and West (2020) surveyed potential employers in the field of education and found that employers often did not know what badges were, but if they did, they valued them. Similarly, Perkins and Pryor (2021) surveyed 73 employers and found 93% were unfamiliar with open badges. However, they wanted to understand the credentials better. This indicated that educational entities need to better partner and communicate with employers about these credentials: "Such synergies are crucial to address the changing skills agenda, to prepare students to thrive in physical and virtual work environments" (p. 24).

Table 1 Three cases from Perea (2020) of community colleges stacking microcredentials

Case title	Goal	Action	Outcome
Tennessee Transfer Pathways project	Facilitated transferring from community colleges to universities within the state	Provided professional micocredentials	Student enrollments increased 44% and completion rates tracked at 85% at one college
Colorado Industry-Demanded Credential Initiative	Provided industry-demanded skills and credentials while still guiding students on a path towards degree completion	Offered digital, competency-based badges matched to industry technical standards and being embedded within manufacturing and applied degree pathways	It enabled students to complete the degree at multiple points to apply their skills in the workforce successfully and additionally helped employers be able to articulate what kinds of skills they needed for specific positions
Basic Health Care Certificate initiated by Rogue Community College in Oregon	To address dual concerns of a lack of entry-level skilled workers in healthcare and the lack of young people entering the field	The standalone Basic Health Care Certificate was interweaved in 11 different programs with a diverse set of electives – preparing students for five different entry-level positions	Students can use it to build credentials horizontally within an occupational field or to ladder up vertically within a professional healthcare career or degree completion pathway

Microcredentials Can Widen Participation in Higher Education

In addition to providing vision to students through potential stacks and pathways, microcredentials can widen student participation and persistence in higher education. The UK Open University, for example, has offered MOOC courses on basic skills. This project aims to develop students' confidence and skills as a "personal 'journey from informal to formal learning' (or JiFL)" in a way that creates "a steppingstone into accredited education" (Hills & Hughes, 2016). They found that 28% of learners "clicked-through" to learn more about enrollment in regular OU programs.

Similarly, Carnevale, Garcia, Ridley, Quinn, & Georgetown University (2020) reported that students in certificate programs at Georgetown University are more likely to be minority or older – in other words, nontraditional. In total, they found that in the United States, 50% of students in undergraduate coursework were enrolled in certificate or associate's degree programs. They argued "the middle-skills pathway—between a high school diploma and a bachelor's degree—is often overlooked." (pp. 3–4). However, they caution that to date, "not enough is known about the risks and rewards" of these educational paths, a gap we also identified in the literature.

However, one potential benefit that badges/microcredentials can play with this segment of students is in helping them communicate their skills for these "middle-skills" careers. Martin et al. (2020) found that "programs need not only to help participants gain knowledge and skills, but also to give them tools for communicating their accomplishments to college and career gatekeepers" (pp. 16–17) – something they believed digital badges could do as tangible representations of learning.

Microcredentials Can Be Interwoven with Traditional Credentials

Some may view microcredentials as competitors to traditional degrees, but there are many documented cases of micro- and macrocredentials being interwoven (or latticed, as Perea, 2020, described) together. Doing so can "break down the silos between workforce development education and transfer education and provide learners with flexibility in meeting both education and career goals" (Perea, p. 23). Indeed, because microcredentials require thoughtful design and consideration of assessment, evidence of learning, and supportive resources, creating a microcredentialing system can cause teachers and institutes to reflect and rethink teaching practices and curriculum. Eaton, Rauseo, d'Entremont, and Dziorny (2019) found this in their evaluation of the Boston After School and Beyond and the Providence After School Alliance programs and reported that providers, "did not realize that the deep work involved in aligning programmatic activities with the pilot's skill-building goals would strengthen the quality of their own programs" (p. 6).

One example of interweaving open microcredentials with traditional academic credit was described by Randall et al. (2013). They designed over 40 skill-specific open badges available within a preservice, grade-based educational technology course. Students could elect to earn credit towards a degree, and if they wished, they could also earn as many open badges as they wanted to demonstrate mastery of specific skills. While finding this to be an effective method to support personalized learning in the course, one challenge was the burden of additional assessment/grading (also identified by Stefaniak & Carey, 2019), as well as the time required to create new microcredentials to support every potential personalized learning pathway. As Stefaniak and Carey (2019) explained, "It takes time to pitch, design, develop, promote, implement, and manage a badge program" (p. 14).

One solution employed by Randall and colleagues was to train students – peers of the target learners – as evaluation and design assistants to help develop new badge credentials and assess/issue credentials to other students. By comparing the quality of design from these student assistants to established experts, they found the student assistants to produce badge rubrics of equal quality, if they had received sufficient training (Randall et al., 2019), indicating that organizations seeking to integrate open microcredentials into traditional educational systems can do so through trained student assistants, alleviating some of the burden on faculty to run the system.

Microcredentials Can Assist Employers in Tracking/Providing Professional Learning

Employers are key end consumers of microcredentials, and the most successful credentialing systems design credentials that benefit employers as well as students.

But what aspects of a microcredential are most important to employers? In one study of educational principals and hiring personnel, Randall and West (2020) found that employers saw the most value in achievement and capability badges, in comparison with participation/attendance or other types of badges. In particular, the employers valued the evidence link and endorsements from established professional organizations. Most employers in this study believed badges would be useful in the hiring process, but they worried about having too much data and being able to sift through the information effectively. Thus, microcredentialing systems and technologies may consider developing better ways of helping these end consumers parse, aggregate, and filter the data available in digital credentials.

Besides interpreting badges/microcredentials on resumes as part of a hiring process, employers have developed microcredentials as part of their own staff training programs. For example, Clements, West, & Hunsaker (2020) described the successful design of a gamified employee skill tracking and professional development system using open badges for employees of a multimedia center in a university library. In this case, the badges were developed to help the supervisor know who was qualified to teach certain workshops and also to establish regular goals and reward opportunities for employees continuing to develop their skills.

Similarly, Copenhaver and Pritchard (2017) reported on a microcredentialing program at Eckherd College Library to train student employees due to the lack of satisfaction with the previous program, which did not fully meet learning outcomes nor engage the employees. In particular, students had difficulty connecting library work to career development. In redesigning the training as modules with open badges, they found they covered more material in greater depth and had better employee retention and learning.

Similarly, National Instruments designed an open badging system mainly to train customers of their products in professional skills for using the products in their own workplaces. Young, West, and Nylin (2019) found that learners felt the badges were helpful and they were likely to repeat the training program to earn additional ones and were likely to recommend the program to peers. For both the badge earners and National Instruments the company, the value seemed to come from the ability to share the microcredential, which helped the earner in progressing their career and applying for new positions, but also provided marketing benefits to the company.

Similarly, IBM developed a robust badging system (first piloted in 2015) to recognize professional learning by its employees and others (Leaser et al., 2020). Results were staggeringly positive, as attendance increased 125% and course completions increased by 226%. In 2017, IBM partnered with Northeastern University to convert these badges into academic, graduate-level credit. As the authors put it, “This type of partnership provides a blueprint for how colleges can collaborate with businesses to improve the job market alignment of their academic credentials in a way that delivers more value for students and employers” (p. 40). By 2018, IBM had issued more than a million badges to 400,000 people in nearly 200 countries.

From this robust implementation of employer-based badges came a few insights documented by Leaser, Jona, and Gallagher. First, that community colleges should focus on areas in-demand by industries and create badging programs aligned to those needs. In fact, issuing badges, they argue, can provide a powerful feedback loop to universities about what skills and abilities are "hot" in the market. Second, they argued that these partnerships between employer badging systems and universities work best in online programs. Third, faculty engagement is essential. Fourth, robust communication and marketing is important to articulate the opportunities to learners. Fifth, the digital badges/credentials must provide very clear specifications and criteria to make it easy to understand what competencies they recognize. Sixth, they argue for the need to develop new and robust policy that understand partnerships between academia and industry and articulates where – and how much – academic training can be provided by industry.

How Can Open Microcredentials Support Learning in the Macrolevel?

Although limited in empirical research, there have been many discussions on the societal and cultural aspects of open microcredentials. Many believe that open microcredentials may help break the boundaries of education by connecting formal and informal learning, enhancing lifelong and community-based learning, as well as building a new network of trust. In addition, different regions and cultures have found the use of open microcredentials valuable in different ways.

Connecting Formal and Informal Learning

Open microcredentials earned in informal educational experiences could be used in and transferred to different parts of formal education, such as college admissions (Gutierrez & Martin, 2021), university transfer decisions, career development, and cross-institution credits transfer. This can help connect formal accredited schooling, informal interest-driven learning, and any other recognition of learning accomplishment (Casilli & Hickey, 2016). The documentation of both formal and informal learning enabled by microcredentials is adjustable and responsive to situational needs and economic demands (Jirgensons & Kapenieks, 2018). For example, many out-of-school-time (OST) programs, such as the Design League program offered by Parsons School of Design, have helped learners in disadvantaged backgrounds communicate informal learning accomplishments to formal educational institutions like college and potential employers. These OST programs leverage digital badges as alternative credentials by recognizing and valuing the shared values among the involved organizations and institutions (Martin et al., 2020).

Similarly, in the Informal Ed to Higher Ed (IE2HE) workshop, different stakeholders including microcredential developers, educators, and faculties from two- and four-year institutions worked with informal learning providers from New York and Pennsylvania to help low-income high school youth enter STEM programs. This partnership could easily yield future work, leveraging community colleges to build cross-institution relationships (Gutierrez & Martin, 2021). To be successful, though, the value of using microcredentials needs to be recognized by different stakeholders in informal, formal, and higher education before microcredentials can truly serve as important alternative credentials (Itow & Hickey, 2016; Martin, Gutierrez, & Muldoon, 2020).

Although much of the research literature in education focuses on formal (e.g., in structured courses) and informal (e.g., self-directed, unstructured) learning, new semiformal educational spaces have arisen in the twenty-first century, where learners can self-direct their learning through structured, but unaccredited and lightly assessed, learning opportunities. One example could be MOOC courses such as those offered by the Open University, mentioned above. These courses allow anyone to enroll and participate at any time, but without direct interaction with the teacher or designer of the course.

Enhancing Lifelong and Community-Based Learning

These semiformal spaces open up the possibility of lifelong learning options, and open microcredentials could help to acknowledge lifelong and lifewide knowledge (knowledge learned from a variety of contexts and environments (Reischmann, 1986), skills, and accomplishments by “unbundling” degrees into small components, recognizing granular accomplishments (Cummings, 2021). With open micro-credentials, learners can simultaneously pursue both degrees and workforce credentials (Derryberry, Everhart, & Knight, 2016) and design individual development pathways across K-12, higher education, professional development, and different careers throughout one’s lifetime.

A robust microcredential system is also valuable in helping connect school communities, such as local educational institutions, historical sites, and habitats. For example, community-based organizations with afterschool and summer learning programs in both Providence and Boston have piloted the use of digital badges to certify courses offered in the Expanded Learning Opportunity (ELO), an after-school program. With these digital badges, learners can showcase all of their learning, not only the components that show up in a grade point average or a standardized test score (Eaton, 2019).

Microcredentials have also been used in developing community-based research. For example, in Aboriginal communities in northern Australia, indigenous researchers take contracting work to earn a salary within flexible working hours while living in their home communities. Microcredentials were designed to help these researchers recognize intercultural research skills, playing an important role in promoting community-based research services and reforming education services offered by universities (Spencer, 2020). Microcredentials may also be used to connect community colleges with four-year colleges, acting as a bridge to build cross-institution relationships (Gu & Martin, 2021).

Improving the Credibility of Credentialing

Educational assessment at its core is an act of communicating – communicating to the learner or to potential employers or important peers – about what the learner knows and can do. We are accustomed to verifying a person’s knowledge, skills, and abilities through degrees and certificates. However, there are concerns about how to trust these credentials and improve their rigor (West & Randall, 2016). With the increasing need of recognizing on-demand and informal accomplishments, how to increase the security, verifiability, and transparency of different credentials remains a challenge (McGovern, 2020).

Like all credentials, open microcredentials function best in society when they can be trusted. However, the basis for this trust is substantially different than with traditional credentials. Instead of basing this trust in the accreditation and the authority of the issuer, the trust shifts to open transparency about the explicit criteria and evidence for earning the credential. In contrast with commercial networks of recognition such as Linkedin, which use endorsements to promote a proprietary network, the open nature of open microcredentials allows the development of trusted networks as other open education resources (e.g., Wikipedia) and provides participants with free and open options of accomplishment recognition services (Cummings, 2021).

Establishing this trustworthiness of open microcredentials will be essential to their adoption. For example, Erickson (2015) interviewed 20 Minnesota hiring directors and found they are interested in open digital credentials because this tool may help increase the potential hiring pool. However, they emphasized that to trust these credentials, standards should be established and recognized by the stakeholders (Fishman et al., 2018), and this recognition process requires negotiation, translation, and partnership among stakeholders across formal and informal educational institutions (Itow & Hickey, 2016).

From a technical perspective, open microcredentialing systems could also be integrated with blockchain technologies to offer a trustworthy credentialing network. For example, in the QualiChain project to support learners' lifelong learning journey and their career trajectories, open badges were integrated with blockchain technologies to make the issuing, storing, and transitioning of open badges more transparent and reliable, providing transparent and reliable accreditation services (Mikroyannidis, Third, Chowdhury, Bachler, & Domingue, 2020). Also, many European countries had been experimenting with educational blockchains to create an infrastructure to document, store, and manage credentials in a permanent, transparent, and sustainable manner while providing learners a lifelong record of achievements (Jirgensons & Kapenieks, 2018).

Open Microcredentials in Different Cultures

These issues of how to develop trust in microcredentials may vary across cultures. Open microcredentials originated with the Mozilla Foundation in the United Kingdom and quickly spread throughout Europe and North America. Today, microcredentialing is still more common in some cultures than others, in part due to differing expectations for what an educational credential should be, look like, and communicate. In addition, there are different connotations for words such as *credential* and *badges* in different cultures. However, increasingly, many varied regional and cultural contexts have found the use of this new technology valuable (Mcgovern et al., 2021), and new research is emerging from these additional cultures. For example, open microcredentials are especially appealing to Kyrgysztan teachers because this technology aligns well with

Krygyzstan's nomadic culture, which praises individualized learning, instant reward, constructivist-based instructional methods, and learning flexibility (Gwin, 2021).

In many regions with different cultures, open microcredentials have been applied as an effective approach to support teachers' professional development (Erickson, 2020). For example, in Southeast Asia, microcredentials were used to provide an extensive range of digital professional learning experiences that enabled educators to learn on-demand skills related to their pedagogical practice, student needs, or school-wide collective goals (Casey, 2019). The Information Communication Technology for Rural Education Development (ICT4RED) initiative in Cofimvaba, Eastern Cape Province of South Africa, also used digital badges to reward teachers participating in professional development training. This project was so successful that later the University of Koblenz-Landau in Germany learned from this experience and adopted it in an online Master's Degree course and designed a multichannel open badge system with an advanced validation system (Niehaus et al. 2017).

Microcredentials were also adopted in teachers' professional development in other countries such as Canada (Dyjur & Lindstrom, 2017), Tanzania (Ghasia, Machumu, & DeSmet, 2019), and Finland (Brauer, Kettunen, & Hallikainen, 2018). In China, digital badges were used as learning modules in Moodle to teach Chinese college students multimedia animation design and production. Students can earn different digital badges, such as participation and completion badges, assessment badges, knowledge talent badges, independent learning badges, and communication badges (Zhou et al., 2019).

Conclusion

In this chapter, we have discussed our analysis of the research literature on open microcredentials/open badges according to the 3 M framework of micro-/meso-/macroeffects. While the research literature in this area is thin, limited to certain contexts, and sometimes contradictory, there have been interesting case examples and research findings documenting benefits of open microcredentials. Because the technology supporting these credentials has existed for only the past decade, it will be important to continue future research into their potential positive and negative effects on learners and educational systems. In addition, important questions remain, such as: How do we recognize learning? What kinds of learning recognitions do we trust? And what role does learning recognition play in the overall teaching and learning process?

Open microcredentials may be one way of exploring the answers to these questions, but other possibilities exist, including verifiable credentials, comprehensive learner records/wallets, and other technologies. Common among these tools is a focus on data representation, openness and transferability, and learner agency. These are sticky ideas and ones that we are excited to see explored in current as well as future technological innovations.

References

Agola, E. A. (2020). *ODU digital commons: An analysis of the effect of digital badging on workplace self- directed e-learners' achievement, persistence, and self- regulation* (Unpublished doctoral dissertation). Old Dominion University. https://doi.org/10.25777/5b8q-av57

Amano, K., Tsuzuku, S., Suzuki, K., & Hiraoka, N. (2019). Reflection support for novice learners: Combining digital badges with follow-up surveys. *International Journal, 13*(1), 95–103.

Bareño, M. A. (2021). *The effect of the gamification element; badges on students' motivation in special education* (Unpublished master's thesis). Open Universiteit. https://research.ou.nl/en/studentTheses/the-effect-of-the-gamification-element-badges-on-students-motivat

Başal, A., & Kaynak, N. E. (2020). Perceptions of pre-service English teachers towards the use of digital badges. *Innovations in Education and Teaching International, 57*(2), 148–162. https://doi.org/10.1080/14703297.2019.1649172.

Beilstein, M., Eunicke, M., Ferdinand, P., Jonas, F., Kämper, A., Kápolnási, G., Köhler, J., Merg, J., Mints, M. O., Pachtchenko, S., Schwind, J., Sieger, L. N., & Vasileva, V. (2019). Open badges for the accreditation of media-related competencies in higher education using the production of instructional videos as a case study. *Proceedings of the 16th International EPortfolio and Identity Conference*, 55–64. https://epic.openrecognition.org/wp-content/uploads/sites/6/2019/08/Proceedings-2018-V0.9.pdf%0AOpen

Besser, E. D., & Newby, T. J. (2019). Exploring the role of feedback and its impact within a digital badge system from student perspectives. *TechTrends, 63*(4), 485–495. https://doi.org/10.1007/s11528-019-00386-2.

Besser, E. D., & Newby, T. J. (2020). Feedback in a digital badge learning experience: Considering the instructor's perspective. *TechTrends, 64*(3), 484–497. https://doi.org/10.1007/s11528-020-00485.

Borrelli, L. M., & Tateo, L. (2021). Badging system and "competence-based" models. Proceedings of the CEUR Workshop, 2817, 0–1.

Brauer, S., Kettunen, J., & Hallikainen, V. (2018). "Learning online" for vocational teachers: Visualisation of a competence-based approach in digital open badge-driven learning. *Ammattikasvatuksen Aikakauskirja, 20*(2), 13–29.

Carey, K. L., & Stefaniak, J. E. (2018). An exploration of the utility of digital badging in higher education settings. *Educational Technology Research and Development, 66*(5), 1211–1229.

Carnevale, A. P., Garcia, T. I., Ridley, N., Quinn, M. C., & Georgetown University. (2020). The overlooked value of certificates and associate's degrees: What students need to know before they go to college. Georgetown University Center on Education and the Workforce. Retrieved from https://eric.ed.gov/?id=ED604942

Casey, T. L. (2019). *Considerations for personalized professional learning at International Academy of South East Asia: A gap analysis* (Unpublished doctoral dissertation). University of Southern California. Retrieved from http://digitallibrary.usc.edu/digital/collection/p15799coll89/id/47617

Casilli, C., & Hickey, D. (2016). Transcending conventional credentialing and assessment paradigms with information-rich digital badges. *The Information Society, 32*(2), 117–129. https://doi.org/10.1080/01972243.2016.1130500.

Cheng, Z., Richardson, J. C., & Newby, T. J. (2020). Using digital badges as goal-setting facilitators: A multiple case study. *Journal of Computing in Higher Education, 32*(2), 406–428. https://doi.org/10.1007/s12528-019-09240-z.

Cheng, Z., Richardson, J. C., & Newby, T. J. (2019). Using digital badges as goal-setting facilitators: A multiple case study. *Journal of Computing in Higher Education, 32*(2), 406–428. https://doi.org/10.1007/s12528-019-09240-z.

Cheng, Z., Watson, S. L., & Newby, T. J. (2018). Goal setting and open digital badges in higher education. *TechTrends, 62*(2), 190–196. https://doi.org/10.1007/s11528-018-0249-x.

Chou, C. C., & He, S.-J. (2017). The effectiveness of digital badges on student online contributions. *Journal of Educational Computing Research, 54*(8), 1092–1116. https://doi.org/10.1177/0735633116649374.

Clements, K., West, R. E., & Hunsaker, E. (2020). Getting started with open badges and open microcredentials. *The International Review of Research in Open and Distance Learning, 21*(1), 153–171. Retrieved from https://doi.org/10.19173/irrodl.v21i1.4529

Collins, K., Grroff, S., Mathena, C., & Kupczynski, L. (2019). Asynchronous video and the development of instructor social presence and student engagement. *Turkish Online Journal of Distance Education, 20*(1), 53–70.

Copenhaver, K., & Pritchard, L. (2017). Digital badges for staff training: Motivate employees to learn with micro-credentials. *Journal of Electronic Resources Librarianship, 29*(4), 245–254. https://doi.org/10.1080/1941126X.2017.1378543.

Cummings, R. E. (2021). Wikipedia and open recognition: Writing the future of work. *New Review of Hypermedia and Multimedia, 1–16*. https://doi.org/10.1080/13614568.2021.1900925.

Delello, J. A., Hawley, H., McWhorter, R. R., Gipson, C. S., & Deal, B. (2018). Gamifying education: Motivation and the implementation of digital badges for use in higher education. *International Journal of Web-Based Learning and Teaching Technologies, 13*(4), 17–33. https://doi.org/10.4018/IJWLTT.2018100102.

Derryberry, A., Everhart, D., & Knight, E. (2016). Badges and competencies. In L. Y. Muilenburg & Z. L. Berge (Eds.), *Digital badges in education: Trends, issues, and cases* (pp. 12–20). New York, NY: Routledge.

Dyjur, P., & Lindstrom, G. (2017). Perceptions and uses of digital badges for professional learning development in higher education. *TechTrends, 61*(4), 386–392. https://doi.org/10.1007/s11528-017-0168-2.

Eaton, A. (2019). Expanding the boundaries of education: Two cities' efforts to credential real-world skills through digital badges. Rennie Center for Education Research & Policy. Retrieved from https://www.renniecenter.org/research/reports/expanding-boundaries-education-two-cities-efforts-credential-real-world-skills

Elkordy, A. (2014). Digital badges: Visible learning. *School Librarian's Workshop, 35*(1), 20–21.

Erickson, C. C. (2015). *Digital credentialing: A qualitative exploratory investigation of hiring directors' perceptions* (unpublished doctoral dissertation). Capella University, Minneapolis, MN.

Erickson, P. (2020). Kansans can: Redesign professional learning and re-licensure. *Educational Considerations, 46*(2), Art. 11.

Facey-Shaw, L., Specht, M., van Rosmalen, P., & Bartley-Bryan, J. (2020). Do badges affect intrinsic motivation in introductory programming students? *Simulation and Gaming, 51*(1), 33–54. https://doi.org/10.1177/1046878119884996.

Fishman, B., Teasley, S., & Cederquist, S. (2018). Micro-credentials as evidence of college readiness: Report of an NSF workshop. Retrieved from https://deepblue.lib.umich.edu/handle/2027.42/143851.

Gallagher, S. (2019). How the value of educational credentials is and isn't changing. *Harvard Business Review*. Retrieved from https://hbr.org/2019/09/how-the-value-of-educational-credentials-is-and-isnt-changing.

Ghasia, M. A., Machumu, H. J., & DeSmet, E. (2019). Micro-credentials in higher education institutions: An exploratory study of its place in Tanzania. *International Journal of Education and Development using Information and Communication Technology, 15*(1). http://erl.lib.byu.edu/login/?url=http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ1214271&site=ehost-live&scope=site

Gutierrez, J., & Martin, W. (2021). How might digital micro-credentials help youth aspiring to go to college? Rapid Community Report Series. Retrieved from https://repository.isls.org/bitstream/1/6853/1/Gutierrez%20and%20Martin%20RCR%20Mar2021.pdf.

Gwin, R. (2021). *Digital-nomad trends for a physical-nomad world: Micro-credentialing teachers in Kyrgyzstan*. Retrieved from https://randallgwin.com/digital-badges-for-millenials-and-pastoralists/.

Hartman, K. B., & Andzulis, J. (2019). Industry-based certificates: Student perceptions of benefits. *Research in Higher Education Journal, 36*, 1–10.

Heinert, S. W., Quasim, N., Ollmann, E., Socarras, M., & Suarez, N. (2020). Engaging youth through digital badges to promote health in underserved communities. *Health Promotion Practice, 1–7*. https://doi.org/10.1177/1524839920934798.

Hensiek, S. (2018). *Digital badges and student motivation in the undergraduate general chemistry laboratory* (Doctoral dissertation, Purdue University).

Hickey, D. T., & Chartrand, G. T. (2020). Recognizing competencies vs. completion vs. participation: Ideal roles for web-enabled digital badges. *Education and Information Technologies, 25*(2), 943–956. https://doi.org/10.1007/s10639-019-10000-w.

Higashi, R., & Schunn, C. D. (2020). Perceived relevance of digital badges predicts longitudinal change in program engagement. *Journal of Educational Psychology, 112*(5), 1020–1041. https://doi.org/10.1037/edu0000401.

Hills, L., & Hughes, J. (2016). Assessment worlds colliding? Negotiating between discourses of assessment on an online open course. *Open Learning, 31*(2), 108–115.

Hrastinski, S., Cleveland-Innes, M., & Stenbom, S. (2018). Tutoring online tutors: Using digital badges to encourage the development of online tutoring skills. *British Journal of Educational Technology, 49*(1), 127–136. https://doi.org/10.1111/bjet.12525.

Hughey, J. (2020). Individual personalized learning. *Educational Considerations, 46*(2).

Itow, R. C., & Hickey, D. T. (2016). When digital badges work: It's not about the badges, It's about learning ecosystems. In *Foundation of digital badges and micro-credentials* (pp. 411–419). Springer, Cham. https://doi.org/10.1007/978-3-319-15425-1_22.

Iwata, J., Wang, S., & Clayton, J. (2019). Students' perceptions about the use of digital badges in an online English terminology course: A three-year study. In N. F. Meunier, J. Van de Vyver, L. Bradley, & S. Thouësny (Eds.), *CALL and complexity – Short papers from EUROCALL 2019* (pp. 199–205). . Research-publishing.net). https://doi.org/10.14705/rpnet.2019.38.1009.

Jirgensons, M., & Kapenieks, J. (2018). Blockchain and the future of digital learning credential assessment and management. *Journal of Teacher Education for Sustainability, 20*(1), 145–156. https://doi.org/10.2478/jtes-2018-0009.

Leaser, D., Jona, K., & Gallagher, S. (2020). Connecting workplace learning and academic credentials via digital badges. *New Directions for Community Colleges, 2020*(189), 39–51.

Malczyk, B. R. (2019). Self-care: There's a badge for that. *Journal of Human Behavior in the Social Environment, 29*(1), 76–84. https://doi.org/10.1080/10911359.2018.1476198.

Martin, W., Gutierrez, J., & Muldoon, M. (2020). Digital badges forging connections between informal and higher education. *Afterschool Matters, 33*, 16–24.

McGovern, T. (2020). Digital badges and employer interest. *Academy of Management Annual Meeting Proceedings, 2020*(1). https://doi.org/10.5465/AMBPP.2020.12852abstract.

Mcgovern, T. M., & Gogan, J. L. (2021). Can digital badging help universities flexibly support students and faculty during crises? A proposal and call for research. In *The Proceedings of the 54th Hawaii international conference on social sciences.* pp. 6339–6348. Retrieved from https://hdl.handle.net/10125/71385

Mikroyannidis, A., Third, A., Chowdhury, N., Bachler, M., & Domingue, J. (2020). Supporting lifelong learning with smart blockchain. *International Journal on Advances in Intelligent Systems, 13*(3&4), 163–176.

Morris, B. J., Dragovich, C., Todaro, R., Balci, S., & Dalton, E. (2019). Comparing badges and learning goals in low- and high-stakes learning contexts. *Journal of Computing in Higher Education, 31*(3), 573–603.

Naimark, J. S. (2021). *Comparative study of affective soft skills badging in general education literature courses* (unpublished doctoral dissertation). Capella University, Minneapolis, MN.

National Center for Educational Statistics. (2020). *Characteristics of Degree-Granting Post-secondary Institutions*. Retrieved from https://nces.ed.gov/programs/coe/pdf/coe_csa.pdf
Newby, T. J., & Cheng, Z. (2019). Instructional digital badges: Effective learning tools. *Educational Technology Research and Development, 68*, 1053–1067. https://doi.org/10.1007/s11423-019-09719-7.
Perea, B. (2020). Using smaller credentials to build flexible degree completion and career pathways. *New Directions for Community Colleges, 189*, 23–37.
Perkins, J., & Pryor, M. (2021). Digital badges: Pinning down employer challenges. *Journal of Teaching and Learning for Graduate Employability, 12*(1), 24–38.
Randall, D. L., Harrison, J. B., & West, R. E. (2013). Giving credit where credit is due: Designing open badges for a technology integration course. *TechTrends, 57*(6), 88–95. https://doi.org/10.1007/s11528-013-0706-5.
Randall, D. L., Farmer, T., & West, R. E. (2019). Effectiveness of undergraduate instructional design assistants in scaling a teacher education open badge system. *Contemporary Issues in Technology and Teacher Education, 19*(4), 825–849. Retrieved July 5, 2022 from https://www.learntechlib.org/primary/p/184503/.
Reid, A. J., Paster, D., & Abramovich, S. (2015). Digital badges in undergraduate composition courses: Effects on intrinsic motivation. *Journal of Computers in Education, 2*(4), 377–398. https://doi.org/10.1007/s40692-015-0042-1.
Reischmann, J. (1986). *Learning "en passant": The forgotten dimension*. Paper presented at the Conference of the American Association of Adult and Continuing Education.
Roy, S., & Clark, D. (2018). Digital badges, do they live up to the hype? *British Journal of Educational Technology, 50*(5), 2619–2636. https://doi.org/10.1111/bjet.12709.
Ryken, P. G. (2006). *Art for God's sake: A call to recover the arts*. Phillipsburg, NJ: P&R Publishing.
Santos-Díaz, S., Hensiek, S., Owings, T., & Towns, M. H. (2019). Survey of undergraduate students' goals and achievement strategies for laboratory coursework. *Journal of Chemical Education, 96*(5), 850–856.
Spencer, A., & Bussi, A. (2020). The university language centre as an open-badge issuer: New directions in ESP assessment and accreditation. *Language Learning in Higher Education, 10*(2), 421–444.
Spencer, M. (2020). Micro-credentialing as making and doing STS. *Learning Communities: International Journal of Learning in Social Contexts, 26*, 64–71. https://doi.org/10.18793/lcj2020.26.10.
Stefaniak, J., & Carey, K. (2019). Instilling purpose and value in the implementation of digital badges in higher education. *International Journal of Educational Technology in Higher Education, 16*(1), 1–21. https://doi.org/10.1186/s41239-019-0175-9.
Sullivan, B. F. M. (2013). New and alternative assessments, digital badges, and civics : An overview of emerging themes and promising directions. The Center for Information & Research on Civic Learning & Engagement, March, 1–22. Retrieved from https://circle.tufts.edu/sites/default/files/2020-01/WP77_NewAlternativeAssessments_2013.pdf
Tomić, B., Jovanović, J., Milikić, N., Devedžić, V., Dimitrijević, S., Đurić, D., & Ŝevarac, Z. (2019). Grading students' programming and soft skills with open badges: A case study. *British Journal of Educational Technology, 50*(2), 518–530. https://doi.org/10.1111/bjet.12564.
Watson, S. L. E. E., Ann, M., Arabia, S., & Watson, W. R. (2020). Preservice teachers ' technology integration attitude change in a course implementing digital badges. *Journal of Technology and Teacher Education, 28*, 89–116.
West, R. E., & Randall, D. L. (2016). The case for rigor in open badges. In L. Y. Muilenburg & Z. L. Berge (Eds.), *Digital badges in education: Trends, issues, and cases* (pp. 12–20). Routledge. https://doi.org/10.4324/9781315718569.
West, R. E., Tawfik, A. A., Gishbaugher, J. J., & Gatewood, J. (2020). Guardrails to constructing learning: The potential of open microcredentials to support inquiry-based learning. *TechTrends:*

Linking Research and Practice to Improve Learning, 64(6), 828–838. https://doi.org/10.1007/s11528-020-00531-2.

Yanek, J. J. (2021). *Digital badges: A study of K-12 educators' degree of exposure to 21st century skills developed through micro-credentials* (unpublished doctoral dissertation). Delaware Valley University.

Young, D., West, R. E., & Nylin, T. A. (2019). Value of open microcredentials to earners and issuers: A case study of national instruments open badges. *International Review of Research in Open and Distance Learning, 20*(5), 104–121. https://doi.org/10.19173/irrodl.v20i5.4345.

Zhou, L., Chen, L., Fan, Q., & Ji, Y. (2019). Students' perception of using digital badges in blended learning classrooms. *Sustainability, 11*(7), 2151. https://doi.org/10.3390/su11072151.

Zimmerman, B. J. (1990). Self-regulated learning and academic achievement: An overview. *Educational Psychologist, 25*(1), 3–17. https://doi.org/10.1207/s15326985ep2501_2.

Designing Online Learning in Higher Education

70

Florence Martin and Doris U. Bolliger

Contents

Abstract

Design is critical in online learning. This chapter reviews research and practice on designing effective online courses in higher education. Firstly, the importance of design in online learning is described including asynchronous, synchronous, and bichronous delivery methods, as well as the significance of course organization and meeting learner needs in online courses. Secondly, we provide a brief overview of online course design research in higher education. Thirdly, standards and rubrics for online course design from US colleges and universities as well as professional organizations across the world are reviewed. Fourthly, we describe a research-based and validated online course design element rubric, which includes overview, course presentation, interaction and communication, assessment and evaluation, and student support. Fifthly, the chapter describes how instructors can

F. Martin (✉)
University of North Carolina at Charlotte, Charlotte, NC, USA
e-mail: Florence.Martin@uncc.edu

D. U. Bolliger
Richard W. Riley College of Education and Leadership, Walden University, Minneapolis, MN, USA
e-mail: dorisbolliger@gmail.com

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_72

be prepared for and supported in online course design, incorporating administrator support, pedagogical support, technology support, and personnel support. Sixthly, the role of instructional designers in online course design is described. The chapter concludes with recommendations for instructors and designers and topics for future research.

Keywords

Online learning · Online course design · Higher education · Instructional design · Online instructors · Course quality · Course design elements · Course design standards · Instructional designers

Introduction

Design is critical in online learning. Online course design is described as “a context-specific form of instructional design oriented to online learning spaces. Therefore, online course design includes both the features of the online course, and the processes and procedures used to create that online course” (Martin, Ritzhaupt, Kumar, & Budhrani, 2019a, p. 35). According to Martin et al. (2019a), online learning includes three critical phases: design, facilitation, and assessment and evaluation. This chapter reviews research and practice on the first phase or “designing effective online courses” in higher education. It will first describe the importance of design in online learning and provide a brief overview of research on online course design in higher education. It will then describe standards and rubrics used for online course design and introduce the online course design elements (OCDE). Furthermore, it will describe how instructors can be prepared for and supported in online course design and discuss the role of instructional designers in online course design. The chapter concludes with recommendations for instructors and designers and future research.

Importance of Design in Online Learning

Online courses are no longer an innovation but have become mainstream in higher education. This was particularly the case when the COVID-19 pandemic disrupted the entire educational system worldwide and education shifted from traditional learning to emergency remote and online learning. Online courses provide flexibility because learners are able to participate in learning from anywhere. There are three types of online courses that institutions may offer: asynchronous, synchronous, and bichronous online learning. Asynchronous online learning is anytime, anywhere online learning where students have the ability to participate in courses at their convenience and work at their own pace. This format, however, tends to have limited interaction with peers and instructors due to the lack of real-time communication and immediacy. Synchronous online learning is anywhere online learning but requires real-time sessions. Students are able to log in through a synchronous tool and communicate with their instructors and peers at the same time. Bichronous learning, although a recent coined terminology, includes the blending of both asynchronous and synchronous online learning (Martin, Polly, & Ritzhaupt, 2020a).

Kuo, Walker, Belland, and Schroder (2013) found that learner-content interaction was the strongest predictor of student satisfaction in online courses. If the course organization is not clear to online learners, it is difficult to retain them in the course. Taking content from an on-campus course and uploading it to a learning management system or delivering content via synchronous lectures does not make an online course effective (Ko & Rossen, 2017). In traditional, on-campus courses, learners have information on how to navigate to their physical classrooms and know what to do once they arrive, which is different from online courses where instructors need to provide enough information on how to get them started and "to get students through 'the door' to the content" (Baldwin, 2019, p. 202).

Another important aspect of designing online courses is meeting the needs of learners. The needs of online learners can be different from on-campus learners because many online students are adult learners who have a variety of responsibilities such as jobs, family, and other duties. Therefore, courses need to be designed considering students' prior knowledge, time constraints, and desired competencies.

A Brief Overview of Online Course Design Research in Higher Education

There are numerous research studies investigating various elements of online course design with a variety of methodologies and methods, study participants, variables, and so forth. It would be impossible to provide a comprehensive review of all of these investigations. However, we would like to highlight a few areas of research such as how instructors design online courses, instructor and student perceptions of online course design elements, other recent developments, and models and frameworks that have been used in online course design research.

Instructors as designers. Recent research has focused on how university instructors approach the design of online courses for adult learners. When Martin et al. (2019a) interviewed eight award-winning online instructors, they found that expert instructors used a systematic approach in their design of the courses, alignment of learning outcomes with content, and chunking of course content. These experts were considerate of online learners' needs, created opportunities for student interaction, integrated a variety of assessments, and used rubrics to grade activities and assignments. Interviewees also mentioned that consistent course organization is critical in online courses.

Baldwin (2019) found that instructors used similar approaches to course design in face-to-face and online courses. Instructors reported they used approaches and strategies that worked in face-to-face courses to design online courses. Baldwin, Ching, and Friesen (2018a) found that instructors did not use instructional design models; however, they followed a similar process as illustrated in instructional design models. Instructors who were interviewed developed learning objectives; searched for existing resources and evaluated them; structured courses based on semester length, class size, and content; aligned topics by modules or weeks; uploaded instructional material in learning management systems; and revised courses based on student feedback. In order to assure quality in online course design, some institutions and programs have invested in faculty training for peer assessment (Gibson & Dunning, 2012; Hollowell, Brooks, & Anderson, 2017).

Faculty perceptions. Limited research has been conducted to include the voices of online faculty regarding good quality online course design. Some of these studies investigated practices by instructors (Lenert & Janes, 2017), quality elements and effective online assessment strategies (Gaytan & McEwen, 2007), and faculty perceptions of facilitation and engagement strategies (Martin & Bolliger, 2018; Martin, Wang, & Sadaf, 2020b). Gregory, Rockinson-Szapkiw, and Cook (2020) focused in their study on how faculty perceptions of the Quality Matters™ rubric, which includes online course design standards, changed after participation in a professional workshop.

Student perceptions. There is a plethora of literature on students' perceptions of good quality online course design. Researchers have focused on useful course design elements (Crews, Wilkinson, & Neill, 2015; Fayer, 2014), quality indicators and effective assessment strategies (Gaytan & McEwen, 2007), effective instructor facilitation or engagement strategies, and skills students need to successfully complete online courses (Bolliger & Martin, 2018; Crews et al., 2015; Young, 2006). Other areas that have been examined are student perceptions of outcomes such as student satisfaction with online learning and perceived learning (Bolliger & Halupa, 2012; Bolliger & Martindale, 2004; Kuo et al., 2013; Paul, Swart, Zhang, & MacLeod, 2015; Swan, 2001).

Other research. Additionally, research has been conducted to examine relationships between online course design elements and outcomes using existing data and self-designed checklists. For example, Jaggars and Xu (2016) studied how online course design elements influenced students' grades using a self-developed course assessment tool, course evaluations, and students' grades. Shin and Cheon (2019) used a similar approach to determine student satisfaction with online course design elements by evaluating courses using a self-designed checklist (based on the Quality Matter's rubric) and student course evaluations.

Models and frameworks. While several instructional design models have been used for the design of in-person instruction, many models can also be used for the design of online instruction (Dick, 1997; Morrison, Ross, Morrison, & Kalman, 2019). Some traditional frameworks that have been used in online course design research are Chickering and Gamson's (1987) Seven Principles for Good Practice in Undergraduate Education (see Crews et al., 2015; Grant & Thornton, 2007), Moore's (1989) Interaction Framework (see Bernard et al., 2009; Karataş, Yilmaz, Dikmen, Ermiş, & Gürbüz, 2017), and Moore's (1991) Transactional Distance Theory (see Paul et al., 2015) and the Universal Design for Learning framework developed by the Center for Applied Special Technology in 2008 (n.d.) (see Rao, Edelen-Smith, & Wailehua, 2015). However, there are a few specific frameworks used to design online courses. For example, Czerkawski and Lyman (2016) developed an e-learning engagement design framework that included four essential components: instructional needs, instructional objectives, learning environments, and summative assessment. The learning environment aspect included components specifically relevant to the online environment such as the development of interaction and collaboration strategies, design of facilitation strategies and feedback, and selection of media and instructional resources. Gao and Ji (2019) created the Five-Star Teaching Cycle Framework of Online Courses which is based on Merrill's (2002) *First Principles of Instruction*. The authors focus on a problem-centered approach that is structured. The framework includes the following steps: problem-centered, problem progression, activation, demonstration, application, and integration. For each stage, instructional design activities are suggested, and interaction activities – when appropriate – are included. Conole (2014) introduces the 7Cs of Learning Design Framework which was developed in partnership with the Open University and University of Leicester to meet the needs of today's learners who has a multitude of digital media and tools at their fingertips. It was conceptualized because it includes the following elements: conceptualize, capture, create, communicate, collaboration, consider, and consolidate. All these models and frameworks emphasize the importance of following a systematic process to design effective instruction.

Standards and Rubrics for Online Course Design

In order to assist practitioners in their efforts to design high-quality online courses, several organizations in the USA have created online course development rubrics. Some of these rubrics include Blackboard's (2020) Exemplary Course Program Rubric and the Quality Matters' (2019) rubric. Several rubrics were developed at universities or colleges in the USA: the California Community Colleges' (2016) Course Design Rubric for the Online Education Initiative, the Illinois Online Network's (2015) Quality Online Course Initiative, the Open SUNY Course Quality Review Rubric (Online Learning Consortium, 2016), and the California State University's (2015) Quality Online Learning and Teaching assist with online course design.

Outside of the USA, there are a few standards such as the Open eQuality Learning Standards (Joint eQuality Committee, 2004) created by the European Institute for e-Learning, the quality assurance framework of the Asian Association of Open Universities (2020), and the Benchmarks developed by the Australasian Council on Open, Distance and e-Learning (2014). Some of these rubrics and standards focus entirely on design, whereas some of them have a broader focus but include some elements pertaining to design. These rubrics have a different number of standards (Table 1); however, all of these rubrics can be used by instructors or instructional designers to guide their design of online courses.

Table 1 List of online learning design rubrics and number of standards

Rubric or standards	Number of standards
Blackboard's (2020) Exemplary Course Program Rubric	17
Quality Matters' (2019) rubric	42
California Community Colleges' (2016) Course Design Rubric	56
Illinois Online Network's (2015) Quality Online Course Initiative	
OSCQR Course Design Review (priorly known as Open SUNY Course Quality Review Rubric	50
California State University's (2015) Quality Online Learning and Teaching	57
Open eQuality Learning Standards (Joint eQuality Committee, 2004) from the European Institute for e-Learning	25
Asian Association of Open Universities (2020) Standards	54
Benchmarks developed by the Australasian Council on Open, Distance and e-Learning (2014)	64

Online Course Design Elements (OCDE)

Building on six of these rubrics, Martin, Bolliger, and Flowers (2021) created and validated the online course design element (OCDE) instrument. This was an extension of a study by Baldwin, Ching, and Hsu (2018b) who identified 22 standard online design elements after analyzing several rubrics including the Blackboard's (2020) Exemplary Course Program Rubric, California Community Colleges' (2016) Course Design Rubric for the Online Education Initiative, Illinois Online Network's (2015) Quality Online Course Initiative, Open SUNY Course Quality Review Rubric (Online Learning Consortium, 2016), California State University's (2015) Quality Online Learning and Teaching, and Quality Matters' (2019) rubric. Martin et al. (2021) extended this analysis through the review of the literature on online course design and an expert panel review. The OCDE instrument includes five categories (Fig. 1) and 38 items (see Table 2).

Overview. An overview to the course assists the online learner in beginning the course. Online learners can benefit from a "getting started" or "start here" module including overview elements such as a student orientation, course goals, student expectations for communication, participation, and assignments. This section can also include the instructor's biography, contact information, availability for office hours, response times, and various policies for the online course.

Research has shown the importance of including a course orientation in online courses (Jones, 2013) for students to be better prepared. Instructional design models and research emphasize the importance of providing course goals and setting expectations. It is also a good practice for the overview module to include the instructor biography and different ways for online learners to contact the instructor (Price, Whitlatch, Maier, Burdi, & Peacock, 2016). Figure 2 includes a sample overview page from an online course with a number of items that students are required to review and complete at the beginning of a course before instructional

Fig. 1 Online course design elements

content is introduced. Online learners can also benefit from an overview of various course projects and the course grading and feedback information.

Content presentation. As part of the content presentation, objectives have to be clearly defined, instructions need to be clearly written and chunked, and activities need to be aligned with the objectives. Online courses have the advantage of including content in various modalities at the same time as maintaining instructional rigor. With this opportunity, however, comes the responsibility of maintaining accessibility for students with disabilities. Most learning management systems (LMSs) have functionalities included to create modules or units and then chunk information based on the course organization (Ko & Rossen, 2017). It is important for content modules to begin with clearly defined course objectives that are aligned with course goals (Czerkawski & Lyman, 2016). Instructional material can be presented in various formats. Figure 3 shows a screenshot of a sample module introduction page which lists the alignment of weekly objectives with course goals in parenthesis and illustrates the alignment with weekly activities.

As mentioned previously, online courses can be delivered asynchronously, bichronously, or synchronously. It is important for the course to include instructor-generated videos or other instructional materials to establish instructor presence. When videos are created, it is helpful to make them reusable (Martin & Betrus, 2019). There are a number of lecture capture tools (e.g., TechSmith Capture™, Camtasia®, Kaltura, etc.) instructors can use to easily record videos in order to integrate them in online courses. These videos can include still pictures or slides,

Table 2 Online course design elements

OCDE categories and items (Martin et al., 2021)
Overview
1. A student orientation (e.g., video overview of course elements)
2. Major course goals
3. Expectations regarding the quality of students' communication (e.g., netiquette)
4. Expectations regarding student participation (e.g., timing, frequency)
5. Expectations about the quality of students' assignments (e.g., good examples)
6. The instructor's contact information
7. The instructor's availability for office hours
8. A biography of the instructor
9. The instructor's response time to e-mails and/or phone calls
10. The instructor's turnaround time on feedback to submitted assignments
11. Policies about general expectations of students (e.g., late assignments, academic honesty)
Content presentation
12. A variety of instructional materials (e.g., textbook readings, video recorded lectures, web resources)
13. Accommodations for learners with disabilities (e.g., transcripts, closed captioning)
14. Course information that is chunked into modules or units
15. Clearly written instructions
16. Course activities that promote achievement of objectives
17. Course objectives that are clearly defined (e.g., measurable)
Interaction and communication
18. Opportunities for students to interact with the instructor
19. Required student-to-student interaction (e.g., graded activities)
20. Frequently occurring student-to-student interactions (e.g., weekly)
21. Activities that are used to build community (e.g., icebreaker activities, introduction activities)
22. Collaborative activities that support student learning (e.g., small group assignments)
23. Technology that is used to promote learner engagement (e.g., synchronous tools, discussion forums)
24. Technologies that facilitate active learning (e.g., student-created artifacts)
Assessment and evaluation
25. Assessments that align with learning objectives
26. Formative assessments to provide feedback on learner progress (e.g., discussions, practice activities)
27. Summative assessments to measure student learning (e.g., final exam, final project)
28. Assessments occurring throughout the course
29. Rubrics for graded assignments
30. Self-assessment options for learners (e.g., self-check quizzes)
31. Opportunity for learners to give feedback on course improvement
Learner support
32. Easy course navigation (e.g., menus)
33. Consistent course structure (e.g., design, look)
34. Easily viewable media (e.g., streamed videos, optimized graphics)

(continued)

Table 2 (continued)

OCDE categories and items (Martin et al., 2021)
35. Media files accessible on different platforms and devices (e.g., tablets, smartphones)
36. Minimum technology requirements (e.g., operating systems)
37. Resources for accessing technology (e.g., guides, tutorials)
38. Links to institutional support services (e.g., help desk, library, tutors)

Note: Items "Content presentation," "Interaction and communication," "Assessment and evaluation," and "Learner support" were excluded because they were short-answer, write-in questions

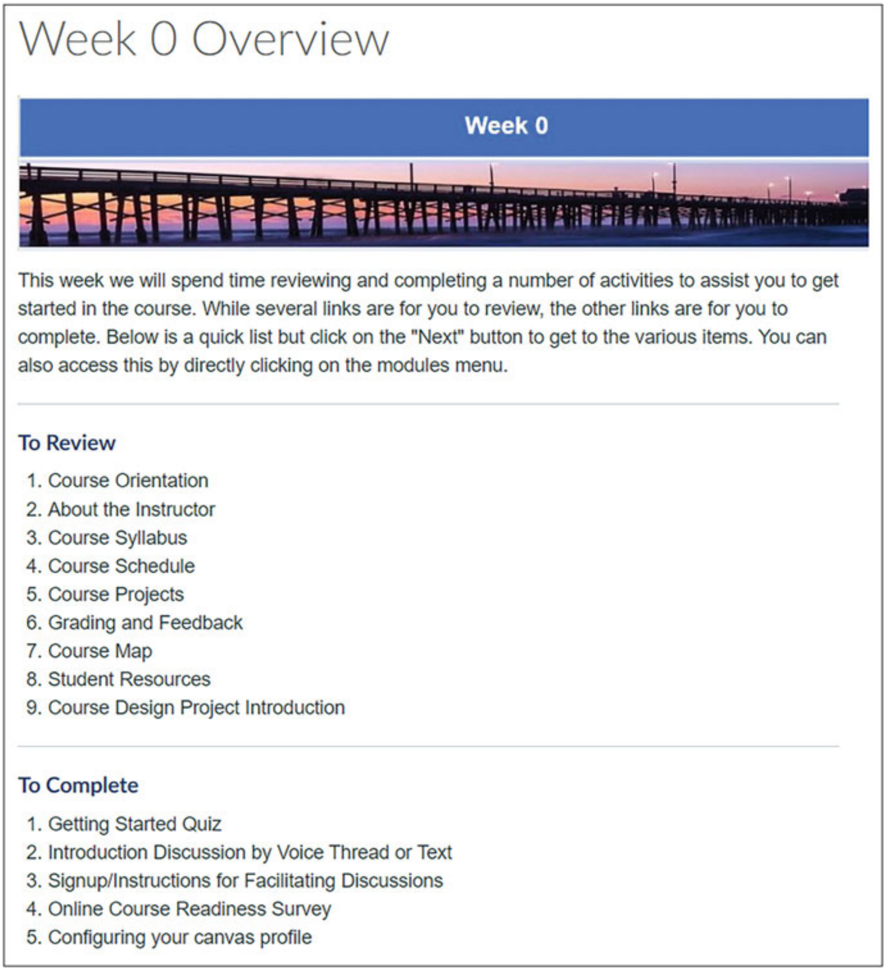


Fig. 2 Sample overview page from an online course

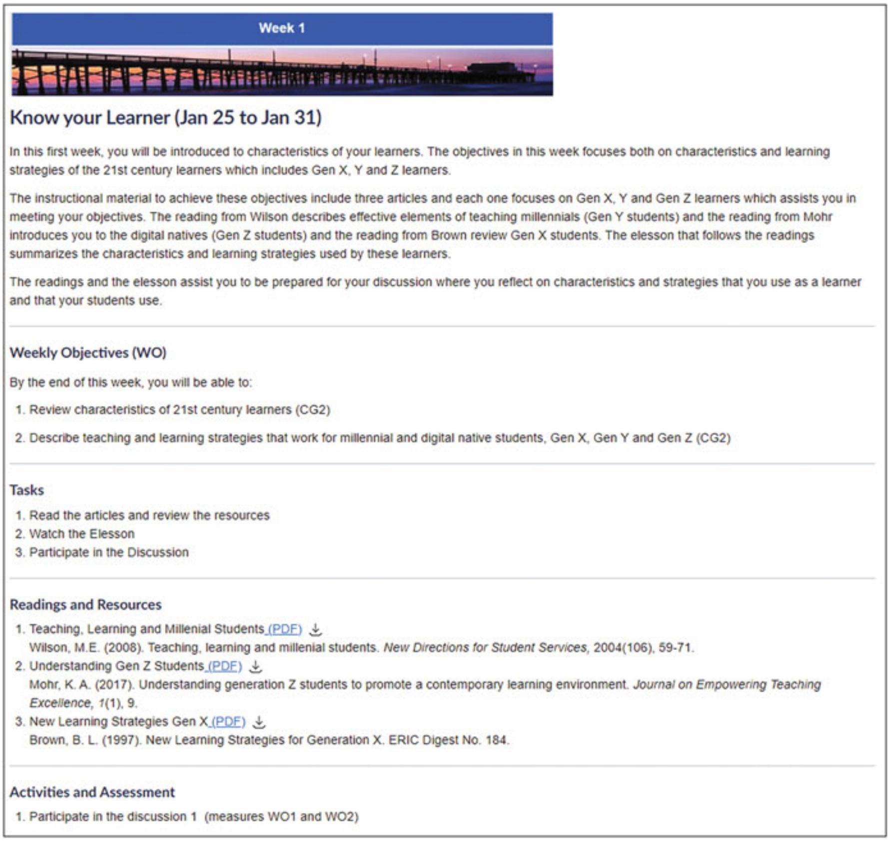


Fig. 3 Module introduction page

video files, motion video capture of the instructor's screen, and the instructor's voice. While external video creation tools are available, some LMSs include video recording functionality. Figure 4 shows a short video recording that was created using Camtasia and uploaded using Kaltura into Canvas, an LMS. It also includes closed captioning to support learners with special needs.

Experts recommend keeping instructional videos relatively short – less than 10 min – to hold students' attention. More complex or complicated topics that require more time to discuss can be broken down into smaller segments (Haley & Heise, 2008). Audio files or podcasts can also be easily created and shared on a variety of learning platforms. Another option includes the integration of open educational resources which may add valuable instructional content to a course without having the need for instructors to generate personal content (Colvard, Watson, & Park, 2018).

Interaction and communication. Student interaction is an essential component in online courses. In online education, teaching and learning takes place in different

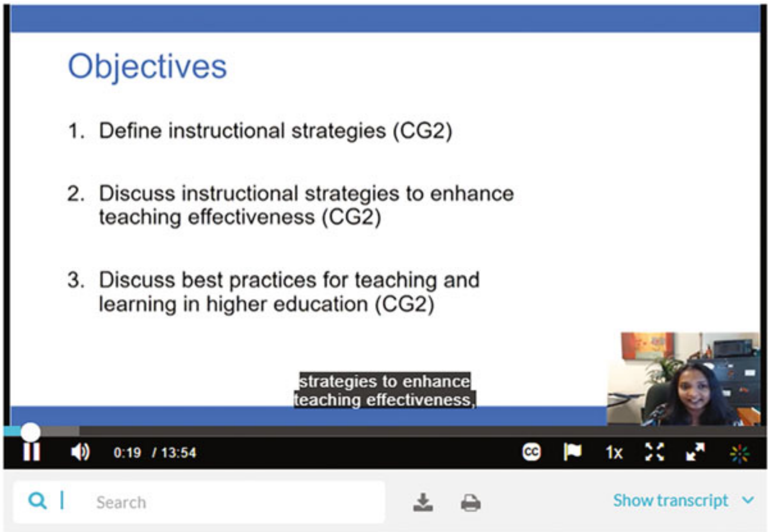


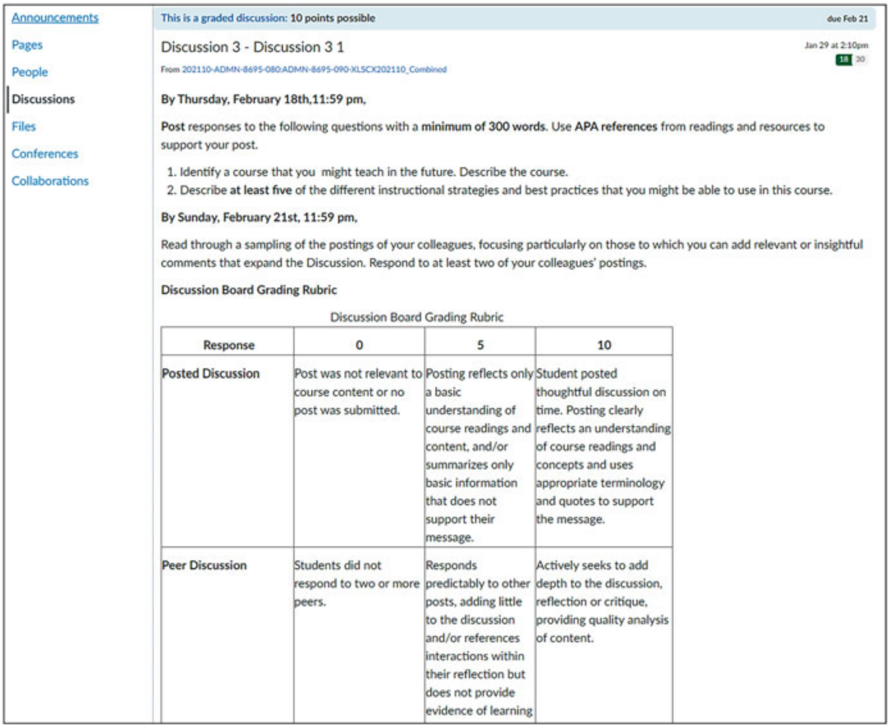
Fig. 4 A short video recording of an instructional lesson

spaces. In other words, online learners are physically separated from their instructors (Moore & Kearsley, 2012). Therefore, it is important to engage learners by creating opportunities for student-student, student-instructor, and student-content interaction. The online course should include opportunities for all three types of interaction (Moore, 1989). These elements focus on the importance of collaborative activities, building and sustaining community, and using technology to enhance interaction and communication.

While various strategies can be used for interaction and communication in an asynchronous online course, synchronous sessions assist in building community and provide immediacy. In an asynchronous online discussion, it is important to provide clear discussion prompts, required number of posts, and due dates. Additionally, it is helpful for learners to include a discussion grading rubric (see Fig. 5).

Some additional ways to enhance learner-instructor interaction and communication include providing periodic announcements, reflection opportunities, and timely feedback. Different ways to provide opportunities for learner-learner interaction include peer review, peer facilitation, group projects, a virtual student lounge for informal conversations, icebreaker discussions, student presentations, etc. (Martin & Bolliger, 2018).

Synchronous sessions can enhance both learner-learner and learner-instructor interactions. The use of various synchronous features, such as text, audio and video chat, polling features, white boards, and screensharing functions, can assist in enhancing interaction with students. Lowenthal, Dunlap, and Snelson (2017) examined the importance of live integrated web meetings, which could reconceptualize virtual office hours. Some of their design recommendations for synchronous sessions included providing a schedule, an orientation to live sessions,



Announcements
Pages
People
Discussions
Files
Conferences
Collaborations

This is a graded discussion: 10 points possible — due Feb 21

Discussion 3 - Discussion 3 1 — Jan 29 at 2:10pm — 18 30

From 202110-ADMN-8695-080:ADMN-8695-090-XLSCX202110_Combined

By Thursday, February 18th,11:59 pm,

Post responses to the following questions with a **minimum of 300 words**. Use **APA references** from readings and resources to support your post.

1. Identify a course that you might teach in the future. Describe the course.
2. Describe **at least five** of the different instructional strategies and best practices that you might be able to use in this course.

By Sunday, February 21st, 11:59 pm,

Read through a sampling of the postings of your colleagues, focusing particularly on those to which you can add relevant or insightful comments that expand the Discussion. Respond to at least two of your colleagues' postings.

Discussion Board Grading Rubric

Discussion Board Grading Rubric

Response	0	5	10
Posted Discussion	Post was not relevant to course content or no post was submitted.	Posting reflects only a basic understanding of course readings and content, and/or summarizes only basic information that does not support their message.	Student posted thoughtful discussion on time. Posting clearly reflects an understanding of course readings and concepts and uses appropriate terminology and quotes to support the message.
Peer Discussion	Students did not respond to two or more peers.	Responds predictably to other posts, adding little to the discussion and/or references interactions within their reflection but does not provide evidence of learning	Actively seeks to add depth to the discussion, reflection or critique, providing quality analysis of content.

Fig. 5 Asynchronous online discussion with a grading rubric

and agenda for each session, selecting an inviting title, sending reminders, and sharing a recording of what to expect. When scheduling live sessions, it is important to consider different time zones, vary day and meeting times, and identify important events in the semester. Other recommendations include providing learners with reasons for the sessions and alternative learning experiences for those who are unable to attend, adding incentives for attendance, and engaging students in learning activities during the session. The authors emphasized the importance of including icebreaker activities, involving students in activities, scheduling formal and informal interactions, and modeling the level of interaction.

Assessment and evaluation. Assessments in online courses can look differently from in-person courses. The importance of aligning assessments with objectives is emphasized along with including formative and summative assessments. Frequent, smaller assessments should be spread out throughout the course instead of including high-stake assessments at the end of the course. Instructors should provide periodic feedback on learner progress, an opportunity for learner self-assessment, and an evaluative feedback option on course improvement.

Martin et al. (2019a) determined that assessment and evaluation are important components of effective online courses. Award-winning online instructors who were interviewed recommended the inclusion of a variety of course assessments, traditional and authentic assessments, and grading rubrics for all assessments. Self-assessments enable learners to measure their progress in achieving learning and course outcomes (Gaytan & McEwen, 2007). For course evaluations, they recommended participation in a high-quality assurance process in which instructors receive feedback on course design and facilitation from both students and peers.

Support. Learner support is also an important online course design category. This category includes easy and consistent course navigation, consistent course structure (e.g., templates), easily accessible and viewable media (e.g., streaming video with closed captioning), minimum technology requirements for learners (e.g., hardware, software), resources for accessing technology such as online guides or tutorials, and links to support services offered by the educational institution (e.g., help desk, library resources).

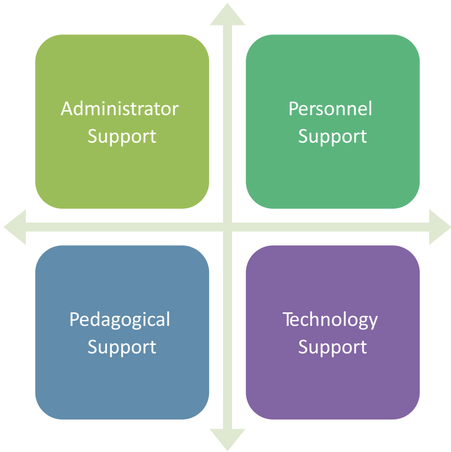
Swan (2001) emphasized the importance of consistent design and easy navigation. When these components are missing, then it is easy for students to get frustrated (Graf, Liu, & Kinshuk, 2010). It is important for all media files to be easily accessible and viewable for all learners. These are essential principles of universal design for learning for content presentation and learner engagement and interaction (Dell, Dell, & Blackwell, 2015; Rose & Meyer, 2006). Coombs (2010) also emphasized the importance of making documents accessible for online learners. Because online learners rely heavily on technology to participate in the course, they need to be aware of minimum technology requirements for them to be successful in the course. Mobile interfaces have been designed for LMSs in order for learners to access courses and content with various devices such as tablets and smart phones (Ssekakubo, Suleman, & Marsden, 2013). Additionally, resources for accessing instructional technologies utilized within the course and support information should be available in case learners encounter challenges. Moore and Kearsley (2012) pointed out that students who learn at a distance need different types of support than on-campus students.

Instructor Preparation and Support for Online Course Design

Not all instructors who begin teaching in higher education are trained to design and deliver online courses. Many doctoral programs focus mainly on content with little consideration for preparation for academic teaching. However, there has been a steady increase in the number of distance or online courses over the past 20 years at higher education institutions. In Fall 2016, over six million students (31.6%) were enrolled in at least one course delivered via distance (Seaman, Allen, & Seaman, 2018).

With the onset of the COVID-19 pandemic, almost all instructors at higher education institutions in the USA were forced to shift from on-campus teaching to emergency remote or online teaching due to campus closures in March of 2020 for several months (Martel, 2020). However, the literature shows that quality online course design requires lead time for instructors, professional development, and instructional design support to assist instructors with the transition from face-to-

Fig. 6 Support for faculty for online course design and teaching



face or blended teaching to online teaching. Martin et al. (2021) determined during the validation of the OCDE instrument that self-reported level of expertise was related to the use of elements listed in the OCDE, whereas years of experience were not.

There are several ways in which instructors can be prepared for and supported in designing online courses. Martin, Wang, Budhrani, Moore, and Jokiaho (2019b) found there are four critical areas of support for faculty: administrative, personnel, pedagogical, and technology (Fig. 6).

Administrative support. Some requests from US instructors to their administration included more preparation time; reduced class sizes, including course development into teaching load; and recognizing quality in online courses (Major, 2010). Some institutions are able to provide incentives to faculty who participate in professional development or training pertaining to online course design or who are involved in the design and development of online courses. Although faculty consider supporting their students as the main reason for teaching online, administrators believe providing incentives to faculty is critical (Herman, 2013).

Personnel support. Faculty who are expected to design online courses also have personnel support needs (Martin et al., 2019b). These personnel include design and development support staff such as instructional designers, technicians, graphic designers, multimedia designers, or coders/programmers. Instructional designers are becoming more common in higher education as instructional design needs are growing due to the number of online courses that institutions are offering (Beirne & Romanoski, 2018; Chen & Carliner, 2021). Instructional designers are trained to systematically design instruction for various delivery methods, including blended and online courses. Quite often they are housed in centers for teaching and learning, distance education centers, libraries, or information technology units (Intentional Futures, 2016). Other personnel who can support instructors includes faculty or peer mentors, members of a learning community, and student teaching assistants.

Pedagogical support. Instructors can benefit from learning about online teaching strategies by participating in training to teach online and having access to instructional resources (Martin et al., 2019b). Training programs can be webinars, one-on-one consultations, formal and informal workshops, department workshops, and opportunities for practice. Most centers for teaching and learning at universities offer professional development workshops for instructors who are new to online course design or want to advance their skills. Instructors can also participate in online course design workshops offered by professional organizations such as the Online Learning Consortium or Quality Matters. Doctoral students who wish to be instructors and faculty new to teaching online can enroll in a graduate-level course at their institutions.

Technology support. Technical support for online instructors is critical. This includes access to help desks with knowledgeable staff during the design and delivery phase of online courses. Instructors also requested software for video creation and hardware such as cameras, headsets, and microphones (Martin et al., 2019b). While many universities in North America have access to an LMS, several universities across the world do not use one. This was one of the biggest challenges in course design for universities during the COVID-19 pandemic.

Role of Instructional Designers in Online Course Design

According to Ko and Rossen (2017), many instructors develop courses on their own. However, many institutions have implemented a team approach in an effort to standardize or streamline online courses. Teams may consist of a faculty member and instructional designer or other members such as project managers and instructional technologists. It is estimated that approximately 13,000 instruction designers work at US higher education institutions (Intentional Futures, 2016). Instructional designers are often involved in supporting faculty with the design and development of online courses because instructors may be overwhelmed with other tasks or do not have the skills to develop high-quality online courses (Chen & Carliner, 2021).

In this collaborative process, instructional designers who have been trained in the systematic design of instruction can support instructors in the analysis, design, development, implantation, and evaluation of instruction, whereas instructors serve as content experts and clients (Kumar & Ritzhaupt, 2017). This process is what Chen and Carliner (2021) term an “assignment” role. Other roles include facilitator of workshops and consultants to faculty members who need input on a particular issue. Quite often, instructional designers manage the process of others such as faculty, the university’s administration, information technology personnel, and other instructional designers (Intentional Futures, 2016). Chen and Carliner found that when instructional designers and instructors work together, they usually utilize instructional design models; modified, customized models; and “quality standard tools” (p. 481). Richardson et al. (2019) found that in order for collaborations to be successful, both parties – instructional designers and instructors – need to have the ability to establish connections; build trusting and respectful relationships; take the time to listen without necessarily providing answers right away; remain open and flexible, particularly when projects shift into a different direction; and be aware of differences pertaining to culture, including the culture of disciplines or organizations.

Recommendations for Instructors and Designers and Future Research

Online course design is critical to the success of online courses. Below are some practical recommendations for instructors and designers for online course design:

- Participate as a student in an online course before you design and/or teach an online course.
- Participate in training before you design online courses.
- Use a framework to guide the design of online courses.
- Review other online courses to get ideas on course design.
- Utilize quality course standards or validated course design rubrics.
- Collaborate with instructional designers.
- Use peer mentoring.
- Use a peer review/observation process.
- Include an overview or getting started module in the online course.
- Include various aspects of course presentation (e.g., media files).
- Interaction and engagement are key to effective online courses.
- Build in learner support structures.
- Provide students with an opportunity to provide continuous feedback.
- Fine-tune your skills by participating in professional development opportunities.

All three types of interactions in online courses (Moore, 1989) are important because they affect student learning (Bernard et al., 2009). However, learner-content interaction even though critical in learning has not been investigated much, and there is a need for more research to examine this type of interaction (Xiao, 2017). Other areas of needed research are the use of online assessments in various contexts (Gaytan & McEwen, 2007), collaboration between online instructors and instructional designers (Chen & Carliner, 2021), and policies for online course design (Meyer, 2002).

References

Asian Association of Open Universities. (2020). Quality assurance framework. Retrieved from https://www.aaou.org/quality-assurance-framework/

Australasian Council on Open, Distance and e-Learning. (2014). Benchmarks for technology enhanced learning. Retrieved from https://www.acode.edu.au/pluginfile.php/550/mod_resource/content/8/TEL_Benchmarks.pdf

Baldwin, S. (2019). Assimilation in online course design. *American Journal of Distance Education, 33*, 195–211. https://doi.org/10.1080/08923647.2019.1610304.

Baldwin, S. J., Ching, Y.-H., & Friesen, N. (2018a). Online course design and development among college and university instructors: An analysis using grounded theory. *Online Learning, 22*(2), 157–171. https://doi.org/10.24059/olj.v22i2.1212.

Baldwin, S., Ching, Y.-H., & Hsu, Y.-C. (2018b). Online course design in higher education: A review of national and statewide evaluation instruments. *TechTrends, 62*, 46–57. https://doi.org/10.1007/s11528-017-0215-z.

Beirne, E., & Romanoski, M. P. (2018, July). *Instructional design in higher education: Defining an evolving field*. Boston: Online Learning Consortium. Retrieved from https://olc-wordpress-assets.s3.amazonaws.com/uploads/2018/07/Instructional-Design-in-Higher-Education-Defining-an-Evolving-Field.pdf

Bernard, R. M., Abrami, P. C., Borokhovski, E., Wade, C. A., Tamim, R. M., Surkes, M. A., & Bethel, E. C. (2009). A meta-analysis of three types of interaction treatments in distance education. *Review of Educational Research, 79*, 1243–1289. https://doi.org/10.3102/0034654309333844.

Blackboard. (2020). Blackboard exemplary course program rubric. Retrieved from https://www.blackboard.com/resources/are-your-courses-exemplary

Bolliger, D. U., & Halupa, C. (2012). Student perceptions of satisfaction and anxiety in an online doctoral program. *Distance Education, 33*, 81–98. https://doi.org/10.1080/01587919.2012.667961.

Bolliger, D. U., & Martin, F. (2018). Instructor and student perceptions of online student engagement strategies. *Distance Education, 39*, 568–583. https://doi.org/10.1080/01587919.2018.1520041.

Bolliger, D. U., & Martindale, T. (2004). Key factors for determining student satisfaction in online courses. *International Journal on E-Learning, 3*, 61–67.

California Community Colleges. (2016). Course design rubric. Retrieved from http://cvc.edu/wp-content/uploads/2016/11/OEI_CourseDesignRubric_Nov2016-3.pdf

California State University. (2015). Quality learning and teaching (QLT) rubric. Retrieved from https://ocs.calstate.edu/rubrics/qlt

Center for Applied Special Technology. (n.d.). About universal design for learning. Retrieved from https://www.cast.org/impact/universal-design-for-learning-udl

Chen, Y., & Carliner, S. (2021). A special SME: An integrative literature review of the relationship between instructional designers and faculty in the design of online courses for higher education. *Performance Improvement Quarterly, 33*, 471–495. https://doi.org/10.1002/piq.21339.

Chickering, A. W., & Gamson, Z. F. (1987). Seven principles for good practice in undergraduate education. *AAHE Bulletin, 39*(7), 3–7.

Colvard, N. B., Watson, C. E., & Park, H. (2018). The impact of open educational resources on various student success metrics. *International Journal of Teaching and Learning in Higher Education*, *30*, 262–276. Retrieved from https://www.isetl.org/ijtlhe/pdf/IJTLHE3386.pdf

Conole, G. (2014). The 7Cs of learning design – A new approach to rethinking design practice. In S. Bayne, C. Jones, M. de Laat, T. Ryberg, & C. Sinclair (Eds.), *Proceedings of the 9th international conference on networked learning 2014* (pp. 502–509). Edinburgh/Scotland: University of Edinburgh. Retrieved from https://www.lancaster.ac.uk/fss/organisations/netlc/past/nlc2014/abstracts/pdf/conole.pdf

Coombs, N. (2010). *Making online teaching accessible: Inclusive course design for students with disabilities*. San Francisco: Jossey Bass.

Crews, T. B., Wilkinson, K., & Neill, J. K. (2015). Principles for good practice in undergraduate education: Effective online course design to assist student success. *Journal of Online Learning and Teaching*, *11*, 87–103. Retrieved from https://jolt.merlot.org/vol11no1/Crews_0315.pdf

Czerkawski, B. C., & Lyman, E. W. I. I. I. (2016). An instructional design framework for fostering student engagement in online learning environments. *TechTrends, 60*, 532–539. https://doi.org/10.1007/s11528-016-0110-z.

Dell, C. A., Dell, T. F., & Blackwell, T. L. (2015). Applying universal design for learning in online courses: Pedagogical and practical considerations. *Journal of Educators Online, 12*(2), 166–192. https://doi.org/10.9743/JEO.2015.2.1.

Dick, W. (1997). A model for the systematic design of instruction. In R. D. Tennyson, F. Schott, N. M. Seel, & S. Dijkstra (Eds.), *Instructional design: International perspectives: Volume 1: Theory, research, and models* (pp. 361–370). New York: Routledge.

Fayer, L. (2014). A multi-case study of student perceptions of online course design elements and success. *International Journal for the Scholarship of Teaching and Learning*, *8*(1), Article 13. Retrieved from https://digitalcommons.georgiasouthern.edu/ij-sotl/vol8/iss1/13/

Gao, D., & Ji, Y. (2019). Research on the framework of online course design based on "First Principles of Instruction". In *2nd Conference on education and cognition, behavior, neuroscience* (ESSP proceedings series, pp. 30–38). https://doi.org/10.25236/icecbn.2019.006

Gaytan, J., & McEwen, B. C. (2007). Effective online instructional and assessment strategies. *American Journal of Distance Education, 21*, 117–132. https://doi.org/10.1080/08923640701341653.

Gibson, P. A., & Dunning, P. T. (2012). Creating quality online course design through a peer-reviewed assessment. *Journal of Public Affairs Education, 18*, 200–228. https://doi.org/10.1080/15236803.2012.12001678.

Graf, S., Liu, T.-C., & Kinshuk. (2010). Analysis of learners' navigational behaviour and their learning styles in an online course. *Journal of Computer Assisted Learning, 26*, 116–131. https://doi.org/10.1111/j.1365-2729.2009.00336.x.

Grant, M. R., & Thornton, H. R. (2007). Best practices in undergraduate adult-centered online learning: Mechanisms for course design and delivery. *Journal of Online Learning and Teaching*, *3*, 346–356. Retrieved from https://jolt.merlot.org/documents/grant.pdf

Gregory, R. L., Rockinson-Szapkiw, A. J., & Cook, V. S. (2020). Community college faculty perceptions of the Quality Matters™ rubric. *Online Learning, 24*(2), 128–141. https://doi.org/10.24059/olj.v24i2.2052.

Haley, K. L., & Heise, K. (2008). *Building the successful online course*. Charlotte: Information Age Publishing.

Herman, J. H. (2013). Faculty incentives for online course design, delivery, and professional development. *Innovative Higher Education, 38*, 397–410. https://doi.org/10.1007/s10755-012-9248-6.

Hollowell, G. P., Brooks, R. M., & Anderson, Y. B. (2017). Course design, Quality Matters training, and student outcomes. *American Journal of Distance Education, 31*, 207–216. https://doi.org/10.1080/08923647.2017.1301144.

Illinois Online Network. (2015). Quality online course initiative (QOCI) rubric: A tool to assist in the design, redesign, and/or evaluation of online courses. Retrieved from https://uofi.app.box.com/s/afuyc0e34commxbfn9x6wsvvyk1fql8p

Intentional Futures. (2016, April). Instructional design in higher education: A report on the role, workflow, and experience of instructional designers. Retrieved from https://intentionalfutures.com/static/instructional-design-in-higher-education-report-5129d9d1e6c988c254567f91f3ab0d2c.pdf

Jaggars, S. S., & Xu, D. (2016). How do online course design features influence student performance? *Computers and Education, 95*, 270–284. https://doi.org/10.1016/j.compedu.2016.01.014.

Joint eQuality Committee. (2004). *Open eQuality learning standards*. Budapest: Learning Innovations Forum and European Institute for E-Learning. Retrieved from http://www.futured.com/OpeneQualityLearningStandards2004.pdf.pdf

Jones, K. R. (2013). Developing and implementing a mandatory online student orientation. *Journal of Asynchronous Learning Networks, 17*(1), 43–45. https://doi.org/10.24059/olj.v17i1.312.

Karataş, S., Yilmaz, A. B., Dikmen, C. H., Ermiş, U. F., & Gürbüz, O. (2017). Interaction in distance education environments: A trend analysis. *Quarterly Review of Distance Education, 18*(1), 63–82.

Ko, S., & Rossen, S. (2017). *Teaching online: A practical guide* (4th ed.). New York: Taylor & Francis.

Kumar, S., & Ritzhaupt, A. (2017). What do instructional designers in higher education really do?. *International Journal on E-Learning*, *16*, 371–393. Retrieved from https://www.learntechlib.org/primary/p/150980

Kuo, Y.-C., Walker, A. E., Belland, B. R., & Schroder, K. E. E. (2013). A predictive study of student satisfaction in online education programs. *International Review of Research in Open and Distance Learning, 14*(1), 16–39. https://doi.org/10.19173/irrodl.v14i1.1338.

Lenert, K. A., & Janes, D. P. (2017). The incorporation of quality attributes into online course design in higher education. *International Journal of E-Learning and Distance Education*, *32*(1), 1–14. Retrieved from http://www.ijede.ca/index.php/jde/article/view/987

Lowenthal, P. R., Dunlap, J. C., & Snelson, C. (2017). Live synchronous web meetings in asynchronous online courses: Reconceptualizing virtual office hours. *Online Learning, 21*(4), 177–194. https://doi.org/10.24059/olj.v21i4.1285.

Major, C. H. (2010). Do virtual professors dream of electric students? University faculty experiences with online distance education. *Teacher College Record*, *112*, 2154–2208. Retrieved from https://www.tcrecord.org/content.asp?contentid=15946

Martel, M. (2020, May). *Report 2: COVID-19 effects on U.S. higher education campuses: From emergency response to planning for future student mobility*. New York: Institute of International Education. Retrieved from https://www.iie.org/en/Connect/COVID-19/COVID-19-Snapshot-Survey-Series

Martin, F., & Betrus, A. K. (2019). *Digital media for learning: Theories, processes, and solutions*. Cham: Springer. https://doi.org/10.1007/978-3-030-33120-7.

Martin, F., & Bolliger, D. U. (2018). Engagement matters: Student perceptions on the importance of engagement strategies in the online learning environment. *Online Learning, 22*(1), 205–222. https://doi.org/10.24059/olj.v22i1.1092.

Martin, F., Ritzhaupt, A., Kumar, S., & Budhrani, K. (2019a). Award-winning faculty online teaching practices: Course design, assessment and evaluation, and facilitation. *The Internet and Higher Education, 42*, 34–43. https://doi.org/10.1016/j.iheduc.2019.04.001.

Martin, F., Wang, C., Budhrani, K., Moore, R. L., & Jokiaho, A. (2019b). Professional development support for the online instructor: Perspectives of U.S. and German instructors. *Online Journal of Distance Learning Administration*, *22*(3). Retrieved from https://www.westga.edu/~distance/ojdla/fall223/martin_wang_budhrani_moore_jokiaho223.html

Martin, F., Polly, D., & Ritzhaupt, A. (2020a, September 8). Bichronous online learning: Blending synchronous and synchronous online learning. *EDUCAUSE Review*. Retrieved from https://er.educause.edu/articles/2020/9/bichronous-online-learning-blending-asynchronous-and-synchronous-online-learning

Martin, F., Wang, C., & Sadaf, A. (2020b). Facilitation matters: Instructor perceptions of helpfulness of facilitation strategies in online courses. *Online Learning, 24*(1), 28–49. https://doi.org/10.24059/olj.v24i1.1980.

Martin, F., Bolliger, D. U., & Flowers, C. (2021). Design matters: Development and validation of the Online Course Design Elements (OCDE) instrument. *International Review of Research in Open and Distance Learning, 22*(2), 46–71. https://doi.org/10.19173/irrodl.v22i2.5187.

Merrill, M. D. (2002). First principles of instruction. *Educational Technology Research and Development, 50*(3), 43–59.

Meyer, K. A. (2002). Does policy make a difference? An exploration into policies for distance education. *Online Journal of Distance Learning Administration*, *5*(4), 1–13. Retrieved from https://www.westga.edu/~distance/ojdla/winter54/Meyer_policy_54.htm

Moore, M. G. (1989). Editorial. Three types of interaction. *American Journal of Distance Education, 3*(2), 1–7. https://doi.org/10.1080/08923648909526659.

Moore, M. G. (1991). Editorial. Distance education theory. *American Journal of Distance Education, 5*(3), 1–6. https://doi.org/10.1080/08923649109526758.

Moore, M. G., & Kearsley, G. (2012). *Distance education: A system view of online learning* (3rd ed.). Belmont: Wadsworth.

Morrison, G. R., Ross, S. J., Morrison, J. R., & Kalman, H. K. (2019). *Designing effective instruction* (8th ed.). Indianapolis: Wiley.

Online Learning Consortium. (2016). OSCQR course design review. Retrieved from https://s3.amazonaws.com/scorecard-private-uploads/OSCQR+version+3.1.pdf

Paul, R. C., Swart, W., Zhang, A. M., & MacLeod, K. R. (2015). Revisiting Zhang's scale of transactional distance: Refinement and validation using structural equation modeling. *Distance Education, 36*, 364–382. https://doi.org/10.1080/01587919.2015.1081741.

Price, J. M., Whitlatch, J., Maier, C. J., Burdi, M., & Peacock, J. (2016). Improving online teaching by using established best classroom teaching practices. *Journal of Continuing Education in Nursing, 47*, 222–227. https://doi.org/10.3928/00220124-20160419-08.

Quality Matters. (2019). *Course design rubric standards* (6th ed.). Retrieved from https://www.qualitymatters.org/qa-resources/rubric-standards/higher-ed-rubric

Rao, K., Edelen-Smith, P., & Wailehua, C.-U. (2015). Universal design for online courses: Applying principles to pedagogy. *Open Learning, 30*, 35–52. https://doi.org/10.1080/02680513.2014.991300.

Richardson, J. C., Ashby, I., Alshammari, A. N., Cheng, Z., Johnson, B. S., Krause, T. S., . . . Wang, H. (2019). Faculty and instructional designers on building successful collaborative relationships. *Educational Technology Research and Development, 67*, 855–880. https://doi.org/10.1007/s11423-018-9636-4.

Rose, D. H., & Meyer, A. (Eds.). (2006). *A practical reader in universal design for learning*. Cambridge, MA: Harvard Education Press.

Seaman, J. E., Allen, I. E., & Seaman, J. (2018). *Grade increase: Tracking distance education in the United States*. Babson Park: Bason Survey Research Group. Retrieved from https://www.bayviewanalytics.com/reports/gradeincrease.pdf

Shin, S., & Cheon, J. (2019). Assuring student satisfaction of online education: A search for core course design elements. *International Journal on E-Learning, 18*, 147–164.

Ssekakubo, G., Suleman, H., & Marsden, G. (2013). Designing mobile LMS interfaces: Learners' expectations and experiences. *Interactive Technology and Smart Education, 10*, 147–167. https://doi.org/10.1108/ITSE-12-2012-0031.

Swan, K. (2001). Virtual interaction: Design factors affecting student satisfaction and perceived learning in asynchronous online courses. *Distance Education, 22*, 306–331. https://doi.org/10.1080/0158791010220208.

Xiao, J. (2017). Learner-content interaction in distance education: The weakest link in interaction research. *Distance Education, 38*, 123–135. https://doi.org/10.1080/01587919.2017.1298982.

Young, S. (2006). Student views of effective online teaching in higher education. *American Journal of Distance Education, 20*, 65–77. https://doi.org/10.1207/s15389286ajde2002_2.

Using Social Media in Open, Distance, and Digital Education

71

Aras Bozkurt

Contents

Abstract

The technology used by Open, Distance, and Digital Education (ODDE) to deliver educational content includes social media (SM), which provides many opportunities to support learning in ODDE processes. This book chapter explains the use of SM in educational processes and the use of SM as a web-based educational technology, focusing specifically on the development of web technologies and SM from the perspective of ODDE. Furthermore, the chapter explores the affordances and limitations of SM through theoretical/conceptual lenses to better understand social media and its use in ODDE. In examining the research patterns on SM, four themes emerged, suggesting SM supports ODDE learning through: (1) social communication, interaction, and collaboration in online learning communities, (2) improved engagement, motivation, and satisfaction of learners, (3) functionality as an alternative learning management system for blended courses in higher education, and (4) facilitation of networked

A. Bozkurt (✉)
Open Education Faculty, Distance Education Department, Anadolu University, Eskişehir, Turkey
e-mail: arasbozkurt@anadolu.edu.tr

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_73

and connectivist informal learning. With its many social features, SM can be used to assist both formal and informal learning, but there still are some issues to resolve before ODDE can fully adopt it.

Keywords

Social media · Social network sites · Educational technology · Online learning · Distance education · Blended learning · Online networks · Social interaction and communication

Introduction: ODDE as an Emerging Field

Over the course of its history, Open, Distance, and Digital Education (ODDE) has evolved in line with educational technology as a field (Moore & Kearsley, 2012). As such, ODDE practices and educational technology development converged (Bozkurt, 2019, 2020), and ODDE emerged as a part of mainstream education (Bozkurt & Zawacki-Richter, 2021). Like many of the technologies that have come to mark the twenty-first century, social media (SM), as a service empowered by online web technologies, has had a major impact on many areas of life, including ODDE practices and theory. Features of SM such as easy access, online interactivity, instant communication, establishing and maintaining social relationships, and forming communities require a closer look at the potential for supporting ODDE.

Web Technologies: Collective Intelligence and the Global Brain

Web technologies have been revolutionary for humankind in many aspects of life, especially education. The potential of these web technologies emerged from their ability to enhance two-way communication and interaction, their participatory nature, the opportunities they provided learners to produce and consume information, and, most importantly, their power to build communities that exhibit the social characteristics of humans. Through successive generations of web technologies, online networks enhanced human capabilities, offering a new online ecosystem, where the boundaries of the offline physical world were extended to virtual online digital worlds.

The first-generation Web 1.0 was static, read-only, and based upon hypertext technology (Barassi & Treré, 2012). Upon the emergence of Web 2.0 in the early 2000s (O'Reilly, 2005), which was followed by Web 3.0 (Barassi & Treré, 2012), social networking sites became popular and attracted millions of users worldwide. Web 2.0 technologies are based on the architecture of participation and motivated by harnessing "the collective intelligence of crowds to create value" and transform "the web into a kind of global brain" (O'Reilly, 2005: p. 25). While Web 2.0 is based on users' participation, Web 3.0 (also known as the Semantic Web) is based on users' cooperation. The changes marking the stages of the evolution of the web are numerically labeled (e.g., 1.0, 2.0, and 3.0) and indicate that it is an emerging, evolving space that must be regarded as a growing and living entity. In line with the idea that technology is an extension of the human body (McLuhan, 1964), Fuchs et al. (2010) highlighted that the different generations of the web require us to consider it as an integrated socio-technical system and that its value lies in its ability to enhance human cognition, communication, and cooperation.

Despite there being critical discourse arguing that there are two sides to the web, negative and positive (Barassi & Treré, 2012), the web is clearly a space that enables information flow across networks and thereby has potential for education. The opportunities provided by web technologies, specifically the second and third generations, point to the social characteristics of these spaces and suggest that these spaces are more than synthetic structures built by binary codes but rather have value waiting to be discovered and harnessed for teaching and learning. Thus, it is difficult to design ODDE learning environments without some understanding of social networks, social media technologies, and their application.

Social Media: Revisiting Its Definition and Concepts that Make It Popular

Despite the clear application of social media to ODDE, the concept of what constitutes social media is sometimes murky and should be defined. A network is a structure, a system that connects different identities. It can be visible (e.g., railway networks) or invisible (e.g., kinship), human-made or naturally emerging. The most basic, albeit significant, value of networks is their ability to connect entities through different channels or links and facilitate communication and interaction between and within the networks or the entities that are connected to these networks. In this regard, networks have always been vital in the evolutionary progress of human beings, insofar as they enable communication and interaction, both of which are crucial elements of being social and fostering socializing.

Referring to Wellman's (1988, p. 37) argument that the world is "composed of networks," McLuhan (1964) asserted the notion that technology is an extension of the human body and increases human capability, from which it can be claimed that SM is a virtual online extension of our networks that exist in the physical offline world. SM (also known as social networks or social networking sites) refers to a variety of online platforms and is used for many purposes, such as socializing with friends and family, romance and flirting, job seeking and professional networking, doing business, and teaching and learning (Aichner, Grünfelder, Maurer, & Jegeni, 2021). The wide spectrum of SM use indicates that these media are not merely online platforms but, rather, projections of many human practices.

SM is defined as "Web-based services that allow individuals to construct a public or semi-public profile within a bounded system, articulate a list of other users with whom they share a connection, and view and traverse their list of connections and those made by others within the system" (Boyd & Ellison, 2007, p. 211). Likewise, Kaplan and Haenlein (2010, p. 61) defined SM as "A group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of user-generated content." In another definition, SM is defined as "Personal and personalisable spaces for online conversations and the sharing of content based typically on the maintenance and sharing of profiles, where individual users can represent themselves to other users through the display of personal information, interests, photographs, social networks and so on" (Selwyn, 2009, p. 157). Lastly, Dabbagh and Kitsantas (2012, p. 1) defined SM as "A variety of networked tools or technologies that emphasize the social aspects of the internet as a channel for communication, collaboration, and creative expression."

All these definitions point out the opportunities that SM provides individuals to present themselves, build or join networks, and communicate and interact socially. In this context, users' online profiles are especially important because their profiles not only present the facts of their life, but also (and perhaps even more importantly) how they want to be perceived by their social environment (Maranto & Barton, 2010). However, it is important to note that there is a continuum between actual and idealized self (Higgins, 1987) and that identity presentation is a performance (Goffman, 1959), meaning that what is presented on SM might be, in many cases, idealized selves (Manago, Graham, Greenfield, & Salimkhan, 2008) rather than actual selves with real identities. However, regardless of whether individuals choose to present their idealized or actual identities, they nonetheless are socially present in online spaces, which, in effect, is the true power of SM.

SM's ability to nurture its users' connections and make them visible and accessible is responsible for its growth in popularity (Greenhow & Robelia, 2009) and for encouraging billions of people to form a digital identity (Bozkurt & Tu, 2016), that is, to create a profile and be socially present online by building relationships and communities (Thurlow, Lengel, & Tomic, 2004). According to Social Capital Theory (Bourdieu, 1983), SM enables the bridging, bonding, and maintaining of social capital (Ellison, Steinfield, & Lampe, 2007). Equipped with all these features, SM has become the *normal* of the online-technology-centric twenty-first century.

The number of people who use SM demonstrates that SM goes well beyond merely being online platforms but, rather, is part of our daily lives and routines. Accordingly, as of 2021, the total population of the world is around 7.83 billion, and approximately 4.66 billion people are Internet users, of which 4.20 billion people are SM users (We Are Social, 2021). These figures suggest that SM has great potential as an educational technology, as it is already being used by nearly half of the world population.

Educational Affordances and Limitations of Social Media

In the online digitally intensive twenty-first century, radical transformations have taken place that have been driven by the massive increase in the diffusion of information facilitated by technological developments (Fischer & Konomi, 2005). This period of time has seen a high demand for information and lifelong learning (Fischer & Konomi, 2005), whose characteristic features are communication, collaboration, community, creativity, and convergence (Friedman & Friedman, 2008). Since its inception, there has been increasing interest in benefitting from social dynamic characteristics of SM (Barrot, 2021). SM can be used in online educational processes to meet learners' needs for more autonomy, connectivity, and socio-experiential learning (McLoughlin & Lee, 2007) by sharing, creating, and remixing information to create affinity spaces (Gee, 2004).

Earlier systematic studies have reported that SM can be used for online and blended courses to enhance learning outcomes and face-to face courses, foster learning communities, understand student perceptions of tool affordances, and increase student engagement with SM by supporting educational processes with social elements such as self-presentation, instant and rich communication, multiple interaction points, and ability to collaborate (Sharma, Tohill, Tietjen, & Akgun, 2018). The opportunities provided by SM have been formed by their ability to enable individuals to communicate, interact, and collaborate through self-driven motivation in socially enriched online spaces that extend beyond formal learning settings (Kimmerle, Moskaliuk, Oeberst, & Cress, 2015). Even in cases where SM does not play a part in learning processes, learners themselves can use SM to build their personal learning environment where learners can create, organize, and share their learning content (Dabbagh & Kitsantas, 2012; McLoughlin & Lee, 2007) and thus build bridges between formal, nonformal, and informal learning spaces (Greenhow & Lewin, 2016). Moreover, as an alternative learning management system (LMS), SM has the potential for blended learning in higher education (Giannikas, 2020).

In addition to the above advantages, SM played a vital role in sustaining education (Cavus, Sani, Haruna, & Lawan, 2021), especially collaborative learning, during the Covid-19 pandemic (Khan, Ashraf, Seinen, Khan, & Laar, 2021). For educational institutions that were not prepared for the sudden shift to emergency remote online education, or which could not afford to invest LMS due to high costs, SM was an effective and working solution (Nadeak, 2020). Likewise, countries that could not afford LMS due to their high costs used SM to sustain and deliver education during the pandemic (Sobaih, Hasanein, & Abu Elnasr, 2020). In this regard, it can be argued that SM proved its value in a time of crisis and may lessen inequities and social injustice derived from the digital divide on national, institutional, or even individual levels.

However, while SM offers many advantages, there are still some limitations to consider. For instance, some faculty may resist adopting SM for delivering educational content and communication with learners (Willems, Adachi, Bussey, Doherty, & Huijser, 2018). Also, some instructors (Veletsianos & Kimmons, 2013) or learners (Poellhuber, Anderson, & Roy, 2011) might be unwilling to integrate SM into their learning processes, and for some students, SM can be an online distraction (Hollis & Was, 2016). How to ensure integrity of SM into education is still an open-ended question for many educators (Moran, Seaman, & Tinti-Kane, 2011), and there are concerns about user-generated data (Krutka et al., 2019), which potentially recognizes learners as products and SM learning processes as a market. Besides, algorithmic bias (Boratto, Fenu, & Marras, 2019) is an issue and less is known regarding on its effects on learners' well-being. In addition to these points, the issues of cyber bullying (Clark, Werth, & Ahten, 2012) and how digital footprints and data privacy could compromise the value of SM in ODDE if normative, ethical, and legal measures are not taken (Buitrago-Ropero, Ramírez-Montoya, & Laverde, 2020). Moreover, students could experience conflicts when they shift from their private social identities to their learner identities (Dennen & Burner, 2017).

An Examination of Social Media in Terms of the Theoretical Underpinnings of ODDE

To better understand the value of SM, it is necessary to examine it from the perspectives of the theoretical bases of ODDE. In this regard, this section will first focus on the Community of Inquiry (CoI) model. According to the CoI (Garrison, Anderson, & Archer, 1999), teaching (design and organization and facilitating discourse direct instruction), cognitive (triggering event, exploration, integration, and resolution), and social (open communication, group cohesion, and personal/affective) presences lead to meaningful learning experiences in an online learning environment. Among these presence types, social presence is defined as the degree of salience of the other person in the (mediated) interaction and the consequent salience of the interpersonal relationships (Short, Williams, & Christie, 1976). In other words, the degree to which it is being perceived as real (Gunawardena, 1995). The value of social presence in online learning environments lies in the ability to help participants be seen as real and social in these environments (Kilgore & Lowenthal, 2015).

Intimacy and immediacy are two important concepts of social presence, and as such, are related to social context, online communication, and interactivity (Tu, 2000). In this sense, SM plays a pivotal role in not only sustaining social communication and interaction but also in increasing the social aspects of learners and learning by supporting their social presence and making them visible through real-life projected digital identities.

Another significant theory underpinning ODDE is the Community of Practice (CoP) model (Wenger, 2010), which highlights the importance of identity formation, joining a community, and initiating interaction for self and professional growth. CoP further suggests that learning does not occur only in formal spaces, arguing that when learners participate in self-emerging communities, informal learning may also occur. However, the development of CoP can be a challenge in online learning spaces (Brook & Oliver, 2003) owing to spatial and temporal distances (Moore & Kearsley, 2012). By virtue of their nature and features, SM platforms offer learners the opportunity to join an existing community or to build their own communities (Holcomb & Krüger-Ross, 2013) via socially empowered networks, where they can connect, network, communicate, and interact (Brady, Holcomb, & Smith, 2010). As a space that has the prerequisite features of building and developing a community, SM provides educational opportunities not only for formal learning but also for nonformal or informal learning.

Spatial and temporal distances are common features of ODDE (Moore & Kearsley, 2012), however, rather than narrowing these distances, it is more important to lessen the gap in transactional distance (Moore, 1993), that is, psychological and communicational distances. Transactional distance involves dialogue and structure (Moore, 1993), where the former reduces the transactional distance and the latter increases it. Tools and services like SM enable learners to meet, discuss, and engage with the learning content more actively, which reduces factors that increase transactional distance (Dron & Anderson, 2014). SM, in this regard, has the potential to lessen transactional distance by loosening the structure and facilitating different dialogue channels (Huang, Chandra, DePaolo, & Simmons, 2016; Quong, Snider, & Early, 2018). Recent studies confirm that SM enhances learners' interaction, and engagement along with their social presence results in increase in dialogue and reduce in transactional distance (Quong et al., 2018).

While interaction is a significant component of all educational processes, it is even more important for ODDE learners due to the limitations stemming from spatial and temporal distances. In this regard, three types of interaction—learner-learner, learner-instructor, and learner-content interaction—have been proposed as essential interaction types (Moore, 1989) that contribute to the satisfaction and academic achievement of learners (Bernard et al., 2009). However, fully online courses that use LMS may fail to completely provide learner-learner and learner-instructor interaction because they are primarily designed to deliver content. SM, which was originally developed to build and sustain social communication and interaction, can be adopted in ODDE to augment communication and interaction between learner-learner and learner-instructor.

In summary, SM can be a social glue for learners who are separated by time and space and isolated from their peers and instructors in cases where they do not have the tools to communicate and interact in online spaces. As explained in the above sections, SM is especially effective in supporting theoretical assumptions of ODDE (e.g., CoI, CoP, transactional distance, and interaction types). The empirical evidence presented in the related literature shows that SM can be used to support some, but not all, components of ODDE practices. The trick is to get the right mix (Anderson, 2003) to ensure meaningful equivalent learning experiences (Simonson, 1999) and facilitate interaction and communication by effectively using the capabilities of SM.

Reflections and Insights from Research on Social Media

This section provides a snapshot of the research that has been conducted on SM by examining articles and proceeding papers (n = 215; Articles: 99, Proceedings: 116) published in the Scopus database between 2001 and 2021. The research corpus was built in June 2021 by using predefined search strings (see "Appendix A"). Text-mining (Feldman & Sanger, 2007) and social network analysis (Hansen, Shneiderman, & Smith, 2011) were used to analyze the papers and identify research patterns. In the text mining process, the titles and abstracts of 215 papers (40,840 total words and 4,213 unique word forms) were analyzed to identify lexical patterns. A thematic map was then created to visualize these patterns (Fig. 1). In the social network analysis, from among the 575 keywords identified, a total of 91 with a minimum occurrence of two were included in the analysis, and a network graph was created to visualize the results (Fig. 2). The analysis identified the following four general themes by triangulating paths in Fig. 1 and nodes in Fig. 2. In other words, the data revealed through the text mining (Fig. 1) and social network analysis (Fig. 2) merged to identify the thematic research patterns and reach a broader perspective.

Social media supports social communication, interaction, and collaboration in online learning communities (see path on Fig. 1 *communication, social, interaction, learning, online, communities, CoP, CoI*; see nodes on Fig. 2, *social learning, communication, interaction, collaboration, participation, learning communities, communities of practice, computer-supported collaborative learning, online learning community, online social network*).

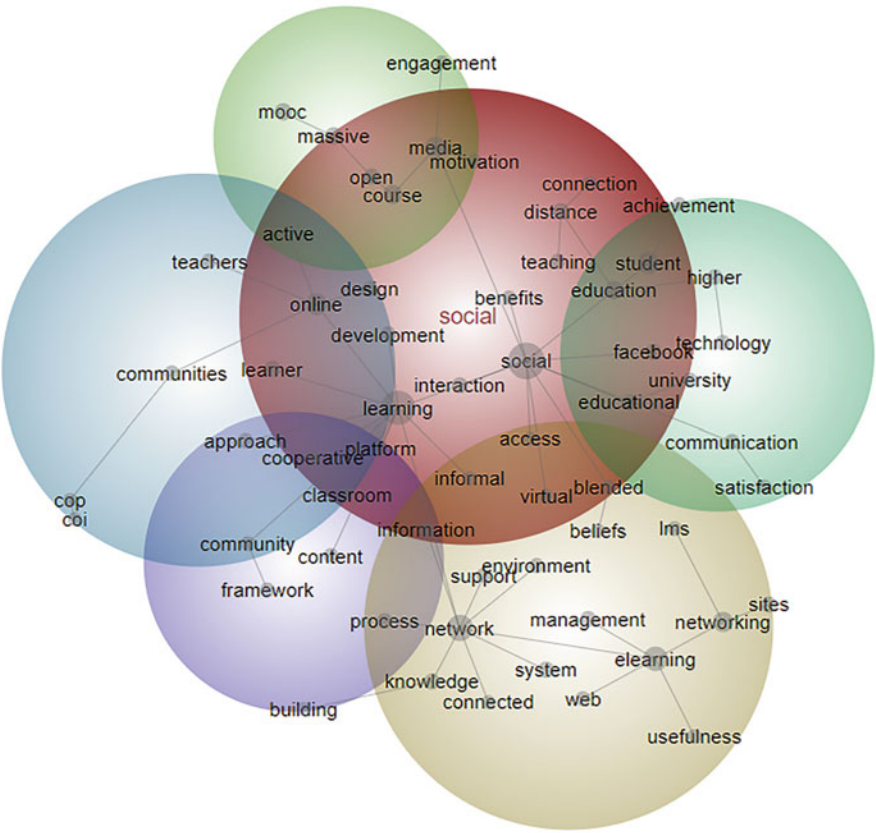


Fig. 1 Text-mining of the titles and abstracts of the papers on social media

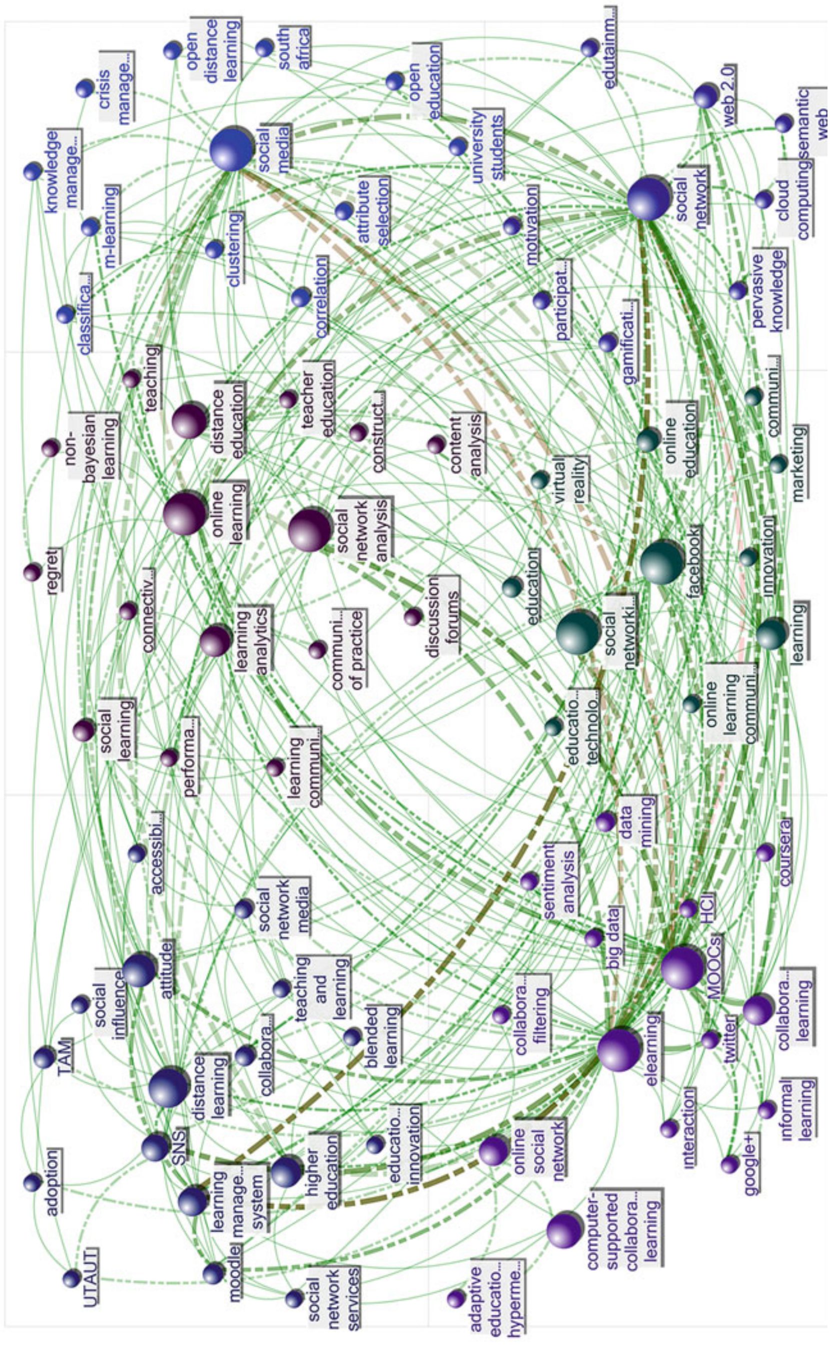


Fig. 2 Social network analysis of the keywords from the papers on social media

The ODDE practices aim to promote social elements of learning and apply a pragmatic approach to the use of education technology. As explained earlier, meaningful learning through different presences (Garrison et al., 1999) and interaction (Moore, 1989, 1993) in a learning community (Wenger, 2010) is essential in ODDE practices. SM, in this context, mitigates many of the limitations that emerge with the spatial and temporal distances (Moore & Kearsley, 2012).

What is more promising, learning communities formed on SM contributes to learners' interaction (Nunes, Palomino, Nakayama, & Silveira, 2016), and these communities can last after the course and provide opportunities to learners to further collaborate and sustain their scholarly discussions beyond course boundaries (de Lima & Zorrilla, 2017). The text mining and social network analysis indicate that the value of SM lies in its ability to promote participation and collaboration, both of which are desired in ODDE and all educational processes.

Social media supports engagement, motivation, and satisfaction of learners (see path on Fig. 1, *satisfaction, communication, social, media, motivation, engagement*; see nodes on Fig. 2, *motivation, social influence, teaching, and learning*).

The existing literature indicates that SM promotes student engagement and motivation (McLoughlin & Lee, 2007; Rueda, Benitez, & Braojos, 2017; Sharma et al., 2018), both of which can affect student learning satisfaction and success on account of the participatory nature of SM and learners' willingness to use these platforms. However, it is important to remember that SM was primarily developed for personal use and that despite the many advantages and opportunities afforded by SM, not every learner will voluntarily adopt SM in their learning process (Poellhuber et al., 2011).

Social media serves as an alternative learning management system for blended courses in higher education (see path on Fig. 1, *LMS, networking, e-learning, management* and *technology, higher, education, social, blended* and MOOC, massive, open, course, media, social, educational, university; see nodes on Fig. 2, *blended learning, Coursera, distance education, distance learning, educational technology, e-learning, Facebook, higher education, learning management system, m-learning, MOOCs, online education, online learning, open and distance learning, social network sites, university students*).

LMS are limited in how they support the social aspects of learning (Sharma et al., 2018). Learners might prefer SM as an alternative to traditional LMS considering that they are more user friendly and always-on and provide opportunities to shift learning experiences between formal and informal online learning spaces (Andrews, Tynan, & Backstrom, 2012). Blended/hybrid modes of learning are becoming increasingly popular (EDUCAUSE, 2021), and as noted by Sharma et al. (2018), SM is mostly used for blended courses and can be a cost-effective, socially forged alternative type of LMS in higher education. Empirical studies confirm that learners demonstrate positive attitudes for the use of SM as a supplement in higher education, and learners find SM more attractive than conventional LMSs (Giannikas, 2020) owing to cost and accessibility opportunities (Perguna, Apriyanti, & Kurniasih, 2021).

Social media facilitates networked and connectivist informal learning (see paths on Fig. 1, *informal, learning, online, active* and *connection, distance, education, social, media* and *connected, network, knowledge, building*; see nodes on Fig. 2, *connectivism, constructivism, informal learning, learning, online social networks, social network, social networking, social media, web 2.0*).

The advent of online networks and SM not only provided new educational opportunities but also led to the emergence of new pedagogical approaches, such as networked learning (Gourlay et al., 2021) and connectivism (Siemens, 2006). Connectivism argues that networking is critical for accessing current information by building or nurturing connections. Networking through SM allows learners to communicate in and out of the formal learning environments (Alzain, 2019) by ensuring the continuity of the learning and moving learning beyond the course objectives by facilitation informal learning opportunities.

Networked learning requires collaborative, cooperative, and collective inquiry, and, in this sense, SM can play a pivotal role. Learners are able to present themselves through SM profiles and increase their social presence in online networks. Moreover, online networks are not limited to formal learning opportunities but rather have a chaotic, complex, emergent, dynamic, open, self-controlled, self-maintained, and self-organized nature that extends the boundaries of online learning to formal, nonformal, and informal learning.

Reflections and insights from research on SM confirm earlier research themes and further indicate the potential of SM in terms of self-presentation and social presence not only for formal educational processes but also for informal educational processes such as networked and connectivist learning. The prevalence and use of SM by too many people can be a good opportunity to further explore how SM promotes communication, interaction, and collaboration and how SM contributes to engagement, motivation, and satisfaction of the learners in ODDE and education in general. The social features of SM support ODDE by default, but it's not just about its social features but also how we design learning processes and integrate SM.

Conclusion and Suggestions

SM, an innovative technology that defined the twenty-first century, has features that enrich and augment socializing in online networks and as such, and it has attracted the attention of all segments of society. It can be argued that the web, online network technologies, and SM have radically transformed how individuals interact and connect. They have also forced education to change and have shaped education based on the realities of the online and digitally intensive twenty-first century.

SM is inherently designed for private use, not for educational purposes. However, currently, it is being seen as an alternative or supplement to traditional LMS. Therefore, educators and learning designers must address certain questions surrounding this new phenomenon, such as: Why is SM seen as a supplement or an alternative? Why do educators design learning platforms that are isolated from the social characteristics of learning? Why is LMS seen as a means to delivering educational content rather than as a means to facilitating and fostering learning?

As argued in theories of ODDE, learning is about eliminating barriers, situating the content of learning in a social context, and facilitating learning through communication and interaction, all of which leads to increased motivation, engagement, and satisfaction of learners. In brief, human learning is social and largely involves socializing the processes involved in learning.

The research on SM demonstrates that SM technologies can be useful in supporting social communication, interaction, and collaboration in online learning communities. The nature and characteristic features of SM support the engagement, motivation, and satisfaction of learners in ODDE. Hybrid and blended modes of education are growing in popularity, and SM appears to be a ready-made alternative or supplement for LMS in some situations. Also, online networks and SM are well tailored for collaboration, participation, and community formation, which can increase their value as a social LMS in online learning. In many cases, learners use SM as a personal learning environment, meaning that their learning experiences are not confined to a single mode. In contrast, by taking advantage of SM, learners can easily shift between different learning modes (e.g., formal and informal learning). Lastly, since SM is controlled and formed by the users, it gives agency to learners to identify their own learning needs and to self-regulate, self-manage, and self-direct their learning processes. Taking into account these features, SM can be effective in networked and connectivist learning processes and empowering learners to engage in informal learning.

In the postmodern world, the borders between formal, nonformal, and informal learning are blurring. Information is distributed across networks, and learners traverse between different modes of learning to meet their learning needs. Given these new circumstances, how can ODDE adopt and position itself in the changing world, and how should learning be designed in the realm of online networks and networked society? It is also important to keep in mind that SM should not necessarily be placed at the center of the learning process but instead should be used to assist learning by facilitating discussions, sharing information, and weaving networks and can be used to bridge formal and informal learning.

Although SM offers many advantages for learning, and most educators are drawn to the features of SM, these socially enhanced technologies may not be as innocuous as they seem, as these technologies were originally meant for profit making and therefore should be approached with caution. Moreover, there are still many areas of concerns about the use of SM, such as data privacy, use of algorithms, ethics, and cyber bullying, which means that learning designers should be careful and find the right mix when they adopt SM in ODDE processes.

Based on the insights gained from the reviewed papers and analysis conducted to identify the recent main research themes, the following suggestions can be taken into consideration for future research directions.

First, SM has already been used by individuals, and it has many potentials to support ODDE, but this requires careful and purposeful instructional design to enable and ensure the participation, collaboration, and community formation. In this regard, instructional designers can focus on how to integrate SM to the curriculum and learning activities. Because some learners only use SM for private use, this still can be a challenge, but learners can be motivated to use SM for educational purposes. Second, conventional LMS can be improved by integrating social features of SM that can lessen the sense of being isolated from the real world. Additionally, another approach can be integrating SM into LMS tools so that learners can optionally present themselves with the digital identities they created. This can be important because profiles in LMS are generally composed of photos and basic personal information; the digital identities in SM can include the real-life connections and reflect real-life backgrounds of learners. As such, the degree of learners being perceived as real can be increased, and their social presence can be strengthened. Third, educational institutions can focus on how to best harness the capabilities of SM and use it beyond formal education. For instance, orientations or courses on SM literacy, how to best use SM in learning processes and how to protect themselves from the side effects can be an effective strategy in a long run. Such an approach can increase the awareness on SM in education and can further empower and give agency to learners. Finally, there is a need to develop regulations and policies to protect learners in case of cyber bullying, misuse of private data, and unethical use of digital footprints.

Cross-References

▶ Institutional Infrastructures for Open, Distance, and Digital Education

Appendix

Appendix A: Information on research corpus and search queries adopted for the inclusion criteria

Research corpus	
Database	SCOPUS
Period	2001–2021
Search queries adopted for the inclusion criteria	
Parameters	Search Strings
Subject-specific queries	"Social media" OR "social network*"
	AND
Field-specific queries	"distance education" OR "distance teaching" OR "distance learning" OR "remote education" OR "remote learning" OR "remote teaching" OR "online education" OR "online learning" OR "online teaching" OR "online course" OR "elearning" OR "e-learning" OR "m-learning" OR "mlearning" OR "u-learning" OR "ulearning" OR "MOOC*" OR "massive open online course*" OR "educational technology*" OR "open education" OR "open learning" OR "open teaching"

References

Aichner, T., Grünfelder, M., Maurer, O., & Jegeni, D. (2021). Twenty-five years of social media: A review of social media applications and definitions from 1994 to 2019. *Cyberpsychology, Behavior and Social Networking, 24*(4), 215–222. https://doi.org/10.1089/cyber.2020.0134.

Alzain, H. A. (2019). The role of social networks in supporting collaborative e-learning based on connectivism theory among students of PNU. *Turkish Online Journal of Distance Education, 20*(2), 46–63. https://doi.org/10.17718/tojde.557736.

Anderson, T. (2003). Getting the mix right again: An updated and theoretical rationale for interaction. *The International Review of Research in Open and Distributed Learning, 4*(2). https://doi.org/10.19173/irrodl.v4i2.149.

Andrews, T., Tynan, B., & Backstrom, K. (2012, November). Distance learners' use of non-institutional social media to augment and enhance their learning experience. In Proceedings of *the 29th Annual Conference of the Australasian Society for Computers in Learning in Tertiary Education (ASCILITE 2012)* (pp. 50–54). ASCILITE.

Barassi, V., & Treré, E. (2012). Does Web 3.0 come after Web 2.0? Deconstructing theoretical assumptions through practice. *New Media & Society, 14*(8), 1269–1285. https://doi.org/10.1177/1461444812445878.

Barrot, J. S. (2021). Scientific mapping of social media in education: A decade of exponential growth. *Journal of Educational Computing Research, 59*(4), 645–668. https://doi.org/10.1177/0735633120972010.

Bernard, R. M., Abrami, P. C., Borokhovski, E., Wade, C. A., Tamim, R. M., Surkes, M. A., & Bethel, E. C. (2009). A meta-analysis of three types of interaction treatments in distance education. *Review of Educational Research, 79*(3), 1243–1289. https://doi.org/10.3102/0034654309333844.

Boratto, L., Fenu, G., & Marras, M. (2019, April). The effect of algorithmic bias on recommender systems for massive open online courses. In Proceedings of *European Conference on Information Retrieval* (pp. 457–472). Cologne, Germany. https://doi.org/10.1007/978-3-030-15712-8_30

Bourdieu, P. (1983). The forms of capital. In J. G. Richardson (Ed.), *Handbook of theory and research for the sociology of education* (pp. 241–258). Westport, CT: Greenwood.

Boyd, D. M., & Ellison, N. B. (2007). Social network sites: Definition, history, and scholarship. *Journal of Computer-Mediated Communication, 13*(1), 210–230. https://doi.org/10.1111/j.1083-6101.2007.00393.x.

Bozkurt, A. (2019). Intellectual roots of distance education: A progressive knowledge domain analysis. *Distance Education, 40*(4), 497–514. https://doi.org/10.1080/01587919.2019.1681894.

Bozkurt, A. (2020). Educational technology research patterns in the realm of the digital knowledge age. *Journal of Interactive Media in Education, 2020*(1), 1–17. https://doi.org/10.5334/jime.570.

Bozkurt, A., & Tu, C.-H. (2016). Digital identity formation: Socially being real and present on digital networks. *Educational Media International, 53*(3), 153–167. https://doi.org/10.1080/09523987.2016.1236885.

Bozkurt, A., & Zawacki-Richter, O. (2021). Trends and patterns in distance education (2014–2019): A synthesis of scholarly publications and a visualization of the intellectual landscape. *The International Review of Research in Open and Distributed Learning, 22*(2), 19–45. https://doi.org/10.19173/irrodl.v22i2.5381.

Brady, K. P., Holcomb, L. B., & Smith, B. V. (2010). The use of alternative social networking sites in higher educational settings: A case study of the e-learning benefits of Ning in education. *Journal of Interactive Online Learning, 9*(2), 151–170. http://www.ncolr.org/jiol/issues/pdf/9.2.4.pdf.

Brook, C., & Oliver, R. (2003). Online learning communities: Investigating a design framework. *Australasian Journal of Educational Technology, 19*(2). https://doi.org/10.14742/ajet.1708.

Buitrago-Ropero, M. E., Ramírez-Montoya, M. S., & Laverde, A. C. (2020). Digital footprints (2005–2019): A systematic mapping of studies in education. *Interactive Learning Environments*, 1–14. https://doi.org/10.1080/10494820.2020.1814821.

Cavus, N., Sani, A. S., Haruna, Y., & Lawan, A. A. (2021). Efficacy of social networking sites for sustainable education in the era of COVID-19: A systematic review. *Sustainability, 13*(2). https://doi.org/10.3390/su13020808.

Clark, C. M., Werth, L., & Ahten, S. (2012). Cyber-bullying and incivility in the online learning environment, Part 1: Addressing faculty and student perceptions. *Nurse Educator, 37*, 150–156. https://doi.org/10.1097/nne.0b013e318262eb2b.

Dabbagh, N., & Kitsantas, A. (2012). Personal learning environments, social media, and self-regulated learning: A natural formula for connecting formal and informal learning. *The Internet and Higher Education, 15*(1), 3–8. https://doi.org/10.1016/j.iheduc.2011.06.002.

de Lima, M., & Zorrilla, M. E. (2017). Social networks and the building of learning communities: An experimental study of a social MOOC. *The International Review of Research in Open and Distributed Learning, 18*(1), 40–64. https://doi.org/10.19173/irrodl.v18i1.2630.

Dennen, V. P., & Burner, K. J. (2017). Identity, context collapse, and Facebook use in higher education: Putting presence and privacy at odds. *Distance Education, 38*(2), 173–192. https://doi.org/10.1080/01587919.2017.1322453.

Dron, J., & Anderson, T. (2014). The distant crowd: Transactional distance and new social media literacies. *International Journal of Learning and Media, 4*(3–4), 65–72. https://doi.org/10.1162/IJLM_a_000104. https://auspace.athabascau.ca/handle/2149/3511.

EDUCAUSE. (2021). *2021 EDUCAUSE horizon report teaching and learning edition*. Boulder, CO: EDUCAUSE. https://www.learntechlib.org/p/219489/.

Ellison, N., Steinfield, C., & Lampe, C. (2007). The benefits of Facebook "friends": Exploring the relationship between college students' use of online social networks and social capital. *Journal of Computer-Mediated Communication, 12*(3). http://jcmc.indiana.edu/vol12/issue4/ellison.html.

Feldman, R., & Sanger, J. (2007). *The text mining handbook: Advanced approaches in analyzing unstructured data*. Cambridge: The USA Cambridge University Press.

Fischer, G., & Konomi, S. (2005). Innovative media in support of distributed intelligence and lifelong learning. In *Proceedings of the third IEEE international workshop on wireless and mobile technologies in education* (pp. 3–10). Los Alamitos, CA: IEEE Computer Society.

Friedman, L. W., & Friedman, H. H. (2008). The new media technologies: Overview and research framework. *SSRN Electronic Journal.* https://doi.org/10.2139/ssrn.1116771.

Fuchs, C., Hofkirchner, W., Schafranek, M., Raffl, C., Sandoval, M., & Bichler, R. (2010). Theoretical foundations of the web: Cognition, communication, and co-operation. Towards an understanding of Web 1.0, 2.0, 3.0. *Future Internet, 2*(1), 41–59. https://doi.org/10.3390/fi2010041.

Garrison, D. R., Anderson, T., & Archer, W. (1999). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education, 2*, 87–105. https://doi.org/10.1016/S1096-7516.

Gee, J. P. (2004). *Situated language and learning: A critique of traditional schooling*. New York, NY: Routledge.

Giannikas, C. (2020). Facebook in tertiary education: The impact of social media in e-learning. *Journal of University Teaching and Learning Practice, 17*(1), 1–13. https://ro.uow.edu.au/jutlp/vol17/iss1/3.

Goffman, E. (1959). *The presentation of self in everyday life*. Garden City, NY: Doubleday.

Gourlay, L., Rodríguez-Illera, J. L., Barberà, E., Bali, M., Gachago, D., Pallitt, N., . . . Knox, J. (2021). Networked learning in 2021: A community definition. *Postdigital Science and Education, 3*(2), 326–369. https://doi.org/10.1007/s42438-021-00222-y.

Greenhow, C., & Lewin, C. (2016). Social media and education: Reconceptualizing the boundaries of formal and informal learning. *Learning, Media and Technology, 41*(1), 6–30. https://doi.org/10.1080/17439884.2015.1064954.

Greenhow, C., & Robelia, B. (2009). Old communication, new literacies: Social network sites as social learning resources. *Journal of Computer-Mediated Communication, 14*(4), 1130–1161. https://doi.org/10.1111/j.1083-6101.2009.01484.x.

Gunawardena, C. N. (1995). Social presence theory and implications for interaction and collaborative learning in computer conferences. *International Journal of Educational Telecommunications, 1*, 147–166. https://www.learntechlib.org/p/15156/.

Hansen, D., Shneiderman, B., & Smith, M. A. (2011). *Analyzing social media networks with NodeXL: Insights from a connected world*. Amsterdam, Netherlands: Morgan Kaufmann.

Higgins, E. T. (1987). Self-discrepancy theory. *Psychological Review, 94*, 1120–1134. https://doi.org/10.1037/0033-295X.94.3.319.

Holcomb, L. B., & Krüger-Ross, M. (2013). Enhancing social presence and communities of practice in distance education courses through social media. In B. Pătruţ, M. Pătruţ, & C. Cmeciu (Eds.), *Social media and the new academic environment: Pedagogical challenges* (pp. 92–114). IGI Global. https://doi.org/10.4018/978-1-4666-2851-9.ch005.

Hollis, R. B., & Was, C. A. (2016). Mind wandering, control failures, and social media distractions in online learning. *Learning and Instruction, 42*, 104–112. https://doi.org/10.1016/j.learninstruc.2016.01.007.

Huang, X., Chandra, A., DePaolo, C. A., & Simmons, L. L. (2016). Understanding transactional distance in web-based learning environments: An empirical study. *British Journal of Educational Technology, 47*(4), 734–747. https://doi.org/10.1111/bjet.12263.

Kaplan, A. M., & Haenlein, M. (2010). Users of the world, unite! The challenges and opportunities of social media. *Business Horizons, 53*(1), 59–68. https://doi.org/10.1016/j.bushor.2009.09.003.

Khan, M. N., Ashraf, M. A., Seinen, D., Khan, K. U., & Laar, R. A. (2021). Social media for knowledge acquisition and dissemination: The impact of the COVID-19 Pandemic on collaborative learning driven social media adoption. *Frontiers in Psychology, 12*. https://doi.org/10.3389/fpsyg.2021.648253.

Kilgore, W., & Lowenthal, P. R. (2015). The human element MOOC: An experiment in social presence. In R. D. Wright (Ed.), *Student–teacher interaction in online learning environments* (pp. 373–391). Hershey, PA: IGI Global.

Kimmerle, J., Moskaliuk, J., Oeberst, A., & Cress, U. (2015). Learning and collective knowledge construction with social media: A process-oriented perspective. *Educational Psychologist, 50*(2), 120–137. https://doi.org/10.1080/00461520.2015.1036273.

Krutka, D., Manca, S., Galvin, S., Greenhow, C., Koehler, M., & Askari, E. (2019). Teaching "against" social media: Confronting problems of profit in the curriculum. *Teachers College Record, 121*(14), 1–42. https://www.tcrecord.org/books/Content.asp?ContentID=23046.

Manago, A. M., Graham, M. B., Greenfield, P. M., & Salimkhan, G. (2008). Self-presentation and gender on MySpace. *Journal of Applied Developmental Psychology, 29*(6), 446–458. https://doi.org/10.1016/j.appdev.2008.07.001.

Maranto, G., & Barton, M. (2010). Paradox and promise: MySpace, Facebook, and the sociopolitics of social networking in the writing classroom. *Computers and Composition, 27*, 36–47. https://doi.org/10.1016/j.compcom.2009.11.003.

McLoughlin, C., & Lee, M. (2007, December 2–5). Social software and participatory learning: Pedagogical choices with technology affordances in the Web 2.0 era. In Proceedings of *ICT: Providing choices for learners and learning* (pp. 664–675). Singapore: ASCILITE. https://www.ascilite.org/conferences/singapore07/procs/mcloughlin.pdf

McLuhan, M. (1964). *Understanding media: Extensions of man*. New York, NY: McGraw-Hill.

Moore, M. G. (1989). Editorial: Three types of interaction. *American Journal of Distance Education, 3*(2), 1–7. https://doi.org/10.1080/08923648909526659.

Moore, M. G. (1993). Theory of transactional distance. In D. Keegan (Ed.), *Theoretical principles of distance education* (pp. 22–38). London, UK: Routledge.

Moore, M. G., & Kearsley, G. (2012). *Distance education: A systems view of online learning*. Wadsworth, OH: Cengage.

Moran, M., Seaman, J., & Tinti-Kane, H. (2011). Teaching, learning, and sharing: How today's higher education faculty use social media. *Babson Survey Research Group*. https://eric.ed.gov/?id=ED535130.

Nadeak, B. (2020). The effectiveness of distance learning using social media during the pandemic period of COVID-19: A case in Universitas Kristen Indonesia. *International Journal of Advanced Science and Technology, 29*(7), 1764–1772. http://repository.uki.ac.id/1717/.

Nunes, C. S., Palomino, C. G., Nakayama, M. K., & Silveira, R. A. (2016). Interaction on distance education in virtual social networks: A case study with Facebook. In M. Caporuscio, F. De la Prieta, T. Di Mascio, R. Gennari, J. Gutiérrez Rodríguez, & P. Vittorini (Eds.), *Methodologies and intelligent systems for technology enhanced learning. Advances in intelligent systems and computing* (pp. 61–70). Cham, Switzerland: Springer.

O'Reilly, T. (2005, September 30). *What is Web 2.0: Design patterns and business models for the next generation of software.* O'Reilly Media. http://oreilly.com/web2/archive/what-is-web-20.html

Perguna, L. A., Apriyanti, N., & Kurniasih, D. (2021). Alternative online learning using social media as a panacea. *International Journal of Emerging Technologies in Learning, 16*(7), 257–265. https://doi.org/10.3991/ijet.v16i07.21209.

Poellhuber, B., Anderson, T., & Roy, N. (2011). Distance students' readiness for social media and collaboration. *The International Review of Research in Open and Distributed Learning, 12*(6), 102–125. https://doi.org/10.19173/irrodl.v12i6.1018.

Quong, J., Snider, S. L., & Early, J. (2018). Reducing transactional distance in online and blended courses through the use of a closed social media platform. *Journal of Educational Technology Systems, 47*(1), 79–100. https://doi.org/10.1177/0047239518766654.

Rueda, L., Benitez, J., & Braojos, J. (2017). From traditional education technologies to student satisfaction in Management education: A theory of the role of social media applications. *Information & Management, 54*(8), 1059–1071. https://doi.org/10.1016/j.im.2017.06.002.

Selwyn, N. (2009). Faceworking: Exploring students' education-related use of Facebook. *Learning, Media and Technology, 34*, 157–174. https://doi.org/10.1080/17439880902923622.

Sharma, P., Tohill, K., Tietjen, P., & Akgun, M. (2018). The use of social media in higher education online and blended courses. In M. G. Moore & W. C. Diehl (Eds.), *Handbook of distance education* (4th ed., pp. 228–243). Routledge. https://doi.org/10.4324/9781315296135.

Short, J., Williams, E., & Christie, B. (1976). *The social psychology of telecommunications*. London, UK: Wiley.

Siemens, G. (2006). *Knowing knowledge*. Vancouver, BC: Lulu Press.

Simonson, M. (1999). Equivalency theory and distance education. *TechTrends, 43*(5), 5–8. https://doi.org/10.1007/bf02818157.

Sobaih, A. E. E., Hasanein, A. M., & Abu Elnasr, A. E. (2020). Responses to COVID-19 in higher education: Social media usage for sustaining formal academic communication in developing countries. *Sustainability, 12*(16). https://doi.org/10.3390/su12166520.

Thurlow, C., Lengel, L., & Tomic, A. (2004). *Computer mediated communication: Social interaction on the internet*. London, UK: Sage.

Tu, C. H. (2000). On-line learning migration: From social learning theory to social presence theory in CMC environment. *Journal of Network and Computer Applications, 23*, 27–37. https://doi.org/10.1006/jnca.1999.0099.

Veletsianos, G., & Kimmons, R. (2013). Scholars and faculty members' lived experiences in online social networks. *The Internet and Higher Education, 16*, 43–50. https://doi.org/10.1016/j.iheduc.2012.01.004.

We Are Social. (2021). *Digital 2021: Global overview report*. We are Social Inc. https://wearesocial.com/digital-2021

Wellman, B. (1988). Structural analysis: From method and metaphor to theory and substance. In B. Wellman & S. D. Berkowitz (Eds.), *Social structures: A network approach* (pp. 19–61). Cambridge, UK: Cambridge University Press.

Wenger, E. (2010). Communities of practice and social learning systems: The career of a concept. In C. Blackmore (Ed.), *Social learning systems and communities of practice* (pp. 179–198). London, UK: Springer.

Willems, J., Adachi, C., Bussey, F., Doherty, I., & Huijser, H. (2018). Debating the use of social media in higher education in Australasia: Where are we now? *Australasian Journal of Educational Technology, 34*(5), 135–149. https://doi.org/10.14742/ajet.3843.

Serious Games and Game-Based Learning 72

Claudia Schrader

Contents

Abstract

This chapter summarizes theory and empirical research concerned with the use of serious games and game-based learning in educational contexts. Relevant characteristics and theoretical foundations of the value of games are assessed. The reviewed empirical findings indicate a strong effect of serious games and game-based learning on learner motivation, affect, and cognitive outcomes. However, the direction of their impact is not always straightforward as it depends on the interplay of conditions including the game type, design features, learner characteristics, and learning activities. This chapter suggests that developers and educators take this interplay into account to ensure optimal learner experiences when developing or choosing serious games or game-based learning approaches for educational purposes.

Keywords

Serious games · Game-based learning · Design issues

C. Schrader (✉)
School of Education, Bergische Universität Wuppertal, Wuppertal, Germany
e-mail: cschrader@uni-wuppertal.de

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_74

Introduction

Serious games and game-based learning are popular methods for teaching and learning. While the value of games and play for learning has a long history in classroom-based contexts, the interest in games for digital and distance education has emerged over the last decade. Based on the enthusiasm this generation's students exhibit for games, they appear to have high motivational value, but in the context of teaching and learning, they are recognized as being much more than motivational tools. To a certain extent, games are argued to support the development of knowledge and skills that are otherwise hard to teach. They allow educators to virtually model real-world tasks in which students are able to interact, which gives students a sense of learning by doing or, in the case of games, learning by playing. Games further encourage students to take risks and to try different ways of learning and thinking with lower consequences of failure (Gee, 2003). Games' immediate response to actions might offer the kind of feedback mechanism to students that digital and distance education sometimes require, so that students can reflect on their difficulties.

Based on these advantages, games are intended to be useful learning tools by engaging learners on cognitive, affective, motivational-behavioral, and social levels (Plass, Homer, Mayer, & Kinzer, 2020; Prensky, 2001). Thus, the current tendency to integrate game-based learning approaches in digital and distance education acknowledges the emergence of new learning experiences that games may offer in order to enhance learning.

In this chapter, the understanding and the role of serious games and game-based learning are analyzed and discussed. The theoretical foundation for the success of games is outlined, and current empirical contributions are reviewed. Essential design features that impact the learning effectiveness of serious games and game-based learning are highlighted. Finally, this chapter closes with a reflection on the value of games for learning and directions for future research.

Definition and Characteristics of Serious Games and Game-Based Learning

Games can be defined as "a system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome" (Salen, Tekinbaş, & Zimmerman, 2004, p. 5). Digital commercial games were developed primarily for fun, entertainment, and recreation. In contrast, the objective of serious games and game-based learning is to use the entertaining quality of games for the purpose of learning (Connolly, Boyle, MacArthur, Hainey, & Boyle, 2012; Michael & Chen, 2006; Wouters, van Nimwegen, van Oostendorp, & van der Spek, 2013). While it can be argued that any game provides learning opportunities, such as gaining technical knowledge and developing motor skills (i.e., the development of body movements related to balance), the explicit function of serious games and game-based learning is to help students (1) acquire new knowledge and skill about an important subject matter, (2) practice existing knowledge and skills, (3) develop learning and innovation skills, and/or (4) prepare for future learning (Plass et al., 2020).

The term "serious game" has a long tradition, starting with Abt (1987), and includes digital and non-digital games in various contexts such as business, industry, marketing, healthcare, and education (Michael & Chen, 2006). With the growing development of technology, however, the understanding of serious games is mostly from a digital point of view, in which they are defined as examples of interactive learning technologies that offer learning experiences through fully animated elements that are under learners' control (Rieber, 2005). The term "serious game" is often mentioned in the literature as synonymous with the term "game-based learning." Game-based learning, however, can be seen as an approach to teaching in educational contexts (Becker, 2021). With a specific learning goal in mind, a learning task is redesigned to make learning more interesting and more effective. This involves the use of serious games in the learning process, seen as a tool of game-based learning.

Common to both the use of serious games in specific contexts and the game-based learning approach in general is the use of games' inherent entertaining characteristics to deliver specific goals, outcomes, and experiences. Games provide rich sensory experiences through combinations of text, graphics, dynamic animations, audio, and haptics. Many games contain a story narrative with characters that involve the players. They consist of a constructed competitive setting with an incentive structure following a clearly defined goal that challenges the players (Graesser, Chipman, & Leeming, 2009). The most commonly cited entertaining characteristic of a game is its interactive nature. A game's story only evolves through interaction with the player's behavior. Therefore, as described in the input-process-output game model (Garris, Ahlers, & Driskell, 2017), feedback is half of the interactive game cycle, as the player's input and the game's output assert reciprocal influence. For example, games use visual and auditory feedback to let players know if certain actions have succeeded or failed.

Theoretical Foundations

The theoretical foundations of what makes the use of serious games and game-based learning psychologically successful can be described from motivational, affective, cognitive, and sociocultural perspectives.

Motivational perspective. The need to motivate learners to stay engaged over long learning periods has been often used in the literature as the main and most important argument for the use of games in educational contexts (Plass, Homer, & Kinzer, 2015). A number of theorists (e.g., Malone & Lepper, 1987; Rigby & Ryan, 2011) have proposed explanations for why games should be motivating, mostly through the inherent game characteristics described above, which apply a range of existing motivational approaches. For instance, the interactive and competitive nature of games increases motivational constructs such as interest, intrinsic motivation, and what Csikszentmihalyi (e.g., 2008) has described as a state of flow, i.e., an extended time spent on a task with intense concentration in a way that perception of time and fatigue disappear. Ideally, the provision of challenge at the zone of proximal development (Vygotsky, 1978), i.e., the matching of challenge difficulty to student ability, satisfies the specific intrinsic needs of competence, autonomy, and relatedness. These three physiological needs comprise the major components of the Player Experience of Need Satisfaction model (Rigby & Ryan, 2011), which has been developed in order to identify game characteristics that are most satisfying. From the perspective of self-determination theory (Deci & Ryan, 1985; Ryan & Deci, 2002), the fulfillment of these learner needs is essential for intrinsic motivation and self-efficacy and leads to action-related behavior in terms of learning.

Affective perspective. By exploring what make games fun, Loftus and Loftus (1983) stated that active player engagement, associated with the right balance in challenge as described above, may also affect players' emotions. Ravaja, Saari, Salminen, Laarni, and Kallinen (2006) found enjoyment related to an exchange between success (acquiring in-game goods) and failure (such as falling over the edge of the game board). This result can be explained through the control-value theory (CVT) of achievement emotions (Pekrun, 2006; Pekrun & Perry, 2014): An optimal challenge (rather than being too hard or too easy) might foster perceived controllability, which, in turn, is linked to positive emotional experiences. Moreover, described in the literature as emotional design (Plass & Kaplan, 2016), a strong narrative and aesthetic visual and auditive design are examples of game features that influence emotions. (For a detailed overview of affective foundations of game-based learning, see Loderer, Pekrun, and Plass (2020).)

Sociocultural perspective. Social learning theories (e.g., Bandura, 1977; Piaget, 1964; Vygotsky, 1978) posit that learning consists of the construction and application of knowledge through direct experience of success and failure and through interaction with others, both of which are characteristics of games. For example, the game Mad City Mystery immerses students in an authentic scientific inquiry of a mysterious death, where teams of students experience social practices of being investigators by actually "practicing inquiry and argumentation skills" (Squire & Jan, 2007). The possibility to interact with the game system, with in-game characters, or with other students integral to the learning process helps to develop skills for collaboration and cooperation – skills which are seen as necessary for the twenty-first-century workforce (De Freitas, Rebolledo-Mendez, Liarokapis, Magoulas, & Poulovassilis, 2010).

Cognitive perspective. By virtue of their motivational, affective, and sociocultural properties described above, games have been intended to foster learning. In the overall context of multimedia learning, both motivation and emotions have been found to be important prerequisites for and mediators of cognitive processes and outcomes (Astleitner & Wiesner, 2004; Leutner, 2014; Moreno & Mayer, 2007; Plass & Kaplan, 2016). Fostering motivational concepts and inducing positive emotions through certain game mechanics could serve as facilitators for cognitive generative processing during learning, including the selection of relevant learning information, its arrangement into a coherent structure, and its integration with prior knowledge relevant for the academic content conveyed through a game (Mayer, 2014).

Based on this overview of different but related theoretical perspectives, it is clear that high expectations exist for games to foster motivation, positive emotions, and deeper learning through their inherent characteristics (Habgood & Ainsworth, 2011). The next section reviews whether games could fulfill these expectations, based on empirical findings from game research.

Empirical Contributions

The research literature that investigates the effects of game-based learning (including computer and video games for learning, serious games, and the concepts of gamification and play) can be organized into cognitive consequences research, media comparison research, and value-added research (Mayer, 2014, 2020). Based on empirical studies using one of the three research approaches, a number of meta-analyses and empirical reviews have been conducted of the effects that game-based learning could have, particularly on motivation and on cognitive learning outcomes (e.g., Clark, Tanner-Smith, & Killingsworth, 2016; Connolly et al., 2012; Sailer & Homner, 2020; Wouters et al., 2013). A meta-analysis (Sailer & Homner, 2020) synthesizing 38 studies that use a consequence research approach by focusing on the effect of gamification for motivation, learning processes, and outcomes demonstrated a positive impact of gamification on cognitive learning outcomes, whereas the effect on behavioral outcomes (i.e., technical, motor skills, performance on specific transfer task) and on motivational variables (i.e., (intrinsic) motivation, preferences, attitudes, engagement, confidence, and self-efficacy) was less stable.

By determining whether there is evidence that learning from games can be more effective than learning from conventional media, in a meta-analysis of 65 studies that used a media comparison approach, Sitzmann (2011) found a positive effect of simulation games on self-efficacy and on conceptual, declarative, and procedural knowledge for the specific group of adult workforce trainees compared to alternative nongame instruction media. The meta-analysis of Wouters et al. (2013) identified 39 studies that investigated the effect of serious games on motivation and on learning outcomes for a wide range of age groups, from children to adults. No significant difference in motivation was found, but there was a positive impact of serious games compared to other more conventional instructional media such as lectures, reading, drill, and practice or hypertext-learning environments on learning outcomes including retention and cognitive skills. However, there was a wide-ranging effect size indicating that in some cases, games can be as effective and in other cases more effective than learning with conventional instruction media. Given two examples of inconclusive results in the context of higher education, Ebner and Holzinger (2007) examined motivation, enjoyment, and learning outcome between the use of the online game Internal Force Master (IFM) and traditional teaching in a math lecture on structural concrete at Master's level, involving 121 seventh-semester students. The results showed that the use of the game fostered motivation and enjoyment.

However, the student group who learned with the online game did not receive higher learning outcomes compared to the group who learned structural concrete in the traditional math course. Nonsignificant differences in learning outcomes between the two groups were found. In contrast, Crocco, Offenholley, and Hernandez (2016) reported an increase in motivation, enjoyment, and an improvement in learning of 440 undergraduate students who learned with games in English and science courses. Especially in science, games have been demonstrated to foster higher learning outcomes compared to conventional media (Mayer, 2020).

Overall, these contradictory findings from research using either a cognitive, affective, and motivational consequences approach, or a media comparison approach, suggest that there is no single and clear answer to the question of whether games positively influence motivation, affect, or cognitive outcomes. A discussion of games' effectiveness seems to be complicated by the fact that empirical studies in the context of serious games, gamification, and game-based learning vary in study populations, game type, academic content, and learning goals.

The inconclusive results further may refer to another problematic aspect discussed by Mayer (2020), who adapted the cognitive theory of multimedia learning (Mayer, 2009) and cognitive load theory (Sweller, Ayres, & Kalyuga, 2011) to describe how learners learn academic content when using digital games. Games have the potential to promote learner motivation, reflected in learners engaging with the material, which can foster generative processing. At the same time, however, they may create extraneous processing caused by the distracting features, even though these help learners to maintain a high level of motivation. Given the limited cognitive capacity of the human information processing system, as result of extraneous processing, there may be no cognitive capacity left for essential and generative processing which is needed for meaningful learning. Therefore, when designing games, there is a need for a balance of features that foster motivation but do not increase irrelevant extraneous processing (Mayer, 2020). This statement is supported by Clark et al.'s (2016) meta-analysis of 69 studies of the learning effect of digital games, which illustrated that only considering the genre of a learning environment is not sufficient to understand its impact on learning. Rather, more closely investigating instructional design features in interaction with learner characteristics may help to improve games' learning effectiveness and may guide game designers. Thus, besides research based on a media comparison or a consequence approach, a different line of research, i.e., value-added research, focuses on the question of how and what kind of design features in games may influence motivation, affect, and learning outcomes. The following section provides an overview of this question.

Design Features Influencing Motivation, Affect, and Learning Outcomes in Games

There have been a few theoretical attempts to summarize typical game design features and their interplay with relevant aspects of learning. In terms of how to improve motivational aspects of learning, the instructional design approach suggested by Malone and Lepper (1987) and the attention, relevance, confidence, and satisfaction (ARCS) model (Keller, 1987; Keller & Suzuki, 2004), for example, have been adapted to the context of gamification (e.g., Hamzah, Ali, Saman, Yusoff, & Yacob, 2015). In their integrative model of emotional foundations of game-based learning, Loderer et al. (2020) used the basic structure of the CVT in order to systematize and describe affective functions of certain game-based learning features such as aesthetic design, narrative, incentives, or feedback. A theoretical attempt that maps these game features onto theoretical components of motivational, emotional, cognitive, and social aspects of learning is the integrated design framework for playful learning (Plass et al., 2015).

While a detailed description of each of these attempts is beyond the scope of this chapter, particular game design features that the value-added research has shown to influence the effectiveness of games will now be briefly summarized.

Mode of play: competition and collaboration. In their comprehensive literature review of the effect of design features of game-based learning, Clark et al. (2016) found competition to be more effective when it is augmented with social interaction of learners. In other words, when learners collaborated in groups to compete against the gaming system, the learning outcome was higher compared to those games using single competitive game designs. Similar results were found in the review of gamification conducted by Sailer and Homner (2020). These findings overwhelmingly demonstrate the effectiveness of collaboration and cooperation over exclusively competitive game settings, which might cause social pressure and have a destructive effect on participation.

However, competition has also been shown to potentially increase enjoyment, situational interest (Plass et al., 2013), intrinsic and extrinsic goal orientation (Vandercruysse, Vandewaetere, Cornillie, & Clarebout, 2013), and positive attitudes toward the academic content (Ke & Grabowski, 2007). The outcome of competition might vary for different types of learners depending on prior knowledge and preference to compete (Riemer & Schrader, 2020). While some students will see that they have no chance of achieving a high ranking and become demotivated, others may be motivated to climb the leaderboards (Abu-Dawood, 2016).

Learner control. As part of interactivity, learner control refers to the potential of a game to allow the users to handle flexibly the technology or the gaming systems (Bryant & Love, 1996). It includes the extent to which users are allowed to manage directions of gameplay activities, adjust task difficulty, or customize an avatar. In addition to the concept of control being an attribute of the game itself, it can also be defined as a psychological factor, which reflects the user’s perceived competence to influence or master certain aspects of the gaming system (Klimmt, Hartmann, & Frey, 2007). Schrader and Nett (2018) designed Liver Defense, a serious game in which the learner must successfully defend the human liver from incoming substances such as ammonia, alcohol, and pharmaceuticals, by creating liver cells and enzymes that are specialized to break down each substance. The goal of the game is to help students to learn about functionalities of the human liver. By comparing three different levels of task difficulty, students reported higher perception of being in control, higher enjoyment, and lower frustration when learning with both low and moderate difficulty levels compared to high difficulty. This finding can be linked to CVT, which predicts that the experience of enjoyment is supported if learners perceive an activity as being controllable. In turn, if activities cannot be handled successfully, frustration might be experienced. However, as also shown by Schrader and Nett (2018), the differences in control perception and in emotions between the three difficulty versions disappeared with increased practice time, yielding nonsignificant results in both affective and cognitive outcomes. Based on this finding, it can be noted that games should become complex as players may welcome gradual increments in the difficulty level. This is also an integral part of flow theory, indicating that the challenge should constantly match learner's ability (Abuhamdeh & Csikszentmihalyi, 2012; Nebel, Beege, Schneider, & Rey, 2020). To fulfill this recommendation of adaptivity, there is a need for continuous measurement of learner experience during gameplay; this is discussed as a methodological challenge for further game research.

Aesthetic and narrative design. A number of universal aesthetic characteristics specifically linked to learner's affect and motivation can be adapted to game-based learning. These include the visual aesthetic design and auditive design. Research on the effects of colors and shapes in games on learners' affect, for example, showed that warm colors and round shapes induced positive emotions (Um, Plass, Hayward, & Homer, 2012). Research investigating the effect of music in games has shown that a musical score positively impacts motivation and enjoyment (Lipscomb & Zehnder, 2004). However, there are mixed results regarding students memorizing facts in a virtual learning environment with and without background music (Fassbender, Richards, Bilgin, Thompson, & Heiden, 2012).

In terms of narrative design, the inclusion of a narrative for situating and anchoring learning in context has been demonstrated to lead to increased positive arousal compared to games without a narrative (Echeverria, Barrios, Nussbaum, Améstica, & Leclerc, 2012; Schneider, Lang, Shin, & Bradley, 2004). The design of human-like game characters with which players identify further leads to positive emotions during play (Hefner, Klimmt, & Vorderer, 2007).

While aesthetic design and strong narratives foster emotional and motivational aspects, Clark et al. (2016) found in their meta-analysis that an aggregate contextualized variable created from visual and narrative game features had a small but significant negative impact on learning outcomes. This result refers to the design problematic designers and educators are challenged with: Visual and auditive complexity and rich narratives might foster motivation and positive emotions that are important for learning. However, these might also distract learners, require nonessential cognitive processing, and hinder learning. Therefore, game design should balance motivating elements and align these with content and learning goals in a manner that does not unnecessarily add to the learner's cognitive load.

Feedback and support. Feedback and support are pedagogical components implemented in games. Feedback is instantly and immediately provided as learners see the outcome of their actions, often in the form of scores, experience points, badges, or power-ups. Examples of support include the provision of explanations in feedback; navigation through the game via on-screen messages, hints, or prompts; or feedback via an avatar (Arroyo, Muldner, Burleson, & Woolf, 2014; Leemkuil & de Jong, 2011; Mayer & Johnson, 2010). All of these features encourage learners to reflect upon and re-evaluate their in-game behavior and strategies.

There is significant evidence suggesting that the implementation of feedback and support is necessary to foster motivation and learning (e.g., Erhel & Jamet, 2013; Rieber, 2005; Yaman, Nerdel, & Bayrhuber, 2008). However, there is a large discussion on how to design and how to integrate feedback and support in order to support students most effectively. Rigby and Ryan (2011) found that feedback that informs about progress during gameplay is more motivating than feedback that only indicates success and failure by the number of points and rewards. The meta-analysis of Clark et al. (2016) found feedback in games especially useful for learning outcomes when it was individually adaptive. Mayer and Johnson (2010) found that integrating support via additional on-screen explanations resulted in greater transfer of the learned academic content.

However, the frequency and amount of feedback and support may determine learner motivation. The addition of frequent support may disrupt game flow and might result in a loss of perceived autonomy and control (Vrugte & de Jong, 2011). For learners with extensive prior knowledge who could succeed with little to no support, it might have a detrimental effect (Tobias, Fletcher, Dai, & Wind, 2011). Thus, support should be carefully incorporated into the environment based on student prior knowledge (Mayer, 2020). Approaches that adapt support to the individual learner by intervening only where necessary may help to avoid loss of the motivational qualities of a game-based learning approach (Janning, Schatten, & Schmidt-Thieme, 2016).

Conclusion

A game-based learning approach, including the use of serious games, is a powerful driver to motivate students rather than just providing them with information. Given the importance of motivation for learning outcomes, the use of games for education and their value for digital and distance education is currently generating much discussion.

This chapter has described theoretical foundations for the potential of games from motivational as well as affective, cognitive, and sociocultural perspectives. This highlights that games need to be understood from many interrelated views. The empirical literature, including media comparison research; cognitive, affective, motivational, and sociocultural consequence research; and value-added research, was reviewed. Based on value-added experiments that aim to identify which design features improve game-based learning and which do not, future design issues that educators should consider when choosing or developing games for learning were highlighted. Although promising, there are neither concrete design feature characteristics nor a combination of features that will always result in optimal learning under every condition.

Future research needs to determine conditions under which games are effective in order to strengthen the evidence for their positive value. For example, research that goes beyond short-term laboratory studies and actually integrates serious games and game-based learning approaches into naturalistic educational contexts (including their embedment in diverse learning activities) to study their effects over a longer time might contribute to a deeper understanding. What is more, research should be expanded to assess not only the final outcomes of learning with games.

Relatively, little attention has been paid so far to actually investigate in the development of learner-relevant factors such as motivation and affect during playing, their interplay, and their mediating role to cognitive processes. This presupposes also methods to detect changes in learner-relevant factors during learning. Emerson, Cloude, Azevedo, and Lester (2020) demonstrated that a multimodal learning analytic approach that incorporates student gameplay, eye-tracking, and facial expression data could predict student interest and performance outcomes. The possibility of continuous assessment of student behavior during gameplay without interrupting the gameplay holds significant promise for detecting suboptimal learning experiences in order to provide adaptive support on time.

References

Abt, C. C. (1987). *Serious games*. Lanham: University Press of America.

Abu-Dawood, S. (2016, July). The cognitive and social motivational affordances of gamification in e-learning environment. In M. Spector, C. C. Tsai, D. G. Sampson, R. Huang, N. S. Chen, & P. Resta (Eds.), *2016 IEEE 16th International Conference on Advanced Learning Technologies (ICALT)* (pp. 373–375). Austin: Conference Publishing Service. https://doi.org/10.1109/ICALT.2016.126.

Abuhamdeh, S., & Csikszentmihalyi, M. (2012). The importance of challenge for the enjoyment of intrinsically motivated, goal-directed activities. *Personality and Social Psychology Bulletin, 38*(3), 317–330. https://doi.org/10.1177/0146167211427147.

Arroyo, I., Muldner, K., Burleson, W., & Woolf, B. P. (2014). Adaptive interventions to address students' negative activating and deactivating emotions during learning activities. In R. Sotillare, A. Graesser, X. Hu, & B. Goldbergs (Eds.), *Design recommendations for intelligent tutoring systems* (pp. 79–92). Orlando: U.S. Army Research Laboratory.

Astleitner, H., & Wiesner, C. (2004). An integrated model of multimedia learning and motivation. *Journal of Educational Multimedia and Hypermedia, 13*(1), 3–21.

Bandura, A. (1977). *Social learning theory*. Englewood Cliffs: Prentice Hall.

Becker, K. (2021). What's the difference between gamification, serious games, educational games, and game-based learning. *Academic Letters, 209*. https://doi.org/10.20935/AL209.

Bryant, J., & Love, C. (1996). Entertainment as the driver of new information technology. In *New infotainment technologies in the home: Demand-side perspectives* (pp. 35–58). New York: Routledge.

Clark, D. B., Tanner-Smith, E. E., & Killingsworth, S. S. (2016). Digital games, design, and learning: A systematic review and meta-analysis. *Review of Educational Research, 86*(1), 79–122. https://doi.org/10.3102/0034654315582065.

Connolly, T. M., Boyle, E. A., MacArthur, E., Hainey, T., & Boyle, J. M. (2012). A systematic literature review of empirical evidence on computer games and serious games. *Computers and Education, 59*(2), 661–686. https://doi.org/10.1016/j.compedu.2012.03.004.

Crocco, F., Offenholley, K., & Hernandez, C. (2016). A proof-of-concept study of game-based learning in higher education. *Simulation and Gaming, 47*(4), 403–422. https://doi.org/10.1177/1046878116632484.

Csikszentmihalyi, M. (2008). *Flow: The psychology of optimal experience*. New York: HarperCollins.

Deci, E. L., & Ryan, R. M. (1985). Conceptualizations of intrinsic motivation and self-determination. In E. L. Deci, & R.M. Ryan (Eds.), *Intrinsic Motivation and Self-determination in Human Behavior* (pp. 11–40). Springer.

De Freitas, S., Rebolledo-Mendez, G., Liarokapis, F., Magoulas, G., & Poulovassilis, A. (2010). Learning as immersive experiences: Using the four-dimensional framework for designing and evaluating immersive learning experiences in a virtual world. *British Journal of Educational Technology, 41*(1), 69–85. https://doi.org/10.1111/j.1467-8535.2009.01024.x.

Ebner, M., & Holzinger, A. (2007). Successful implementation of user-centered game based learning in higher education: An example from civil engineering. *Computers and Education, 49*(3), 873–890.

Echeverria, A., Barrios, E., Nussbaum, M., Améstica, M., & Leclerc, S. (2012). The atomic intrinsic integration approach: A structured methodology for the design of games for the conceptual understanding of physics. *Computers and Education, 59*(2), 806–816. https://doi.org/10.1016/j.compedu.2012.03.025.

Emerson, A., Cloude, E. B., Azevedo, R., & Lester, J. (2020). Multimodal learning analytics for game-based learning. *British Journal of Educational Technology, 51*(5), 1505–1526. https://doi.org/10.1111/bjet.12992.

Erhel, S., & Jamet, E. (2013). Digital game-based learning: Impact of instructions and feedback on motivation and learning effectiveness. *Computers and Education, 67*, 156–167. https://doi.org/10.1016/j.compedu.2013.02.019.

Fassbender, E., Richards, D., Bilgin, A., Thompson, W. F., & Heiden, W. (2012). VirSchool: The effect of background music and immersive display systems on memory for facts learned in an educational virtual environment. *Computers and Education, 58*(1), 490–500. https://doi.org/10.1016/j.compedu.2011.09.002.

Garris, R., Ahlers, R., & Driskell, J. E. (2017). Games, motivation, and learning: A research and practice model. *Simulation and Gaming, 3*(4), 475–501. https://doi.org/10.1177/1046878102238607.

Gee, J. P. (2003). *What video games have to teach us about learning and literacy.* New York: Palgrave/Macmillan.

Graesser, A., Chipman, P., & Leeming, F. (2009). Deep learning and emotion in serious games. In U. Ritterfeld, M. Cody, & P. Vorderer (Eds.), *Serious games* (pp. 105–124). New York: Routledge. https://doi.org/10.4324/9780203891650.

Habgood, M. J., & Ainsworth, S. E. (2011). Motivating children to learn effectively: Exploring the value of intrinsic integration in educational games. *Journal of the Learning Sciences, 20*(2), 169–206.

Hamzah, W. M. A. F. W., Ali, N. H., Saman, M. Y. M., Yusoff, M. H., & Yacob, A. (2015). Influence of gamification on students' motivation in using e-learning applications based on the motivational design model. *International Journal of Emerging Technologies in Learning, 10*(2), 30–34.

Hefner, D., Klimmt, C., & Vorderer, P. (2007). Identification with the player character as determinant of video game enjoyment. In L. Ma, R. Nakatsu, & M. Rauterberg (Eds.), *International conference on entertainment computing* (pp. 39–48). Berlin: Springer.

Janning, R., Schatten, C., & Schmidt-Thieme, L. (2016). Perceived task-difficulty recognition from log-file information for the use in adaptive intelligent tutoring systems. *International Journal of Artificial Intelligence in Education, 26*(3), 855–876.

Ke, F., & Grabowski, B. (2007). Gameplaying for maths learning: Cooperative or not? *British Journal of Educational Technology, 38*(2), 249–259. https://doi.org/10.1111/j.1467-8535.2006.00593.x.

Keller, J. M. (1987). Motivational design and multimedia: Beyond the novelty effect. *Strategic Human Resource Development Review, 1*(1), 188–203.
Keller, J. M., & Suzuki, K. (2004). Learner motivation and E-learning design: A multinationally validated process. *Journal of Educational Media, 29*(3), 229–239.
Klimmt, C., Hartmann, T., & Frey, A. (2007). Effectance and control as determinants of video game enjoyment. *Cyberpsychology and Behavior, 10*(6), 845–848. https://doi.org/10.1089/cpb.2007.9942.
Leemkuil, H., & de Jong, T. (2011). Instructional support in games. In S. Tobias & J. D. Fletcher (Eds.), *Computer games and instruction* (pp. 353–369). Charlotte: IAP Information Age Publishing.
Leutner, D. (2014). Motivation and emotion as mediators in multimedia learning. *Learning and Instruction, 29*, 174–175.
Lipscomb, S. D., & Zehnder, S. M. (2004). Immersion in the virtual environment: The effect of a musical score on the video gaming experience. *Journal of Physiological Anthropology and Applied Human Science, 23*(6), 337–343. https://doi.org/10.2114/jpa.23.337.
Loderer, K., Pekrun, R., & Plass, J. (2020). Emotional foundations of game-based learning. In J. L. Plass, R. E. Mayer, & B. D. Homer (Eds.), *Handbook of game-based learning* (pp. 123–164). Cambridge, MA: MIT Press.
Loftus, G. R., & Loftus, E. F. (1983). Mind at play; The psychology of video games. Basic Books, Inc.
Malone, T., & Lepper, M. (1987). Making learning fun: A taxonomy of intrinsic motivations of learning. In R. E. Snow & M. J. Farr (Eds.), *Aptitude, learning, and instruction: Conative and affective process analyses* (pp. 223–253). Hillsdale: Lawrence Erlbaum.
Mayer, R. E. (2009). *Multimedia learning* (2nd ed.). New York: Cambridge University Press.
Mayer, R. E. (2014). *Computer games for learning: An evidence-based approach*. Cambridge, MA: MIT Press.
Mayer, R. E. (2020). Cognitive foundations of game-based learning. In J. L. Plass, R. E. Mayer, & B. D. Homer (Eds.), *Handbook of game-based learning* (pp. 101–122). Cambridge, MA: MIT Press.
Mayer, R. E., & Johnson, C. I. (2010). Adding instructional features that promote learning in a game-like environment. *Journal of Educational Computing Research, 42*(3), 241–265. https://doi.org/10.2190/EC.42.3.a.
Michael, D., & Chen, S. (2006). *Serious games. Games that educate, train, and inform*. Boston: Thomson.
Moreno, R., & Mayer, R. (2007). Interactive multimodal learning environments. *Educational Psychology Review, 19*(3), 309–326.
Nebel, S., Beege, M., Schneider, S., & Rey, G. D. (2020). Competitive agents and adaptive difficulty within educational video games. *Frontiers in Education, 5*, 129. https://doi.org/10.3389/feduc.2020.00129.
Pekrun, R. (2006). The control-value theory of achievement emotions: Assumptions, corollaries, and implications for educational research and practice. *Educational Psychology Review, 18*, 315–341.
Pekrun, R., & Perry, R. P. (2014). Control-value theory of achievement emotions. In R. Pekrun & L. Linnenbrink-Garcia (Eds.), *International handbook of emotions in education* (pp. 120–141). New York: Routledge.
Piaget, J. (1964). Part I: Cognitive development in children: Piaget development and learning. *Journal of Research in Science Teaching, 2*(3), 176–186.
Plass, J. L., & Kaplan, U. (2016). Emotional design in digital media for learning. In S. Tettegah & M. Gartmeier (Eds.), *Emotions, technology, design, and learning* (pp. 131–161). New York: Elsevier.
Plass, J. L., O'Keefe, P. A., Homer, B. D., Case, J., Hayward, E. O., Stein, M., & Perlin, K. (2013). The impact of individual, competitive, and collaborative mathematics game play on learning,

performance, and motivation. *Journal of Educational Psychology, 105*(4), 1050. https://doi.org/10.1037/a0032688.

Plass, J. L., Homer, B. D., & Kinzer, C. K. (2015). Foundations of game-based learning. *Educational Psychologist, 50*(4), 258–283.

Plass, J. L., Homer, B. D., Mayer, R. E., & Kinzer, C. K. (2020). Theoretical foundations of game-based learning and playful learning. In J. L. Plass, R. E. Mayer, & B. D. Homer (Eds.), *Handbook of game-based learning* (pp. 17–34). Cambridge, MA: MIT Press.

Prensky, M. (2001). *Digital game-based learning*. St. Paul: Paragon House.

Ravaja, N., Saari, T., Salminen, M., Laarni, J., & Kallinen, K. (2006). Phasic emotional reactions to video game events: A psychophysiological investigation. *Media Psychology, 8*(4), 343–367.

Rieber, L. P. (2005). Multimedia learning in games, simulations, and microworlds. In *The Cambridge handbook of multimedia learning* (pp. 549–567). New York: Cambridge University Press.

Riemer, V., & Schrader, C. (2020). Playing to learn or to win? The role of students' competition preference on self-monitoring and learning outcome when learning with a serious game. *Interactive Learning Environments, 2020*, 1–13. https://doi.org/10.1080/10494820.2020.1752741.

Rigby, S., & Ryan, R. M. (2011). *Glued to games: How video games draw us in and hold us spellbound*. Westport: Praeger/ABC-CLIO.

Ryan, R. M., & Deci, E. L. (2002). Overview of self-determination theory: An organismic-dialectical perspective. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 3–33). Rochester: University of Rochester Press.

Sailer, M., & Homner, L. (2020). The gamification of learning: A meta-analysis. *Educational Psychology Review, 32*, 77–112.

Salen, K., Tekinbaş, K. S., & Zimmerman, E. (2004). *Rules of play: Game design fundamentals*. Cambridge, MA: MIT Press.

Schneider, E. F., Lang, A., Shin, M., & Bradley, S. D. (2004). Death with a story: How story impacts emotional, motivational, and physiological responses to first-person shooter video games. *Human Communication Research, 30*(3), 361–375.

Schrader, C., & Nett, U. (2018). The perception of control as a predictor of emotional trends during gameplay. *Learning and Instruction, 54*, 62–72. https://doi.org/10.1016/j.learninstruc.2017.08.002.

Sitzmann, T. (2011). A meta-analytic examination of the instructional effectiveness of computer-based simulation games. *Personell Psychology, 64*(2), 489–528. https://doi.org/10.1111/j.1744-6570.2011.01190.x.

Squire, K. D., & Jan, M. (2007). Mad City Mystery: Developing scientific argumentation skills with a place-based augmented reality game on handheld computers. *Journal of Science Education and Technology, 16*(1), 5–29. https://doi.org/10.1007/s10956-006-9037-z.

Sweller, J., Ayres, P., & Kalyuga, S. (2011). *Cognitive load theory*. New York: Springer. https://doi.org/10.1007/978-1-4419-8126-4_5.

Tobias, S., Fletcher, J. D., Dai, D. Y., & Wind, A. P. (2011). Review of research on computer games. In S. Tobias & J. D. Fletcher (Eds.), *Computer games and instruction* (pp. 127–221). Charlotte: IAP Information Age Publishing.

Um, E., Plass, J. L., Hayward, E. O., & Homer, B. D. (2012). Emotional design in multimedia learning. *Journal of Educational Psychology, 104*(2), 485–498. https://doi.org/10.1037/a0026609.

Vandercruysse, S., Vandewaetere, M., Cornillie, F., & Clarebout, G. (2013). Competition and students' perceptions in a game-based language learning environment. *Educational Technology Research and Development, 61*(6), 927–950.

Vrugte, J., & de Jong, T. (2011, October). How to adapt games for learning: The potential role of instructional support. In S. De Wannemacker, S. Vandercruysse, & G. Clarebout G. (Eds.), *Serious games: The challenge. ITEC/CIP/T 2011. Communications in Computer and Information Science* (pp. 1–5). Berlin/Heidelberg: Springer. https://doi.org/10.1007/978-3-642-33814-4_1.

Vygotsky, L. S. (1978). Socio-cultural theory. *Mind in Society, 6*, 52–58.

Wouters, P., Van Nimwegen, C., Van Oostendorp, H., & Van Der Spek, E. D. (2013). A meta-analysis of the cognitive and motivational effects of serious games. *Journal of Educational Psychology, 105*(2), 249–256. https://doi.org/10.1037/a0031311.

Yaman, M., Nerdel, C., & Bayrhuber, H. (2008). The effects of instructional support and learner interests when learning using computer simulations. *Computers and Education, 51*(4), 1784–1794. https://doi.org/10.1016/j.compedu.2008.05.009.

73 Designing Online Learning Environments to Support Problem-Based Learning

Xun Ge and Kun Huang

Contents

Abstract

Problem-based learning (PBL) represents an instructional approach through which learning is gained by investigating, negotiating, and resolving meaningful problems. PBL can be challenging to implement, and the online learning ecology adds another layer of challenges as it demands effective interactions between pedagogy and technology. To inform the design of online learning environments to support PBL, this chapter presents a practical pedagogical framework to support four key aspects of PBL implementation: (1) preparation and planning, (2) design and development, (3) implementation and facilitation, and (4) assessment. Strategies, tools, and examples were drawn from the literature to address each aspect.

X. Ge (✉)
Department of Educational Psychology, The University of Oklahoma, Norman, OK, USA
e-mail: xge@ou.edu

K. Huang
The University of Kentucky, Lexington, KY, USA
e-mail: k.huang@uky.edu

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_76

Keywords

Problem-based learning · PBL · Online learning · Inquiry learning · Distance education · Hybrid education · Instructional design

Introduction

Problem-based learning (PBL) has been widely acclaimed as a powerful pedagogical approach to develop learners' twenty-first century skills such as real-world problem-solving, reflective thinking, and self-directed learning (Kek & Huijser, 2017). Research over the past two decades has documented effective strategies, tools, and resources to support PBL. However, most research on PBL has focused on the in-person context, and there has been scant research about designing and facilitating PBL in the online learning environment. With a global trend of moving learning and instruction online, particularly after the COVID-19 pandemic, there has been an increasing demand for a pedagogical framework to guide the design and facilitation of online PBL, which can take an asynchronous, synchronous, or blended format.

PBL educators often encounter challenges in various aspects of PBL in the classroom context, and adapting PBL to an online learning environment presents further challenges to educators. On the other hand, online or hybrid learning environments have the advantage of integrating emerging technologies as cognitive tools (Lajoie, 2000) to scaffold learners' PBL experiences. While pedagogical principles should remain the focus in designing online PBL (Brush & Saye, 2017), Uden and Beaumont (2006) argued that the characteristics of PBL make it a particularly suitable environment in which to blend technology, thus affording the possibility to integrate pedagogy and technology seamlessly to the best effect (Savin-Baden, 2006).

The purpose of this chapter is to present a pedagogical framework based on a synthesis of the literature to help online PBL designers and educators in their practice. We start by introducing the essentials that characterize PBL, followed by a discussion of four key aspects in conducting online PBL: preparation and planning, design and development, implementation and facilitation, and assessments.

The PBL Essentials

PBL was first created as a pedagogical approach in the 1960s to address the disconnection between theories and clinical applications in the medical education curriculum. From the perspective of cognitive psychology, PBL creates conditions to facilitate the processing of new information and retrieval of information from long-term memory (Schmidt, 1983). While working in small groups on a problem, students need to analyze the situation and provide an explanation to the symptoms or phenomena that underlie the causes of the problem. They collect additional information and formulate learning objectives in order to define the problem. The analysis of the problem calls for a careful examination of the known information, activation of prior knowledge, and development of initial hypotheses. The groups of students will then come up with learning objectives, prioritize tasks, identify relevant resources, and collect information that will help them achieve the learning objectives. As a result, the PBL activities and processes help learners to analyze clinical cases, synthesizing and testing the newly acquired information.

From a sociocultural perspective, PBL is highly contextualized and situated problem-solving. Learners are engaged in the professional activities that enable students to identify with the professionals (Lave & Wenger, 1991). Through community-based learning, students learn not only from peers but also from experts who model their thinking that is made visible to the students and scaffold student learning. The students' learning activities are enculturated in the professional activities, which motivates their learning and makes learning more meaningful to them. In the process of developing their knowledge and identity, students develop self-directed learning skills, communication, and collaboration competence while the instructors serve as tutors or experts to provide facilitation as learners work independently and collaborate with other group members.

A wealth of literature (e.g., Barrows, 1994; Hmelo-Silver, 2004; Norman & Schmidt, 1992) suggests five essentials that characterize PBL: (1) *authentic and complex problems* allow students to simulate real-world reasoning and problem-solving experiences, which affords a learning context that activates students' prior knowledge; (2) learners engage in *information seeking and inquiry* to analyze problems, acquire new information, generate solutions, and develop new understandings; (3) through *communication and collaboration,* learners work together to brainstorm causes of problems, share new information, present multiple perspectives, and negotiate solutions; (4) learners apply and further develop *self-directed learning (SDL)* to identity and bridge their knowledge gaps both within the PBL context and beyond in lifelong learning; and (5) learners take advantage of the skillful *tutoring and facilitation* provided by PBL tutors or computer systems to guide their problem-solving process through modeling, scaffolding, feedback, and gradual withdrawal of support as their competence grows.

A Pedagogical Framework for Online PBL Design

Guided by the PBL essentials, we present a pedagogical framework in this section to support online PBL focusing on four key aspects: (1) preparation and planning, (2) design and development, (3) implementation and facilitation, and (4) assessment. For each aspect, we draw from the literature specific strategies, learning activities, digital tools, and online resources for optimizing the learning experience.

Preparation and Planning

Planning is particularly important for online PBL that integrates PBL and online instruction in one learning experience (Savin-Baden, 2007). The literature suggests four planning considerations. The first consideration is the *scope*: Is the online PBL intended for part of a course, an entire course, or a program? Does it involve a single or multiple instructors (Grant & Glazewski, 2017)? A one-time implementation within a course may require less time and effort, but as the scope increases, more time and efforts are necessary for planning. Since program-level PBL involves comprehensive curriculum planning, we choose not to focus on it in this chapter. On the other hand, we suggest that online PBL should build on the experience gained from previous in-person PBL implementations.

With a determined scope, an important next consideration is the *learning goals* – that is, what learners are expected to achieve from the online PBL. The formulation of learning goals is no different between online and in-person PBL. As such, readers are referred to Savin-Baden (2007) for a discussion of PBL learning goals. Of particular note is that learning goals should take into account the context where learners will act as members of a community of practice (Lave & Wenger, 1991) and aim for developing learners' strategic and metacognitive knowledge, which would contribute to SDL and lifelong learning (Brush & Saye, 2017).

Another important consideration is the *delivery format* of the online PBL. Will it be completely online or blending some in-person components, and will it be mostly synchronous, asynchronous, or blended? Blended can be blending of online and in-person learning, or blending of synchronous and asynchronous online learning, namely, bichronous online learning according Martin (2021). Some PBL programs are carried out completely online in a synchronous format. For example, an international online PBL enabled medical students from Canada and Hong Kong to work together synchronously (Lajoie et al., 2014). The COVID-19 pandemic also forced many in-person PBL into online synchronous sessions (Coiado, Yodh, Galvez, & Ahmad, 2020; Murata, Moss, Wright, & Pardi, 2021).

Other PBL programs are asynchronous, where the instructor and students do not participate concurrently. For example, the aforementioned international online PBL was later changed to the asynchronous format to address the challenge of meeting synchronously from different time zones (Lajoie et al., 2020). In many asynchronous online courses, PBL is often conducted asynchronously as part of a course (e.g., Huang, Ge, & Law, 2017).

Still, other PBL programs blend online sessions with in-person meetings. For example, in a dental education online PBL program in Saudi Arabia, students met on the first day to clarify terms, identify the problems to work on, and formulate learning objectives, followed by online asynchronous discussions to share, debate, refine, and reach common understandings. After the asynchronous online phase, students had another in-person meeting to synthesize and wrap up their learning (Saqr, Nouri, Vartiainen, & Malmberg, 2020).

While different programs choose different delivery formats out of their needs, contexts, and constraints, it appears that a blended approach has the potential to harness the benefits of different formats: in-person or synchronous meetings can help students and the facilitator to know each other, promoting a sense of social presence (Garrison, 2007; Lajoie et al., 2020), while the asynchronous modality affords in-depth and thoughtful interactions, permanently accessible discussion records, and the possibility to ensure that all students respond to a given topic (Lajoie et al., 2020).

Lastly, another important planning consideration is *technology readiness*. When it comes to the adoption of technology for online PBL, it is critical that technology should serve pedagogical purposes (Uden & Beaumont, 2006). Many educational institutions now use a learning management system (LMS) for online education, and online PBL often makes use of the same platform with its suite of tools. In other cases, some PBL programs adopt technology to support specific learning activities. For example, online conferencing tools such as *Zoom* and *Skype* are particularly helpful for synchronous online PBL (Savin-Baden & Bhakta, 2019). Some programs conduct online PBL in immersive virtual worlds such as *Second Life* or *Terf* (Araújo, 2019). Of particular note is Maastricht University's experiment with a MOOC PBL (Verstegen et al., 2019). There are also tools developed specifically for PBL such as *STEP* for case-based teacher education (Derry, Siegel, Stampen,, & the STEP team., 2002) and *Compsoft* for PBL in medical education (Kaufman, Ireland, & Sauvé, 2009). Regardless of the tools adopted, the planning should ensure that both instructors and students have adequate access and support for using the tools.

In addition to access to technology, a consistent challenge in online PBL is the instructor's use of technology, especially sophisticated tools such as simulations (Brown, Lawless, & Boyer, 2015). Instructors should be well versed in not only the tools per se but also supporting students' use of the tools in their PBL inquiry. Sufficient time, training, and resources should be allocated to prepare instructors' technology readiness (Savin-Baden & Bhakta, 2019).

Design and Development

Following the preparation and planning, the design and development phase plays a key pedagogical role in online PBL. This phase involves, in a sense, another level of planning, which is the design and development of the problem, learning resources, and inquiry activities *before* the start of online PBL. Throughout this phase, technology continuously plays a critical role in supporting and augmenting pedagogical decisions.

The problem. Online PBL similarly to traditional PBL holds the problem as the linchpin that drives, structures, and inspires learning (Barrows, 1994; Hung, 2019). Guidelines for designing the problem in traditional PBL apply equally to the online counterpart. Readers are referred to the 3C3R framework (Hung, 2019) for designing effective problems that offer sufficient content coverage, support the development of problem-solving skills, and maintain learner motivation. Of particular note is 3C3R's emphasis on affective factors, problem difficulty, and teamwork functions in problem design. For instance, instilling different roles in a problem is likely to promote teamwork (Hung, 2019). As an example, in Brown et al.'s (2015) web-based PBL, middle-school students acted as science advisors representing different countries to negotiate issues and develop policies related to science-based global concerns.

The online modality of PBL offers unique advantages for the design and presentation of the problem. The availability of different media types can offer rich contexts to enhance the authenticity of a problem. On the "low-tech" end, a slideshow that presents a patient case can incorporate photographs, patient diaries, and journal entries to depict rich narratives about the case (Bizzocchi & Schelle, 2009; Chen, 2016). At a more advanced level, Derry et al. (2002) used classroom video cases to present problems to preservice teachers.

Compared with texts, video problems have a few advantages: they offer nonverbal cues which, in medical education, can help learners develop more personalized perceptions of real patients and their problems (Bizzocchi & Schelle, 2009); video cases also contribute to a higher level of problem exploration activities in situated contexts (Chan, Lu, Ip, & Yip, 2012). At an even more advanced level, problem scenarios in virtual worlds such as *Second Life* offer immersive experiences that allow learners to manipulate and interact (Savin-Baden & Bhakta, 2019).

In designing problems for online PBL, one often does not have to start from scratch. Online databases such as *PBL Clearinghouse* and *National Center for Case Study Teaching in Science* can be good places to start. In developing video problems based on written cases, Bizzocchi and Schelle (2009) suggested the consideration of several narrative components: language, audience, point of view, time frame, crisis point, dialog, and character development. While video problems can be powerful, the quality of a video can affect its effectiveness, and PBL educators are recommended to collaborate with learning technologists to produce videos (Bizzocchi & Schelle, 2009; Savin-Baden & Bhakta, 2019).

Learning resources. Along with the problem, resources are also essential in the design and development phase of online PBL. We refer to resources as any information, data, or tools that learners will use to explore the subject matter of the problem. Online PBL makes it convenient to provide or access online resources. The resources can be adopted, adapted, or created by the instructor, ranging from assigned readings, mini-lectures, websites, databases, simulations, invited speakers, or other tools. For example, Saye and Brush (2017) provided more than 1,000 multimedia artifacts to secondary students' historical inquiry PBL.

In STEM education, computer-based modeling and simulations such as *Excel, NetLogo*, and *Python* serve as unique resources for learners to explore and test their hypotheses (Morge, Narayan, & Tagliarini, 2019). Organization of learning resources is particularly important for online PBL, especially when a large volume of resources is provided. In the case of Saye and Brush (2017), more than 1,000 multimedia resources were organized into a chronological and conceptual architecture to facilitate students' exploration. Appropriate scope is also necessary for resources to avoid being too overwhelming to students (Saye & Brush, 2017). In addition to instructor-provided resources, learners can also make use of the vast resources online to locate information pertaining to the problem.

Inquiry activities. Another important consideration is the design of inquiry activities for online PBL. Saye and Brush (2002) distinguished hard and soft scaffolds to support learning. While soft scaffolds offer dynamic and situation-specific support, hard scaffolds provide static support that can be anticipated and preplanned.

In the PBL context, hard scaffolds are preplanned activities and assignments. Savin-Baden (2007) used a table to illustrate the systematic planning of inquiry activities: the rows represented activities at different stages, while the columns specified details of each activity including necessary time, corresponding learning intentions, locations, and available resources. For online PBL, the design of learning activities cannot be separated from consideration of the *location*, or the online space where an activity takes place.

The selection of the location should take into account not only the nature of a PBL activity but also necessary group communication and collaboration in carrying out the activity. Ryberg (2019) classified four types of PBL-related activities: inquiry and exploration, resource management, dialogue and communication, and production. The locations and associated cognitive tools for each type can be planned in advance. *Inquiry and exploration* of the problem space can take place in a database provided by the instructor or in library databases, search engines, or even academic social networking sites, such as *Twitter* or *ResearchGate*. *Resource management* can take place on note-taking platforms, such as *Evernote*, social bookmarking sites such as *Diigo*, bibliographic reference managers such as *Zotero*, file sharing services, such as *Google Drive*. For multimedia resource management in particular, annotation tools and embedded notebooks can be helpful for interpretation and analysis (Lajoie et al., 2020; Saye & Brush, 2017). The third type, *dialogue and communication*, can take place synchronously via audio conferencing, online chat, or interactive whiteboard, or asynchronously on discussion boards, social media channels, or mobile apps, which were found to promote reflective thinking, information sharing, and social knowledge construction (Lan, Tsai, Yang, & Hung, 2012). The last type, *production activities* such as sharing and collaborating, can take place on collaborative writing sites such as *Google Docs* and wikis.

In online PBL, predesigned activities and assignments, which serve as hard scaffolds, often appear to students in the form of guidelines. These guidelines are particularly important for asynchronous online PBL because an "adjust as you go" approach would not work well (Caroni & Nikoulina, 2021). The guidelines organize the complex PBL process into different stages, which become the vehicle leading students to the creation of problem solutions (Childs, van Oostveen, Flynn, & Clarkson, 2015). The stages can be organized by cognitive processes of problem-solving (e.g., problem representation and solution generation, Ge, Law, & Huang, 2016) or activity phases (e.g., research, interaction, and debriefing, Brown et al., 2015).

In designing the guidelines, it is important that directions, deliverables, and expectations are clearly outlined and communicated to students (Caroni & Nikoulina, 2021; Huang, Lee, & Dugan, 2017). The guidelines should offer a tailored yet flexible structure (An & Reigeluth, 2008). Further, appropriate scaffolds should be provided to help students produce deliverables, especially targeting student weaknesses. For example, noticing that students often did not attend to competing narratives in historical inquiries, Saye and Brush (2017) designed an argumentation storyboard to intentionally scaffold students' presentations. Ge and

Land (2003) used a template with guiding questions to support students' problem representation and solution formulation.

Implementation and Facilitation

With the completion of planning, design, and development, students are ready to participate in online PBL. Similar to the design phase, the implementation and facilitation phase plays an important pedagogical role. This phase, on the other hand, is challenging due to its fluid and interactive nature. Key aspects in this phase include student readiness and instructor facilitation.

Student readiness. One cannot assume that students are ready to participate in PBL at the beginning. The success of online PBL hinges on students' readiness in at least three areas: the PBL pedagogy, the online platform and tools, and group formation. Online PBL is often implemented in one course or as part of a course while the rest of learning is more lecture-based (Savin-Baden & Bhakta, 2019). To prepare students for PBL, students should be clearly told their roles and expected quantity and quality of contributions (Valaitis, Sword, Jones, & Hodges, 2005). Further, students are often unfamiliar with the online platform and related technologies. They prefer an orientation that introduces only the essentials (Chen, 2016).

Lastly, students need to form small groups. Web-based sticky notes, such as *Linoit*, can facilitate online group formation. Students can share their background and interests on a sticky note and post it near peers' notes similar to theirs. The instructor can then finalize the group formation based on student input (Huang, Lee, & Dugan, 2017). In online PBL, smaller group sizes were found to positively correlate with student performance (Saqr, Fors, & Nouri, 2018). Once groups are formed, an informal in-person meeting or online icebreaker activity can help students to know each other while establishing common understandings of their roles and rules for group communication and collaboration (de Jong, Krumeich, & Verstegen, 2017; Verstegen et al., 2019).

Instructor facilitation. After students have been working on PBL tasks over a period of time, ranging from one to several class sessions or weeks, the predesigned hard scaffolds (guidelines for inquiry activities and assignments) can be offered to guide students through the key problem-solving stages. Meanwhile, the instructor's key role at this stage is to provide soft scaffolds throughout the stages of inquiry, both synchronously and asynchronously. The facilitation focuses on three intertwining aspects: (1) collaboration and communication among students, (2) the problem-solving process, and (3) the social-emotional aspect.

Facilitation of collaboration and communication. The facilitation can be different between synchronous and asynchronous PBL. In synchronous sessions, structure and clarity are important in maximizing efficiency, helping students to focus on PBL tasks, and avoiding unnecessary cognitive demand. Students should be asked to review the problem before a session begins (Savin-Baden, 2007). During the session, the instructor should manage the time by being explicit about the stages in the session, the current stage, allocated time, and goals for each stage (Chen, 2016).

Sufficient time should be allocated to the research stage to allow for adequate information retrieval and critical appraisal of information (Chen, 2016). Ground rules and etiquettes should be clearly established for communication and discussion (e.g., students should take turns to speak to avoid multiple individuals speaking at once, de Jong et al., 2017; Nagge, Killeen, & Jennings, 2018). In communicating directions and expectations to students, the instructor should be clear and specific to overcome any ambiguity or misunderstanding (de Jong et al., 2017).

In addition to structure and clarity, instructors should also be aware of various issues or patterns typically found in synchronous communications: There can be audio delays (Chen, 2016); students are comfortable with longer periods of silence (Nagge et al., 2018); there tends to be fewer side conversations; quieter students may participate more (Chen, 2016); students are less aggressive and show more mutual respect compared with in-face sessions (Lajoie et al., 2014); the pace can be slower to allow people to speak; slow typing may affect synchronous chat (Valaitis et al., 2005); and students tend to be distracted with increased screen time (Coiado et al., 2020).

The instructor should also model and encourage students to take advantage of different synchronous communication and collaboration tools. In addition to audio conversations, text chat affords thoughtful comments or questions, digital white-board enables students to visualize and share their thinking (Chen, 2016), file sharing tools allow students to share useful resources, and collaborative writing tools help groups to document progress and record ideas. In fact, tutors found that students' use of online file sharing and collaborative notes contributed to smoother synchronous sessions that required fewer interventions (Ng, Bridges, Law, & Whitehill, 2013).

A variety of strategies and tools can help engage students and facilitate collaboration in synchronous PBL. Students can be assigned to breakout rooms to meet in small groups and engage in critical thoughts around class topics (Chen, 2016). Online polling keeps students actively engaged while seeing how others approach the same questions. Private chat allows the instructor to provide immediate feedback regarding participation, roles, performance, and behaviors (Coiado et al., 2020).

To improve collaboration, An and Reigeluth (2008) suggested that the instructor should help groups divide tasks properly for members to collaborate rather than mostly working on their own parts. *Google Docs* or other collaborative task management tools can document each member's charges and timeline for completion. Role assignment is another strategy to engage students in synchronous sessions. For example, Coiado et al. (2020) required students to rotate eight different roles: leader, innovator, searcher, scribe, reader, synthesizer, inquisitor, and AV-tech. A unique challenge for PBL instructors in synchronous sessions is the additional tasks of offering technology support to students while attending to multiple communication channels such as text chat or whiteboard (Chen, 2016; Ng et al., 2013). A support person would be very helpful in monitoring communications and pointing the instructor to issues that need attention (Lajoie et al., 2014).

For asynchronous sessions, the facilitation of communication and collaboration shares many similarities to the synchronous format. It is equally important to communicate expectations clearly to students. Take asynchronous online discussions, for example – the instructor should make clear the requirements of the discussion and specify student contributions in terms of quantity, timing, and expectations. On the other hand, asynchronous sessions are more paced, which offers more time and space for instructor's management and intervention. Further, the variety of collaboration tools (e.g., blogs, wikis, chats, group emails, tasks, and discussions) makes students' thinking visible to the instructor (Ertmer & Glazewski, 2019). It should be noted that the instructor does not have to participate in all discussions. Instead, facilitation is achieved through accessing ongoing discussions and intervening as needed (Savin-Baden & Bhakta, 2019).

Facilitation of the problem-solving process. In addition to facilitating communication and collaboration, instructors should focus on facilitating students' problem-solving process to help them engage with the disciplinary knowledge and the self-regulative processes of problem-solving. The preplanned hard scaffolds offer a level of support but are not sufficient. Appropriate soft scaffolds are necessary to offer flexible guidance and support at different PBL stages. Instructors should maintain a balance between being overly silent and overly directive (Savin-Baden, 2006). Three areas of facilitation are necessary: the problem-solving stages, deep learning and engagement, and metacognition and self-directed learning.

Ge et al. (2016) stipulated that problem-solving involves two iterative stages: problem representation and solution generation. Naive problem solvers often spend little time on problem representation or lack necessary iterations between the two stages (Huang, Lee, & Dugan, 2017). To ensure that students develop adequate problem representations, mindmap tools can help students illustrate their understanding of the problem, which can provide the instructor a clear knowledge about students' problem-space coverage (Imafuku, Kataoka, Mayahara, Suzuki, & Saiki, 2014). The instructor can also prepare a set of questions to prompt students to consider what is known and unknown and what information they need to seek further.

To encourage meaningful iterations between the two problem-solving stages, the instructor can prompt students to critically examine their emerging solutions to determine if further revisions or iterations are necessary. Synchronous online sessions can dedicate a time period for students to consider the prompts. In asynchronous PBL, these considerations can be facilitated with an online discussion board. In either case, as students record their ideas and reasoning with digital tools, the instructor is afforded a "window" to observe their problem-solving process and intervene as necessary. Such facilitated discussions could lead to greater and deeper problem space coverage than non-facilitated ones (Ertmer & Koehler, 2015).

In addition to facilitating students through problem-solving stages, the second aspect of facilitating the problem-solving process is to promote students' deep engagement in the process. In both synchronous and asynchronous PBL, students often go through the motions while not developing a deep understanding (Erickson, Neilson, O'Halloran, Bruce, & McLaughlin, 2021; Hmelo-Silver, Bridges, &

McKeown, 2019). Their inquiries often stay at the exploration stage while not reaching the resolution level (Garrison, 2007).

In game- or simulation-based PBL, measures must be taken to prevent PBL from becoming a mere game without any educational dimension (Brown et al., 2015). To promote deep engagement in online discussions, Lan et al. (2012) emphasized justifications in their guidelines for students: "(1) finding learning resources, (2) making logical inferences, (3) offering opinions with reasons, (4) comparing and evaluating evidences, (5) asking relevant questions and seeking answers, (6) making criteria-based judgments, (7) making evidence-based decisions, and (8) reflexivity" (p.1125). Jolly, Brodie, and Jolly's (2011) analysis of tutor interactions in PBL identified desirable tutor patterns that promote deep engagement (pointing out problems, questioning, confirmation, prompting learning behaviors), as well undesirable patterns (prompting students to include certain content in their work, directly giving content to students). Readers are referred to Kanuka, Rourke, and Laflamme (2007) and Gilbert and Dabbagh (2005) for more strategies to promote quality online discussions.

The third and final aspect of facilitating the problem-solving process is the facilitation of students' development of SDL and metacognitive skills. When students feel overwhelmed by a vast amount of online information, it is necessary to support their information seeking. Providing guiding questions and helping to clarify the goal of inquiry can help students focus on their information search, identify relevant information, and evaluate and integrate different sources of information as a group (Jeong & Hmelo-Silver, 2010). Problem-solving requires the self-regulative processes of planning, execution, and reflection, but students often lack skills in planning and reflection (Ge et al., 2016). The instructor should explicitly emphasize planning and reflection through planning worksheets and reflective prompts. Well-guided debriefing activities, such as sharing group solutions online and private reflective writing, can help to promote reflection, metacognition, and transfer after the conclusion of a PBL (An & Reigeluth, 2008; Brown et al., 2015; Lajoie et al., 2020).

Facilitation of social, emotional, and motivational aspects of PBL. While the cognitive and metacognitive aspects of PBL have been extensively studied, the social, emotional, and motivational aspects have received much less attention, especially in online PBL. Students may be disinterested in the PBL topic, perceive little value in the PBL approach, not feel competent in performing PBL tasks, or feel overwhelmed by the uncertainties in PBL inquiries. The online setting presents additional challenges, such as a lack of peer response (Valaitis et al., 2005) and difficulties in rapport building (Erickson et al., 2021). Instructors also find it hard to establish a social presence in online PBL (Fonteijn, 2015).

While the literature offers few suggestions for online PBL, online networking sessions, weekly hangouts with the instructor, or the use of emoticons can help to build social presence in online PBL (Verstegen et al., 2019). The instructor should maintain a continuous and active presence for both cognitive and emotional benefits of students. While not intended for online PBL, readers are referred to Belland, Kim, and Hannafin (2013) and Ge and Chua (2019) for strategies such as helping students establish perceived task value and promoting mastery learning goals.

Assessment

Assessments are an integral part of PBL and have been discussed extensively in the research literature. Assessments should align with PBL learning intentions and can be done individually or by groups, based on products, processes, or a combination of multiple artifacts (Grant & Glazewski, 2017). Assessments for online PBL can take a variety of formats, such as team presentations, essays, portfolios, or peer assessment (Savin-Baden, 2007). This chapter does not intend to give an exhaustive account of assessments in online PBL, but instead focuses on two aspects, namely process-oriented assessment and analytics-supported assessment.

Process-oriented assessment. In online PBL, students' problem-solving processes are recorded in different digital media (e.g., synchronous meeting videos, online discussions, group blogs and wikis, whiteboards, chats). Thus, the instructor should take advantage of the rich online records to incorporate the PBL processes in the assessment (Childs et al., 2015). The instructor can "prime" the PBL process by assigning a considerable portion of the grade to the problem-solving and learning process (An & Reigeluth, 2008), and by emphasizing desirable process performance in the assessment criteria. For example, in a rubric assessing case discussions, Murata et al. (2021) emphasized such qualities as evaluating evidence, organizing and prioritizing hypotheses, and making logical inferences.

Analytics-supported assessments. This type of assessment has received much attention in recent years. Through mining and analysis of analytics data generated in PBL, a variety of processes can be formatively assessed to inform instructor facilitation. Lajoie et al. (2020) described an example platform, *HOWARD*, which was intended to scale up costly small-group PBL tutoring to be able to monitor and scaffold multiple PBL groups asynchronously. The system can analyze discussion boards and interactive whiteboards and generate visual indicators of students' participation in group discussions, progress on tasks, group cohesion, and interaction patterns. Based on the visual displays, the instructor can recognize when group interactions go awry and facilitate accordingly. Similarly, Saqr et al. (2020) used social network analysis to examine the relationship between students' interaction variables and PBL performance, which can inform analytics-supported formative assessments and facilitation.

By now we have presented a pedagogical framework focusing on four key areas based on a critical and thorough literature review. The framework has been discussed with specific details focusing on the strategies and rationales for planning, designing, developing, implementing, facilitating, and assessing online PBL. For the convenience of processing and retrieving the information represented by the framework, the pedagogical framework is summarized and displayed in Table 1.

Table 1 A pedagogical framework for online PBL environments

Key aspects	Areas of consideration	Suggestions
Preparation and planning	Scope	Consider the scope (module/course/program; single/multiple instructors)
	Learning goals	Consider professional context Aim for developing SDL
	Delivery format	Adopt in-person and synchronous formats to promote social presence Use asynchronous online format for thoughtful interactions and permanently accessible records Use blended format to harness the benefits of both in-person and asynchronous formats
	Technology readiness	Ensure access to all technology for PBL pedagogy Ensure instructor readiness for pedagogical use of technology
Design and development	The problem	Present with low or advanced technology Use videos to depict nonverbal cues and complexity of situations to promote problem exploration Adapt from existing resources
	Learning resources	Adopt, adapt, created by instructor, or identified by learners Keep resources organized Avoid too big a scope
	Inquiry activities	Delineate stages of inquiry and plan specifics for each stage Select online "locations" for each inquiry stage based on types of inquiry activities Predesigned activity guidelines serve as hard scaffolds Provide clear guidelines c(directions, deliverables, and expectations) and address known student weaknesses
Implementation and facilitation	Student readiness	Communicate student roles and expectations Orient learners to online platform and technology with only the essentials Take advantage of online tools to form and prepare groups
	Instructor facilitation	Facilitate collaboration and communication: Communicate with structure and clarity Model and encourage the use of tools for communication and collaboration Prepare for unique communication patterns and use a support person in synchronous sessions Monitor student interactions in asynchronous PBL; intervene as needed Facilitate problem-solving process: Use dedicated time/location in synchronous/asynchronous PBL to facilitate each problem-solving stage

(continued)

Table 1 (continued)

Key aspects	Areas of consideration	Suggestions
		Emphasize justifications; employ strategies to promote deep learning and engagement Support information seeking; use well-guided debriefing to facilitate SDL Facilitate social, emotional, and motivational aspects Use online networking sessions, weekly hangouts, and emoticons Maintain a continuous and active presence
Assessment	Process-oriented assessment	Take advantage of rich online records to examine PBL processes Assign a considerable portion of grades to problem-solving and learning processes
	Analytics-supported assessment	Use mining and analysis of analytic data to generate visual performance indicators Use formative assessment to inform instructor facilitation

Conclusion

Through this chapter, we have shared examples, strategies, rationales, and considerations for designing online PBL environments. Although online PBL shares many similarities with in-person PBL, it has its unique challenges. The existing literature helps us to put together a pedagogical framework for designing online PBL environments. Despite the limited empirical findings to test this framework, this chapter offers helpful and practical guidelines to design and facilitate various aspects of online PBL.

This chapter is intended to lead to a productive discussion and empirical research to refine the pedagogical framework. There are many research questions to be empirically investigated using various research methods. Priorities should be placed on testing the validity of the framework by using practical research methods, such as design-based research. Research is also needed for examining each of the PBL phases indicated in the framework; for example, comparing different delivery modes for different scope, goals, and PBL activities, examining the effects of students' or instructor's technology readiness on students' online PBL experiences, investigating effects of various facilitation strategies in online PBL. In addition, we can also use social network analysis to examine the relationship between students' interaction variables and PBL performance.

At the conclusion of the chapter, we offer a few suggestions that are not unique to online PBL but general to online learning. Because multimedia is an essential part of online PBL, their successful use for PBL learning purposes depends on the effective management of learners' cognitive load. Multimedia learning principles should be followed in the design, development, and use of multimedia in online PBL (Chen, 2016; Mayer, 2014). Further, best practices for online learning apply equally to online PBL. The navigation, structure, and organization of the PBL resource site should be easy for learners to navigate and locate content and materials. This is especially important when an online PBL adopts an asynchronous format.

Cross-References

- ▶ Artificial Intelligence in Education and Ethics
- ▶ Asynchronous Tools for Interaction and Collaboration
- ▶ Designing Online Learning Communities
- ▶ Designing Online Learning in Higher Education
- ▶ Learning Analytics in Open, Distance, and Digital Education (ODDE)
- ▶ Motivation to Learn in Open, Distance, and Digital Education
- ▶ Online Infrastructures for Open Educational Resources
- ▶ Student Engagement in Open, Distance, and Digital Education
- ▶ Synchronous Tools for Interaction and Collaboration
- ▶ The Role of the Online Instructor
- ▶ Theories of Motivation and Empowerment in Open, Distance, and Digital Education
- ▶ Using Social Media in Open, Distance, and Digital Education

References

An, Y., & Reigeluth, C. M. (2008). Problem-based learning in online environments. *Quarterly Review of Distance Education, 9*(1), 1–16.

Araújo, U. F. (2019). 3D immersive platforms and problem-based learning projects: A search for quality in education. In W. Hung, M. Moallem, & N. Dabbagh (Eds.), *The Wiley handbook of problem-based learning* (pp. 575–592). Hoboken, NJ: Wiley.

Barrows, H. S. (1994). *Problem-based learning applied to medical education*. Springfield, IL: Southern Illinois University Press.

Belland, B. R., Kim, C., & Hannafin, M. J. (2013). A framework for designing scaffolds that improve motivation and cognition. *Educational Psychologist, 48*, 243–270.

Bizzocchi, J. S. M., & Schelle, R. M. A. (2009). Rich-narrative case study for online PBL in medical education. *Academic Medicine, 84*, 1412–1418.

Brown, S. W., Lawless, K. A., & Boyer, M. A. (2015). The GlobalEd 2 simulations: Promoting positive academic dispositions in middle school students in a web-based PBL environment. In A. Walker, H. Leary, C. E. Hmelo-Silver, & P. A. Ertmer (Eds.), *Essential readings in problem-based learning* (pp. 147–160). West Lafayette, IN: Purdue University Press.

Brush, T., & Saye, J. W. (Eds.). (2017). *Successfully implementing problem-based learning in classrooms: Research in K-12 and teacher education*. West Lafayette, IN: Purdue University Press.

Caroni, A., & Nikoulina, A. (2021). Problem-based learning in online settings during Covid-19. *International Journal of Management, Knowledge and Learning, 10*, 21–30.

Chan, L. K., Lu, J., Ip, M. S. M., & Yip, A. L. M. (2012). Effects of video triggers on the PBL process. In S. Bridges, C. McGrath, & T. L. Whitehill (Eds.), *Problem-based learning in clinical education. The next generation* (pp. 139–150). New York, NY: Springer.

Chen, R. (2016). Learner perspectives of online problem-based learning and applications from cognitive load theory. *Psychology Learning & Teaching, 15*, 195–203.
Childs, E., van Oostveen, R., Flynn, K., & Clarkson, J. (2015). Community building in online PBL courses: Instigating criticality. In *A full paper presentation for the Higher Education in Transformation Symposium*. Dublin, Ireland.
Coiado, O. C., Yodh, J., Galvez, R., & Ahmad, K. (2020). How Covid-19 transformed problem-based learning at Carle Illinois College of Medicine. *Medical Science Education, 30*, 1353–1354.
de Jong, N., Krumeich, J. S., & Verstegen, D. M. L. (2017). To what extent can PBL principles be applied in blended learning: Lessons learned from health master programs. *Medical Teacher, 39*, 203–211.
Derry, S. J., Siegel, M., Stampen, J., & the STEP team. (2002). The STEP system for collaborative case-based teacher education: Design, evaluation, and future directions. In G. Stahl (Ed.), *Proceedings of CSCL 2002* (pp. 209–216). Hillsdale, NJ: Erlbaum.
Erickson, S., Neilson, C., O'Halloran, R., Bruce, C., & McLaughlin, E. (2021). 'I was quite surprised it worked so well': Student and facilitator perspectives of synchronous online problem based learning. *Innovations in Education and Teaching International, 58*, 316–327.
Ertmer, P. A., & Glazewski, K. D. (2019). Scaffolding in PBL environments: Structuring and problematizing relevant task features. In W. Hung, M. Moallem, & N. Dabbagh (Eds.), *The Wiley handbook of problem-based learning* (pp. 321–342). Hoboken, NJ: Wiley.
Ertmer, P. A., & Koehler, A. A. (2015). Facilitated versus non-facilitated online case discussions: Comparing differences in problem space coverage. *Journal of Computing in Higher Education, 27*, 69–93.
Fonteijn, H. (2015). Making students responsible for their learning – Empowering learners to build shared mental models. In A. Dailey-Hebert (Ed.), *Transforming processes and perspectives in higher education* (pp. 97–116). Dordrecht, The Netherlands: Springer.
Garrison, D. R. (2007). Online community of inquiry review: Social, cognitive, and teaching presence issues. *Journal of Asynchronous Learning Networks, 11*(1), 61–72.
Ge, X., & Chua, B. L. (2019). The role of self-directed learning in PBL: Implications for learners and scaffolding design. In W. Hung, M. Moallem, & N. Dabbagh (Eds.), *The Wiley handbook of problem-based learning* (pp. 367–388). Hoboken, NJ: Wiley.
Ge, X., & Land, S. (2003). Scaffolding students' problem-solving processes in an ill-structured task using question prompts and peer interactions. *Educational Technology Research and Development, 51*(1), 21–38.
Ge, X., Law, V., & Huang, K. (2016). Detangling the interrelationships between self-regulation and ill-structured problem solving in PBL. *Interdisciplinary Journal of Problem-based Learning, 10*(2), 1–13. https://doi.org/10.7771/1541-5015.1622.
Gilbert, P. K., & Dabbagh, N. (2005). How to structure online discussions for meaningful discourse: A case study. *British Journal of Educational Technology, 36*(1), 5–18.
Grant, M. M., & Glazewski, K. D. (2017). What is missing; what is needed? Future research directions with PBL in K-12 and teacher education. In T. Brush & J. W. Saye (Eds.), *Successfully implementing problem-based learning in classrooms: Research in K-12 and teacher education* (pp. 275–292). West Lafayette, IN: Purdue University Press.
Hmelo-Silver, C. E. (2004). Problem-based learning: What and how do students learn? *Educational Psychology Review, 16*, 235–266.
Hmelo-Silver, C. E., Bridges, S. M., & McKeown, J. M. (2019). Facilitating problem-based learning. In M. M. Hung & N. Dabbagh (Eds.), *The Wiley handbook of problem-based learning* (pp. 2297–2319). Hoboken, NJ: Wiley.
Huang, K., Ge, X., & Law, V. (2017). Learners' deep and surface processing of instructor's feedback in an online course. *Educational Technology & Society, 20*(4), 247–260.
Huang, K., Lee, S. J., & Dugan, A. (2017). Leveraging teaching presence in online courses: Strategies, technology, and student perspectives. In Information Research Management Association (Ed.), *Blended learning: Concepts, methodologies, tools, and applications* (pp. 1687–1711). Hershey, PA: IGI Global.

Hung, W. (2019). Problem design in PBL. In W. Hung, M. Moallem, & N. Dabbagh (Eds.), *The Wiley handbook of problem-based learning* (pp. 249–272). Hoboken, NJ: Wiley.
Imafuku, R., Kataoka, R., Mayahara, M., Suzuki, H., & Saiki, T. (2014). Students' experiences in interdisciplinary problem-based learning: A discourse analysis of group interaction. *Interdisciplinary Journal of Problem-Based Learning, 8*(2), 1–18. https://doi.org/10.7771/1541-5015.1388.
Jeong, H., & Hmelo-Silver, C. E. (2010). Productive use of learning resources in an online problem-based learning environment. *Computers in Human Behavior, 26*, 84–99.
Jolly, H., Brodie, L., & Jolly, L. (2011). Evaluating tutor training for online PBL teamwork courses in first year engineering. In W. Hernandez (Ed.), *Proceedings of research in engineering education symposium* (pp. 182–190). Madrid, Spain: Universidad Politécnica de Madrid.
Kanuka, H., Rourke, L., & Laflamme, E. (2007). The influence of instructional methods on the quality of online discussion. *British Journal of Educational Technology, 38*, 260–271.
Kaufman, D., Ireland, A., & Sauvé, L. (2009). A collaborative, online, problem-based simulation platform (compsoft) for medical education. In M. Danubianu, J. Noll, & C. Dini (Eds.), *Proceedings of the fourth international multi-conference on computing in the global information technology* (pp. 186–191). Los Alamitos, CA: IEEE Computer Society.
Kek, M., & Huijser, H. (2017). *Problem-based learning into the future: Imagining an agile PBL ecology for learning*. Singapore, Singapore: Springer.
Lajoie, S. (2000). *Computers as cognitive tools: No more walls* (Vol. II). Mahwah, NJ: Erlbaum.
Lajoie, S. P., Bodnar, S., Hmelo-Silver, C. E., Chen, Y., Zheng, J., Huang, L., & Kazemitabar, M. (2020). Toward quality online problem-based learning. In S. M. Bridges & R. Kmafuku (Eds.), *Interactional research into problem-based learning* (pp. 367–390). West Lafayette, IN: Purdue University Press.
Lajoie, S. P., Hmelo-Silver, C., Wiseman, J., Chan, L. K., Lu, J., Khurana, C., . . . Kazemitabar, M. (2014). Using online digital tools and video to support international problem-based learning. *Interdisciplinary Journal of Problem-Based Learning, 8*(2), 1–16. https://doi.org/10.7771/1541-5015.1412.
Lan, Y., Tsai, P., Yang, S., & Hung, C. (2012). Comparing the social knowledge construction behavioral patterns of problem-based online asynchronous discussion in e/m-learning environments. *Computers and Education, 59*, 1122–1135.
Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge, UK: Cambridge University Press.
Martin, F. (2021). Bichronous online learning: Is blending asynchronous & synchronous the best approach? *AECT Interactions*. Retrieved from https://interactions.aect.org/bichronous-online-learning-is-blending-asynchronous-and-synchronous-the-best-approach
Mayer, R. E. (2014). The Cambridge Handbook of Multimedia Learning (2nd ed.). New York: Cambridge University Press.
Morge, S. P., Narayan, S., & Tagliarini, G. A. (2019). Project-based learning and computer-based modeling and simulation. In W. Hung, M. Moallem, & N. Dabbagh (Eds.), *The Wiley handbook of problem-based learning* (pp. 617–644). Hoboken, NJ: Wiley.
Murata, R. M., Moss, M. E., Wright, W., & Pardi, V. (2021). Knowledge to action: Integrating evidence-based practice into online PBL cases during COVID-19. *Journal of Dental Education, 85*, 1938–1939.
Nagge, J. J., Killeen, R., & Jennings, B. (2018). Using a course pilot in the development of an online problem-based learning (PBL) therapeutic course in a post-professional PharmD program. *Currents in Pharmacy Teaching and Learning, 10*, 231–234.
Ng, M. L., Bridges, S., Law, S. P., & Whitehill, T. (2013). Designing, implementing and evaluating an online problem-based learning (PBL) environment – A pilot study. *Clinical Linguistics & Phonetics, 28*(1–2), 117–130.
Norman, G. R., & Schmidt, H. G. (1992). The psychological basis of problem-based learning: A review of the evidence. *Academic Medicine, 67*(9), 557–565.

Ryberg, T. (2019). PBL and networked learning: Potentials and challenges in the age of mass collaboration and personalization. In W. Hung, M. Moallem, & N. Dabbagh (Eds.), *The Wiley handbook of problem-based learning* (pp. 593–644). Hoboken, NJ: Wiley.
Saqr, M., Fors, U., & Nouri, J. (2018). Using social network analysis to understand online problem-based learning and predict performance. *PLoS One, 13*, 1–20.
Saqr, M., Nouri, J., Vartiainen, H., & Malmberg, J. (2020). What makes an online problem-based group successful? A learning analytics study using social network analysis. *BMC Medical Education, 20*, 1–11.
Savin-Baden, M. (2006). The challenge of using problem-based learning online. In M. Savin-Baden & K. Wilkie (Eds.), *Problem-based learning online* (pp. 3–13). New York, NY: Open University Press.
Savin-Baden, M. (2007). *A practical guide to problem-based learning online*. New York, NY: Routledge.
Savin-Baden, M., & Bhakta, R. (2019). Problem-based learning in digital spaces. In W. Hung, M. Moallem, & N. Dabbagh (Eds.), *The Wiley handbook of problem-based learning* (pp. 645–666). Hoboken, NJ: Wiley.
Saye, J., & Brush, T. (2002). Scaffolding critical reasoning about history and social issues in multimedia-supported learning environments. *Educational Technology Research and Development, 50*(3), 77–96.
Saye, J., & Brush, T. (2017). Using technology-enhanced learning environments to support problem-based historical inquiry in secondary school classrooms. In T. Brush & J. W. Saye (Eds.), *Successfully implementing problem-based learning in classrooms: Research in K-12 and teacher education* (pp. 197–238). West Lafayette, IN: Purdue University Press.
Schmidt, H. G. (1983). Problem-based learning: Rationale and description. *Medical Education, 17*, 11–16.
Uden, L., & Beaumont, C. (2006). *Technology and problem-based learning*. London, England: Information Science.
Valaitis, R. K., Sword, W. A., Jones, B., & Hodges, A. (2005). Problem-based learning online: Perceptions of health science students. *Advances in Health Sciences Education, 19*, 231–252.
Verstegen, D. M. L., Fonteijin, H. T. H., Dolmans, D. H. J. M., de Rijdt, C. C. E., de Grave, W. S., & van Merriënboer, J. J. G. (2019). An exploration of problem-based learning in a MOOC. In W. Hung, M. Moallem, & N. Dabbagh (Eds.), *The Wiley handbook of problem-based learning* (pp. 667–690). Hoboken, NJ: Wiley.

Designing Online Learning for Children and Youth

74

Jered Borup and Leanna Archambault

Contents

Abstract

Students at the primary and secondary levels are increasingly enrolling in online courses either to supplement or completely replace their in-person courses. While there are benefits to learning online, they come at a cost, and students are less likely to pass their online courses compared to their in-person courses. In this chapter, we share two frameworks. We share the 4Es framework that highlights how online courses should be designed to enable, extend, engage, and elevate student learning. However, a well-designed course is not enough, and most students will require support from others to be successful. For this reason, we also share the Academic Communities of Engagement (ACE) framework that

J. Borup (✉)
George Mason University, Fairfax, VA, USA
e-mail: jborup@gmu.edu

L. Archambault
Arizona State University, Tempe, AZ, USA
e-mail: leanna.archambault@asu.edu

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_77

highlights the supports that can increase a student's affective, behavioral, and cognitive engagement. The ACE framework identifies actors within the student's personal community and course community who can provide students with the support that they require.

Keywords

Online learning, Children and adolescents, Instructional design, Online learner support, Learner engagement

Introduction

Over the last 20 years, primary and secondary students have increasingly enrolled in online courses (Taie & Goldring, 2019). For instance, in North America, most students have easy access to online learning options at low or no cost to the student (Digital Learning Collaborative, 2019). Most of these students choose to enroll in one or two online courses to supplement their in-person coursework. By taking online courses, students can access classes that may not be offered locally, recover previously failed credits, and/or learn during times that are more convenient for them. Full-time online learning options, commonly called cyber schools, are also increasing in popularity for those students who require high levels of flexibility due to other pursuits such as competitive athletics. They may be pivoting from home schooling but still want to learn from home or are leaving in-person schooling due to health, safety, or personal reasons (Evergreen Educational Group, 2017).

Growth in online course enrollments at the primary and secondary levels has varied greatly across counties (Barbour, 2018). For online enrollments to increase, there needs to exist government and public support, along with access to adequate Internet (Palvia et al., 2018). Although Internet access and telecommunication infrastructures have rapidly grown and strengthened to make online learning possible, the lack of government and public support has limited or even completely prevented actual online course enrollments from occurring in many countries. However, in an attempt to slow the spread of COVID-19, countries throughout the world, including those who were previously resistant to online learning, closed their school buildings and shifted to learning online. While researchers have correctly pointed out that this emergency remote learning is not the same as preplanned online learning (Hodges, Moore, Lockee, Trust, & Bond, 2020), it is likely this experience will have a lasting impact on government and public support for online learning throughout the world.

There are potential benefits to learning online, but those benefits also come with associated challenges. For instance, research has repeatedly shown that students are less likely to pass online courses compared to in-person courses (Freidhoff, 2021). High attrition rates can be attributed to low learner engagement and lack of support (Borup, Graham, West, Archambault, & Spring, 2020). While students and their parents are drawn to online learning, they are often ill-prepared for its difficulties.

Learning online can be especially challenging because students not only need to learn the course material online but also need to learn how to learn online (Lowes & Lin, 2015). Just as teaching demands different skills than in-person teaching (Pulham & Graham, 2018), learning online requires different skill sets than what is required to learn in person.

Primary and secondary online course providers need to carefully consider both how the courses are designed and the supports that are provided to teachers and students. In this chapter, we first share the 4Es framework that can help in the design and evaluation of effective online learning activities and courses. Following, we use the Academic Communities of Engagement (ACE) framework to discuss how online students' engagement in online learning activities can be supported by their course community (e.g., teachers, mentors, peers) and personal community (e.g., parents, family, and friends).

Online Courses and Design Models

The beginning of online learning can be marked in the 1990s when the Internet became easily navigable and affordable for many households. However, the roots of online learning are firmly grounded in the much deeper history of distance education. Distance education began over a century ago as correspondence courses where students were mailed paper packets of content and activities that they completed and mailed back to the instructor for grading. Radio, television, and then computers allowed students to learn with richer content, but individualized interaction with their instructor was limited, and they had little or no communication with other students in the course. Dial-up Internet in the 1990s with email, discussion forums, and basic learning management systems (LMS) allowed students to have more communication than ever before. Today, faster Internet speeds and the advent of new technologies have allowed for new forms of content, communication, collaboration, and creation (for a more detailed history of primary and secondary distance and online learning, see Barbour, 2019).

Often K-12 online learning programs are categorized by their comprehensiveness (supplemental vs. full-time), their reach (global, national, multistate, state, multi-district, or single district), or the body that has operational control (independent vendor, state, university, regional authority, consortium, local board, private school, public school) (Watson, Murin, Vashaw, Gemin, & Rapp, 2011). However, these categorizations provide little insight into how the courses are actually designed. As a result of shifting to remote learning due to COVID-19, many teachers found themselves in the role of instructional designer, asking themselves, "what should be included in my online class? how should I organize and present them in the required online learning platform?, how should I teach remotely? and how do I know my students are learning?" (Wang, 2021, p. 9). In response, the Content, Activities, Facilitation, and Evaluation (CAFE) model was created to help elementary and secondary teachers transition their instruction online. It asks teachers to organize their instructional content in a systematic way (Content), design and develop various

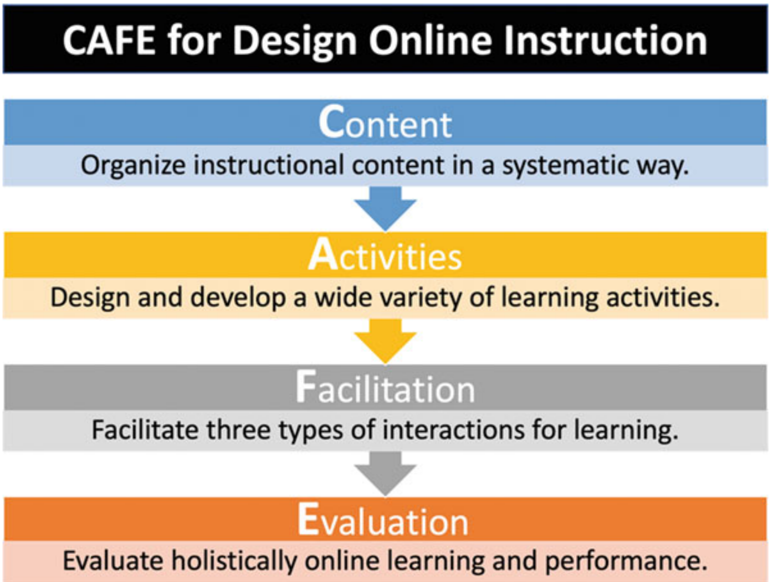


Fig. 1 CAFE for Design Online Instruction. (Adapted from Wang, 2021)

activities (Activities), facilitate online learning interactions (Facilitate), and then evaluate learning performance/outcomes (Evaluate) (Wang, 2021) (Fig. 1).

As described by the CAFE model among many other instructional design models, one of the key elements is learning interactions. Graham (2006) explained that learning interactions can be categorized based on the flexibility in time and place that students participate. Most course designs provide students with a high degree of flexibility with respect to the time of day that they complete learning activities with optional supplemental synchronous sessions (Digital Learning Collaborative, 2019). Similarly, course providers tend not to place any restrictions on where students participate in learning activities. However, at the local level some schools restrict students' flexibility by requiring them to attend a specific class time in their local brick-and-mortar school. This additional structure appears to help some students to participate in learning activities more consistently (Borup & Stimson, 2019).

Interactions that make up the course design can also be categorized by what or who the student is interacting with. For instance, Moore (1989) identified the following three types of interaction that act as the primary building blocks when designing learning experiences: student-content, student-teacher, and student-student interactions (see Fig. 2).

Despite the ability to have rich human interactions, a large portion of the K-12 online courses are actually designed as if they were high-tech correspondence courses, rich in media and learner-content interaction but lacking regular interactions with the teacher and others in the course. These courses can also focus on scalability by replacing some subjectively scored assessments such as projects that require teacher grading and feedback with objectively scored assessments that can be graded using technology.

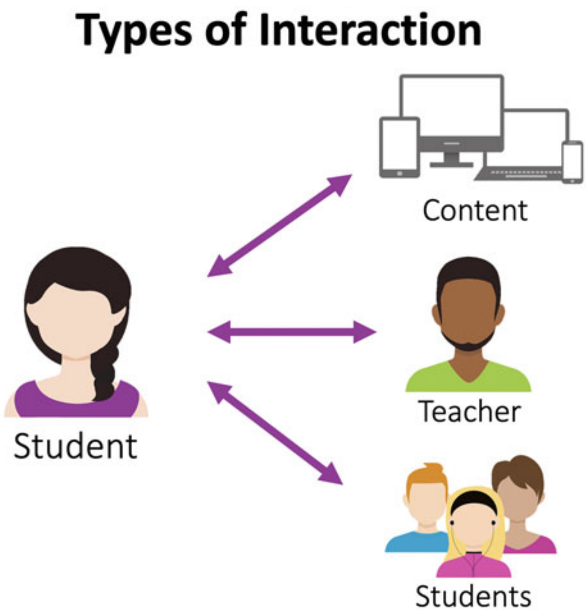


Fig. 2 Three types of interaction. (Created by Jered Borup, CC BY)

Teachers in these independent study programs are made available for students to contact for help but tend not to proactively contact students or attempt to develop close relationships with them (Oviatt, Graham, Borup, & Davies, 2018). These courses tend to have high attrition rates (Hawkins, Graham, Sudweeks, & Barbour, 2013), and student success often depends on their local support systems. These flexible courses are especially common in supplemental online programs where students follow a variety of different school calendars for their in-person courses. However, even cyber schools where students take most or all of their courses online and could follow a common calendar tend to follow an independent study model (Woodworth et al., 2015). Full-time cyber schools' focus on flexible pacing and independent study is particularly concerning because students could graduate from secondary school without any experiences collaborating with peers. Other programs emphasize developing close caring relationships between students and teachers, where teachers provide students with high levels of personalized feedback and encouragement. Despite their physical separation, teachers can successfully form caring relationships with students that allow them to better met their students' needs (Velasquez, Graham, & West, 2013).

The 4Es: Goals when Designing and Assessing Learning in Online Environments

Regardless of the course model, to build a quality online experience, it is necessary to focus on specific goals when it comes to designing and assessing learning. Building on previous research and frameworks such as David Merrill's (2009) e3

Fig. 3 The 4Es. (Created by Jered Borup, CC BY)

and Liz Kolb's (n.d.) Triple E frameworks, Borup, Graham, Short, and Shin (2021) identified the following four goals when designing and evaluating online learning activities and assessments: enable, extend, engage, and elevate (the 4Es; see Fig. 3). Specifically, the 4Es framework asks if the online course activities:

- **Enable** new types of learning activities?
- **Engage** students in meaningful interactions with others and the course content?
- **Elevate** the learning activities by including real-world skills that benefit students beyond the classroom?
- **Extend** the time, place, and ways that students can master learning objectives?

Enable

Instructors and designers may be tempted to replicate the in-person learning experience online. For instance, Woodworth et al. (2015) examined full-time cyber schools and stated:

> Some [online] schools may function exactly like the traditional brick-and-mortar school. They may require all students to log in at specific times to receive instruction with the only difference from a traditional brick-and-mortar school being that the students are in different physical locations. (p. 42)

The attempt to digitize the in-person learning experience was also evident when social distancing requirements required primary and secondary schools to close their buildings and rapidly move online. Understandably, many teachers and administrators began using synchronous webinar platforms in an attempt to replicate what they would have done in-person (Lowenthal, Borup, West, & Archambault, 2020).

While some aspects of teaching and learning appear to transfer well from the in-person to the online environment, others can become more challenging and frustrating. One example is establishing social presence in an online setting. Social presence encompasses fostering a trusted community in the online setting including developing interpersonal relationships, connecting to learners, and helping them to feel comfortable in the online environment (Garrison & Arbaugh, 2007). Developing strategies that promote social presence in online settings may be foreign to teachers, particularly when they are separated from students in space and/or time.

Instead of simply digitizing in-person activities, a better approach is to carefully consider the possibilities of the online environment and then leverage those possibilities to design online learning activities and assessments. In doing so, online technologies and learning environments can unlock and enable activities that teachers and students would not be able to do, or at least very difficult to do, without online technology.

Engage

Learner engagement is frequently credited for learning success, and its absence may be blamed for education's ills. While learner engagement is far from a panacea, research has confirmed that online learner engagement is an important factor in several learning outcomes including performance, pass rates, and sense of community (Avcı & Ergün, 2019; Heyman, 2010; Shackelford & Maxwell, 2012). Sustained learner engagement is so valuable and elusive that Sinatra, Heddy, and Lombardi (2015) referred to it as the "holy grail of learning" (p. 1). Course design can play an important part in both the levels and forms of learner engagement that are required.

One challenge of sustaining learner engagement is that the research community has yet to produce a widely accepted definition (Halverson & Graham, 2019). The research community does agree that engagement is a complex, multidimensional concept. The primary disagreements occur when identifying and defining the dimensions of engagement (Bond & Bedenlier, 2019; Redmond, Heffernan, Abawi, Brown, & Henderson, 2018; Rodgers, 2008). Within the context of online learning, researchers tend to focus on the following three dimensions of engagement:

- Behavioral – the physical energy that students exert when completing learning activities. The PIC model categorizes activities as either passive, interactive, or creative.
- Affective – the emotional energy that is present when completing learning activities.
- Cognitive – the mental energy that students exert to learn the course content and develop new skills (Borup, 2018; Borup et al., 2020).

Fig. 4 Dimensions of student engagement (created by Jered Borup, CC BY)

Teachers commonly refer to these dimensions when they talk about engaging students' hands (behavioral engagement), hearts (affective engagement), and heads (cognitive engagement) (see Fig. 4). The three dimensions of engagement also influence each other. For instance, too often students are not affectively engaged in their learning because they are given passive learning activities. If technology is used in ways that encourage students to be more active participants, it can increase their enjoyment and affective engagement. At the same time, if students are tasked with engaging behaviorally but lack cognitive and affective engagement, the task will be viewed as "busy work."

One framework that helps to categorize students' behavioral engagement in learning activities and examine learning activities in comparison with what could be done without technology is called the PICRAT framework (Kimmons, Graham, & West, 2020). The PICRAT framework is particularly useful when designing learning activities for the online learning environment. Specifically, PIC describes students' behavioral engagement as one of the following:

- Passive: students learn by consuming presented information but do not control or contribute to what is presented (e.g., reading an article, listening to a podcast, watching a video).
- Interactive: students exert some control over their learning by being an active participant in communications with others (e.g., discussions, peer reviews, study groups) or by interacting with content that is responsive or adaptive to student behavior (e.g., educational games, simulations, adaptive learning software).
- Creative: students learn or demonstrate their learning by creating original materials and artifacts using technology (e.g., writing a report, editing a video, creating a digital poster).

The RAT element then articulates how learning activities use technology. Specifically, it categorizes the use of technology as one of the following:

- Replaces – online technology sustains current practice without making meaningful changes to learning activities.
- Amplifies – online technology incrementally improves learning activities in ways that may result in some improvements in learning outcomes.

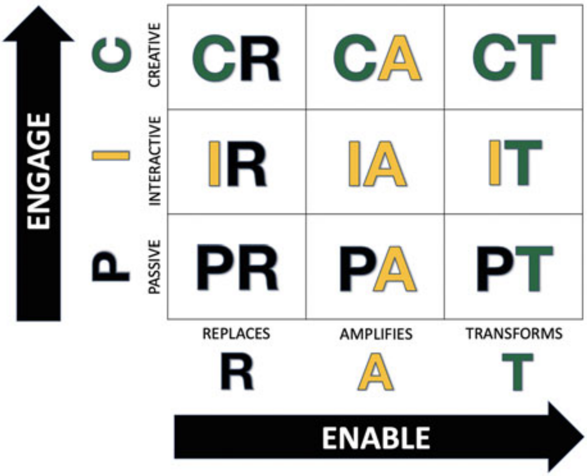


Fig. 5 The PICRAT framework matrix. (Based on Kimmons et al., 2020; graphic created by Jered Borup, CC BY)

- Transforms – online technology fundamentally changes learning activities in ways that may result in significant improvement in learning outcomes.

While the PIC and RAT frameworks can each stand alone, Kimmons et al. (2020) combined them to form the PICRAT framework matrix. The matrix allows instructional designers and teachers to describe both student behavioral *engagement* and how the online environment and technologies *enable* learning activities (see Fig. 5).

It is important to note the PICRAT matrix by itself does not measure the worth of a learning activity. There are times when a passive activity that simply replaces a traditional in-person environment (PR) is a good and perhaps the best activity possible. That said, an issue arises when students engage in too many passive learning experiences that go on for too long. Even in an in-person classroom, learning experiences can be too passive, but it is particularly concerning when there are too many passive learning experiences online because they require the student to maintain focus – a difficult task when students with low self-regulation skills are not under the direct supervision of the teacher and can access countless online distractions (Pettyjohn, 2012). As a result, some online tools can help to make passive learning activities such as watching a video more interactive by periodically requiring students to answer questions regarding what they are learning.

Extend

The distributed nature of online learning extends learning opportunities to students regardless of their location so long as students have an Internet-connected device. The extension in students' place of learning focuses on access to learning opportunities, but online learning can also be extended in ways that improve how and even what students learn. For example, online learning can extend the time when students complete learning activities. While some online programs require regular synchronous class sessions, online courses are offered largely asynchronously that may be supplemented with optional synchronous sessions.

This extension of students' learning time also affords students some flexibility and control in their pace of learning. The one-pace-fits-all approach to public education has long been highlighted as a limitation (see Skinner, 1958). Assignment deadlines (or the lack thereof) largely determine the pace of instruction, but even when courses establish weekly deadlines, students have flexibility to pace their learning during that week. Even with flexible timelines, ultimately online students will require support and feedback to help them to progress through learning activities. Not all feedback is equally valuable (Hattie, 2008). Feedback is best when it is timely, friendly, and specific (Borup, West, & Thomas, 2015). Teachers' content and pedagogical knowledge makes them an especially important source of feedback. However, providing detailed feedback can be time-consuming, making it challenging for teachers to provide timely feedback to all of their students. As a result, some online programs use technology such as adaptive learning programs and artificial technology to provide students with in-the-moment feedback, but these types of feedback should not replace teacher feedback (Amro & Borup, 2019; Amro & Dabbagh, 2020).

The extension of students' learning time can also have important benefits in online discussions. Certain types of students tend to struggle in synchronous discussions. For instance, students with learning disabilities, introverted tendencies, or those not proficient in the language can all struggle for different reasons to participate in fast-paced discussions and benefit when the discussion is extended to allow for extra time to reflect and form responses (Borup, West, & Graham, 2013). While these asynchronous discussions are most commonly text-based, discussion platforms are increasingly allowing for asynchronous audio and video communication. Allowing students some choice in their mode of communication will likely result in more equitable participation.

Lastly, online courses can be designed to extend the ways that students reach and demonstrate mastery of the learning objectives. This type of extension can occur to different degrees. For instance, students may be provided two options (e.g., read this article or watch this video, write a report or make a video). Students can also be provided with a choice board listing a variety of learning activities for students to choose from. At times teachers may also work with students to help them to develop their own learning goals and path to reach those goals (Arnesen, Graham, Short, & Archibald, 2019).

When students decide how their learning is extended, it is called personalized learning (Arnesen et al., 2019). While providing students with choice can potentially have positive impacts on student engagement, there are important drawbacks to allowing online students to extend and personalize their learning time, pace, and ways of learning. When students are provided with a high degree of choice in their learning time, pace, and ways of learning, it is possible to have each student completing different learning activities at any point in time, which can eliminate certain communication- and collaboration-based learning activities that require students to be working on similar tasks at similar times.

This dilemma has created a tension between interactive learning and the flexibility in pace that has helped to make online learning so popular (Borup, 2016b). Richard Cullatta, the former director of the US Department of Education, explained that learning is inherently social and issues arise when online technology is used to isolate students (Davis, 2017). As a result, courses should be carefully designed so that students have some choice in the time, pace, and ways that they learn while still allowing for meaningful opportunities for student-student communication and collaboration.

Elevate

There is also an opportunity to use online technologies and learning environments to help elevate learning activities to include higher-order and twenty-first-century skills such as communication, collaboration, critical thinking, and creativity skills. Effective online activities should promote deeper learning. The 4 Shifts Protocol outlines four shifts toward more relevant, personalized learning across grade levels and content areas (McLeod & Graber, 2019). First, deeper learning is promoted by a focus on higher-level thinking such as problem-solving and creativity rather than lower-level thinking such as factual recall. Second, student agency takes a larger role in deeper learning such that students have more ownership and control over what and how they learn, offering more personalization. Third, authentic work offers students the ability to participate in meaningful learning communities that are interdisciplinary in nature and relevant to local, national, and international contexts. Fourth, deeper learning includes the strategic infusion of technology to be able to effectively mobilize shifts toward higher-level thinking, student agency, and authentic work. It is this connection to "authentic work" where online activities can elevate the learning process. Authentic intellectual work (AIW), as originally described by Newmann and Associates (1996), contains the following four key indicators: higher-order thinking, deep knowledge, substantive conversation, and connectedness to the real world (Table 1).

AIW extends students' learning by building new understandings and going beyond prior knowledge, valuing knowledge that extends beyond basic factual recall. It pushes students to support their new understandings through evidence (Newmann & Associates, 1996; Saye et al., 2018). These components have been correlated with the development of complex problem-solving and higher-order thinking skills (Saye et al., 2018).

AIW is frequently accomplished by using technology to situate learning tasks into "real-world" problems and projects. This can help increase elements of authentic pedagogy, including higher-order thinking skills and connections to students' lives through engaging with meaningful, real-world problems through disciplined inquiry. Given its focus on observations, data collection, and drawing conclusions, science is full of real-world applications for students. For example,

Table 1 AIW indicators

Indicator	Description
Higher-order thinking	Occurs when students combine facts and ideas to synthesize, generalize, explain, hypothesize, or arrive at some conclusion or interpretation
Deep knowledge	Concerns the central ideas of a topic or discipline because such knowledge is judged to be crucial to a topic or discipline. Mastery is demonstrated by student success in producing new knowledge by discovering relationships, solving problems, constructing explanations, and drawing conclusions
Substantive conversation	Discussion centers on the subject matter in the discipline and includes higher-order thinking and is shared (is not scripted or dominated by one party) and builds on student ideas to promote collective understanding of a theme/topic
Connectedness to the real world	Occurs when students recognize the connection between classroom knowledge and situations outside the classroom that create personal meaning and significance for the knowledge

Note. Adapted from Saye & Associates (2015, p. 67)

students can participate in citizen science projects that are organized online and allow them to collect and interpret data that have an impact on solving real-world problems such as biodiversity research. One such opportunity is Project Noah https://www.projectnoah.org, which allows students to learn about and identify various species of wildlife, create their own online nature journal, follow naturalists, and connect with experts in the field. Many other such projects exist and can be explored at https://www.commonsense.org/education/top-picks/real-world-science-resources-for-students.

Online activities can be structured so they allow students to engage in disciplinary literacies (Lent, 2015) that provide opportunities to read, write, and think like historians, scientists, mathematicians, and writers. For example, in social studies, they may create interactive timelines with associated narratives along with relying on valid primary and secondary sources for support. In language arts, students might write on relevant topics affecting them and the world. They may work to determine credible research on the issue and use it to support or refute claims, reflecting on multiple texts to guide their writing. They may even reach out with questions to a particular writer or researcher. Math provides the opportunity to connect to everyday life including budgeting and money management, investment and financial planning, building and engineering concepts that allow students to use information to come to a solution, calculating figures using mathematical principles, finding patterns, and estimating/generalizing. Students can use technology to communicate in authentic ways with each other but also with researchers, scientists, and other experts. Given the vast amount of information that is available online, together with the ability to communicate and collaborate with others, this provides students an avenue to engage with content in a real-word manner that includes higher-order thinking, deep knowledge, and substantive dialog to enhance learning in a meaningful way.

ACE: A Framework for Supporting Online Student Engagement

Designing and developing meaningful online learning activities following the 4Es is important, but many students will still be unable to fully engage in the activities without support from others. In fact, some students need so much support that they are told not to enroll in online courses. Rose, Smith, Johnson, and Glick (2015) explained that restricting online learning opportunities to those with low support needs results in inequitable access. Rather online programs should carefully consider the supports that are required for each student and then work to offer that support.

Support and scaffolding has long been viewed as an important part of learning, and Vygotsky (1978) argued that what students "can do with the assistance of others might be in some sense even more indicative of their mental development than what they can do alone" (p. 85). Building on Vygotsky's zone of proximal development, Borup et al. (2020) argued that each student varies in their ability to independently engage in learning activities behaviorally, affectively, and cognitively. Students' ability to independently engage in learning activities is dependent on different facilitators such as the learner's background and characteristics as well as the learning environment and the students' personal environment (see Fig. 6). Of the four highlighted facilitators of engagement, instructors have the most control over the learning environment and the support that they directly provide to students. However, teachers and programs can also have an impact on support that is provided by those within students' personal environments (Hoover-Dempsey et al., 2005).

The ACE framework identifies the support elements that can narrow or bridge the gap between learner independent engagement without support and the level of engagement that is necessary for academic success (see Fig. 7). Cognitive engagement can increase when students receive instructing and collaborating support. Behavioral engagement can increase when students receive the following types of support: (a) troubleshooting and orienting, (b) organizing and managing, and

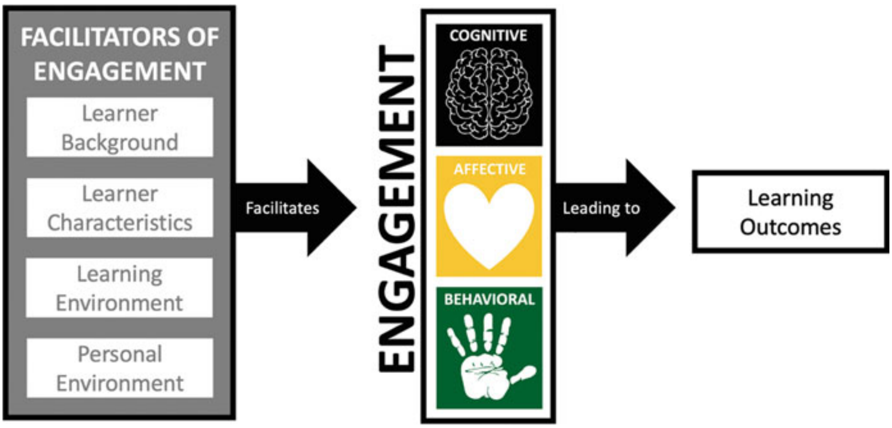


Fig. 6 Facilitators of engagement. (Created by Jered Borup, CC-BY)

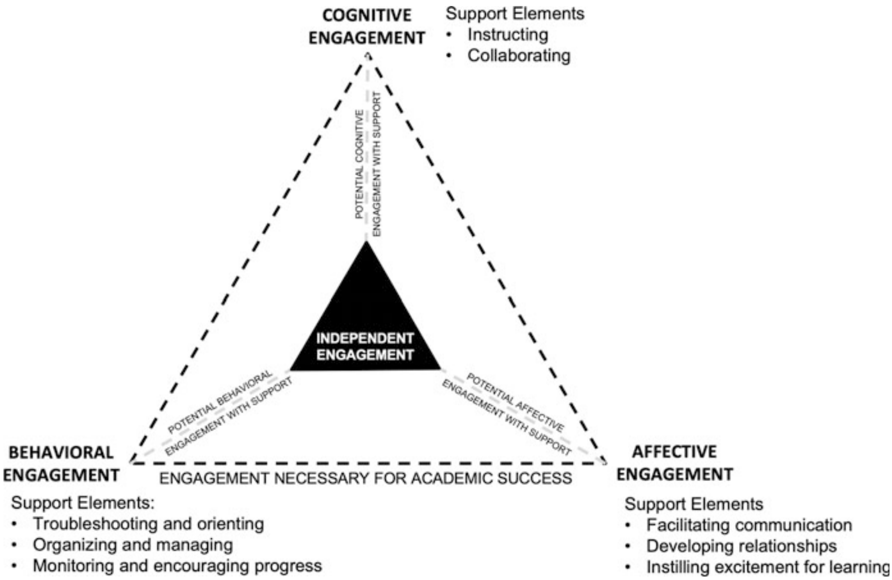


Fig. 7 The gap between a student's independent engagement (black triangle), the engagement necessary for academic success (dotted triangle), and the listed supports required to bridge the gap

(c) monitoring and encouraging progress. Affective engagement can increase when students receive the following types of support: (a) facilitating communication, (b) developing relationships, and (c) instilling excitement for learning.

The ACE framework also identifies two support communities that can provide students with the support that they require: the student's course community and student's personal community (see Fig. 8). Actors within students' course communities can include teachers, other students in the course, facilitators/mentors, aids, and other support staff. In many cases, the course community actors have no relationship with the student prior to the course. In contrast, actors within students' personal communities can include parents, guardians, friends, coaches, and members of community who have developed relationships with the student outside of and prior to the course with some relationships beginning at birth. As a rule, actors in the course community will have greater knowledge of the course content and procedures, but actors in the personal community will have greater knowledge of the student's background, interests, tendencies, strengths, and limitations.

Parents, guardians, and/or caretakers are likely to be the most important actors in a student's personal community. While they can likely provide their primary students with content-related support, it becomes more difficult once students are in secondary school. As a result, parental support (which can be provided by a parent, guardian, or close family member who serves as a caretaker) tends to focus more on affective and behavioral engagement and less on cognitive engagement (Borup, 2016a; Borup, Stevens, & Hasler Waters, 2015). However, the amount of

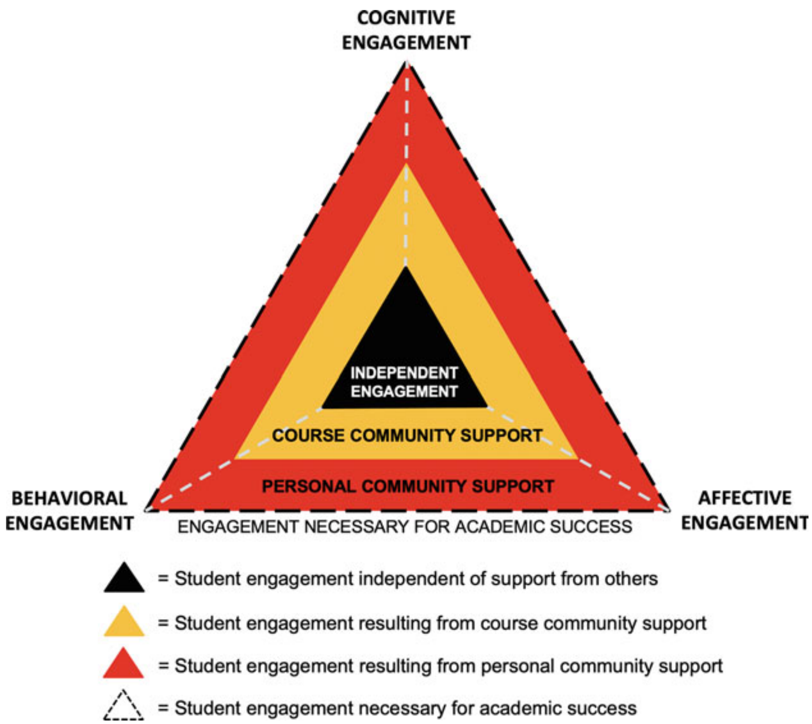


Fig. 8 The ACE framework with support from the course and personal communities

time invested in providing parental support can vary greatly. Hoover-Dempsey et al. (2005) identified several obstacles that parents encounter when providing students with support including how they have constructed and perceived their roles, parent self-efficacy that their efforts will actually impact student performance and behavior, and demands on their time. They also found that parents were more likely to provide support when they received specific invitations from teachers and their students.

Teachers are an important actor within the course community and can develop caring relationships with students while providing them with high levels of support (Velasquez et al., 2013), often their high student loads and physical separation from students may prevent them from providing each student with the level of support that they require (Hawkins, Barbour, & Graham, 2011, 2012). As a result, online programs are increasingly providing students with online or in-person facilitators (see Fig. 9). These facilitators do not replace the instructor and typically are not experts in the course content. Instead facilitators work to develop caring relationships with students and support their efforts to learn how to learn online (Borup, 2018). Teachers and facilitators can also provide students with opportunities to support each other. For instance, teachers established a student-student tutoring program at a cyber charter school (Borup, 2016b).

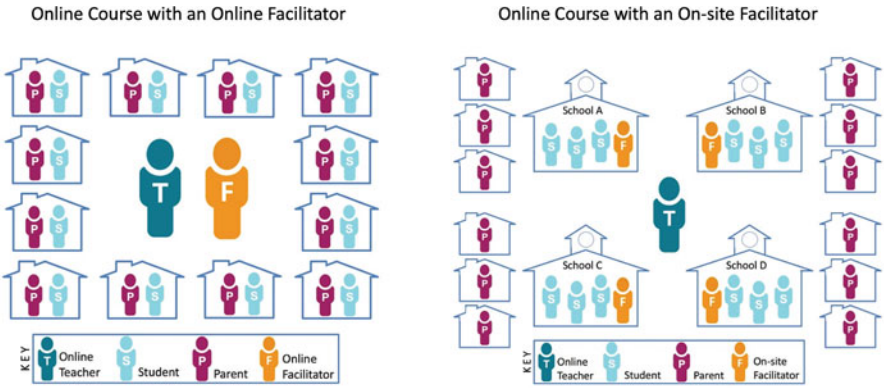


Fig. 9 Online courses where students receive support from the online teacher and a facilitator

Implications

When designing online learning for youth and children, we need to consider not only how the courses are designed but also how to develop support systems so that students are able to succeed. The 4Es framework and Academic Communities of Engagement (ACE) frameworks have important implications for steps we need to take in order to improve online students' engagement in online learning activities and how these activities can be supported by their course community and personal communities. These include the need for additional learning opportunities and professional development for practicing teachers as well as for those who are becoming teachers as part of their teacher education programs.

Need for Additional Learning Opportunities/Experience for Teachers

Current and future educators need guidance, support, and practice in designing and implementing online/blended activities. First, school districts should support teachers with learning opportunities specific to designing effective lessons for the online/blended setting. This support may include release time for the creation and sharing of lessons and approaches, peer review of created materials, and coaching/support from skilled professionals. In addition, districts should provide the latitude for teachers to try new approaches and make adjustments as they go, including opportunities to design materials to enable new types of learning activities; engage in meaningful interaction with one another and with the content; elevate activities with authentic, real-world applications; and extend flexibility for mastering learning objectives/outcomes.

When applying design principles to online learning, teachers need professional development opportunities that are well-designed and effective. To accomplish this goal, professional development should be ongoing, be content-focused, and involve teachers as active learners (Birman, Desimone, Porter, & Garet, 2000). It should be job-embedded, meaning that it involves “systematic, planned, intentional and regularly scheduled efforts to embed teacher learning with teachers’ daily lives” (Dawson & Dana, 2018, p. 248).

In addition to designing activities, teachers may need specific professional development geared toward working with students’ personal and course communities as well as developing their teaching and social presence so that they are better equipped to cultivate critical relationships with students in online settings. These relationships can result in an increased sense of belongingness, connectedness, engagement, academic achievement, participation, and motivation (Cohen, McCabe, Michelli, & Pickeral, 2009; Miller, Riley, & Slay, 2021) – all important elements for success in the online classroom. There are a number of open educational resources, such as this volume as well as others, including those found at https://edtechbooks.org centered on blended learning approaches that may prove to be helpful when it comes to pragmatic approaches to designing online and blended learning activities.

Teacher Education Programs

In addition to professional development opportunities for current teachers, future teachers also need preparation for designing online learning for online and blended learning environments. However, historically, teacher education programs have offered limited opportunities for future teachers to create/implement online or blended lessons (Archambault, 2011; Archambault et al., 2016; Kennedy & Archambault, 2012). As a result, teacher education programs should recognize the importance of embedding coursework and practical experiences for future educators. It is important that the first-time teachers are exposed to creating online learning activities prior to their first teaching experience.

There are a number of actions teacher preparation programs can pursue to address this issue. First, programs should consider a dedicated instructional design course to teach future educators strategies for enabling, extending, engaging, and enhancing online learning activities as well as exploring uses of technology that are creative and transformative. In addition, effective technology use should be integrated throughout pedagogical and content-related coursework to ensure that future teachers can experience its modeling as a teaching tool. Often programs select one approach or the other. However, future teachers need to experience not only principles of effective lesson design but also the implementation and evaluation of such lessons and strategies for blending in-person and online instruction. Also, the inclusion of an online or blended field experience could help future teachers gain valuable experience when it comes to building comfort and capacity in an online setting. As a result of COVID-19 along with how quickly society is changing due to the connected nature of modern-day living, the need to be able to design and implement effective online lessons is more evident than ever.

Conclusion

As online offerings continue to expand at the primary and secondary levels for a variety of reasons, teachers and course providers need to be equipped with ways to help improve the design of effective online learning activities. The 4Es framework provides a structure for considering important design elements when it comes to online activities. Relatedly, the ACE framework shows how students' course and personal communities can support their engagement when it comes to online learning. Both are important and useful tools for those involved with creating and designing quality online learning experiences for children and youth.

References

Amro, F., & Borup, J. (2019). Exploring blended teacher roles and obstacles to success when using personalized learning software. *Journal of Online Learning Research, 5*(3), 229–250. https://www.learntechlib.org/primary/p/210642/

Amro, F., & Dabbagh, N. (2020). Using primary language support in a computer-based intervention to scaffold second language learners. *Journal of Online Learning Research, 6*(1), 57–76. https://www.learntechlib.org/primary/p/181296/

Archambault, L. (2011). The practitioner's perspective on teacher education: Preparing for the k-12 online classroom. *Journal of Technology and Teacher Education, 19*(1), 73–91. https://www.learntechlib.org/primary/p/31410/

Archambault, L., Kennedy, K., Shelton, C., Dalal, M., McAllister, L., & Huyett, S. (2016). Incremental progress: Re-examining field experiences in K-12 online learning contexts in the United States. *Journal of Online Learning Research, 2*(3), 303–326. https://www.learntechlib.org/primary/p/174116/

Arnesen, K. T., Graham, G. R., Short, C. R., & Archibald, D. (2019). Experiences with personalized learning in a blended teaching course for preservice teachers. *Journal of Online Learning Research, 5*(3), 251–274. https://www.learntechlib.org/primary/p/210637/

Avcı, Ü., & Ergün, E. (2019). Online students' LMS activities and their effect on engagement, information literacy and academic performance. *Interactive Learning Environments*, 1–14. https://doi.org/10.1080/10494820.2019.1636088.

Barbour, M. K. (2018). A history of K-12 distance, online, and blended learning worldwide. In R. Ferdig & K. Kennedy (Eds.), *Handbook of research on K-12 online and blended learning* (2nd ed., pp. 21–40). Entertainment Technology Center Press, Carnegie Mellon University. https://press.etc.cmu.edu/index.php/product/handbook-of-research-on-k-12-and-blending-learning-second-edition/

Barbour, M. K. (2019). The landscape of K-12 online learning: Examining the state of the field. In M. G. Moore & W. C. Diehl (Eds.), *Handbook of distance education* (4th ed., pp. 521–542). Routledge.

Birman, B. F., Desimone, L., Porter, A. C., & Garet, M. S. (2000). Designing professional development that works. *Educational Leadership, 57*(8), 28–33.

Bond, M., & Bedenlier, S. (2019). Facilitating student engagement through educational technology: Towards a conceptual framework. *Journal of Interactive Media in Education, 2019*(1), 11. https://doi.org/10.5334/jime.528.

Borup, J. (2016a). Teacher perceptions of parental engagement at a cyber high school. *Journal of Research on Technology in Education, 48*, 67–83. https://doi.org/10.1080/15391523.2016.1146560.

Borup, J. (2016b). Teacher perceptions of learner-learner engagement at a cyber high school. *The International Review of Research in Open and Distance Learning, 17*(3). https://doi.org/10.19173/irrodl.v17i3.2361.

Borup, J. (2018). On-site and online facilitators: Current and future direction for research. In K. Kennedy & R. Ferdig (Eds.), *Handbook of research on K-12 online and blended learning* (2nd ed., pp. 423–442). ETC Press. Available at: http://repository.cmu.edu/etcpress/82/

Borup, J., Graham, C. R., Short, C. R., & Shin, J. K. (2021). The 4Es evaluation criteria. In C. R. Graham, J. Borup, M. A. Jensen, K. T. Arnesen, & C. R. Short (Eds.), *K-12 blended teaching (Vol 2): A guide to practice within the disciplines*. EdTech Books. https://edtechbooks.org/k12blended2/evaluating_bt

Borup, J., Graham, C. R., West, R. E., Archambault, L., & Spring, K. J. (2020). Academic communities of engagement: An expansive lens for examining support structures in blended and online learning. *Educational Technology Research and Development, 68*(2), 807–832. https://doi.org/10.1007/s11423-020-09744-x.

Borup, J., Stevens, M. A., & Hasler Waters, L. (2015). Parent and student perceptions of parent engagement at a cyber charter high school. *Online Learning, 19*(5). https://doi.org/10.1017/CBO9781107415324.004.

Borup, J., & Stimson, R. J. (2019). Responsibilities of online teachers and on-site facilitators in online high school courses. *American Journal of Distance Education, 33*(1), 29–45. https://doi.org/10.1080/08923647.2019.1554984.

Borup, J., West, R. E., & Graham, C. R. (2013). The influence of asynchronous video communication on learner social presence: A narrative analysis of four cases. *Distance Education, 34*, 48–63. https://doi.org/10.1080/01587919.2013.770427.

Cohen, J., McCabe, L., Michelli, N. M., & Pickeral, T. (2009). School climate: Research, policy, practice, and teacher education. *Teachers College Record, 111*(1), 180–213. http://www.tcrecord.org/Content.asp?ContentId=15220

Davis, M. R. (2017). The future of classroom technology: 5 experts weigh in. *Education Week*. https://www.edweek.org/education-industry/the-future-of-classroom-technology-5-experts-weigh-in/2017/06

Dawson, K. & Dana, N. (2018). Professional development for K-12 online teachers. In K. Kennedy & R. Ferdig (Eds.), *Handbook of research on K-12 online and blended teaching*. (2nd ed., pp. 247–260). Carnegie Mellon ETC Press. https://press.etc.cmu.edu/index.php/product/handbook-of-research-on-k-12-and-blending-learning-second-edition/

Digital Learning Collaborative. (2019). Snapshot 2019: A review of K-12 online, blended, and digital learning. https://perma.cc/P559-JARE

Evergreen Educational Group. (2017). *Keeping pace with K-12 online learning 2016*. Evergreen Education Group. Retrieved from http://www.kpk12.com/wp-content/uploads/EEG_KP2016-web.pdf

Freidhoff, J. R. (2021). *Michigan's K-12 virtual learning effectiveness report 2019–20*. Michigan Virtual University. https://michiganvirtual.org/research/publications/michigans-k-12-virtual-learning-effectiveness-report-2019-20/

Garrison, D. R., & Arbaugh, J. B. (2007). Researching the community of inquiry framework: Review, issues, and future directions. *Internet and Higher Education, 10*(3), 157–172. https://doi.org/10.1016/j.iheduc.2007.04.001.

Graham, C. R. (2006). Blended learning systems. In *The handbook of blended learning: Global perspectives, local designs* (Vol. 1, pp. 3–21). San Francisco, CA: Pfeiffer Publishing.

Halverson, L. R., & Graham, C. R. (2019). Learner engagement in blended learning environments: A conceptual framework. *Online Learning, 23*(2), 145–178. https://doi.org/10.24059/olj.v23i2.1481.

Hattie, J. (2008). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. Oxon, England: Routledge.

Hawkins, A., Barbour, M. K., & Graham, C. R. (2011). Strictly business: Teacher perceptions of interaction in virtual schooling. *The Journal of Distance Education, 25*(2). https://www.learntechlib.org/p/54021/

Hawkins, A., Barbour, M. K., & Graham, C. R. (2012). "Everybody is their own island": Teacher disconnection in a virtual school. *The International Review of Research in Open and Distance Learning, 13*(2), 124–144. https://doi.org/10.19173/irrodl.v13i2.967.

Hawkins, A., Graham, C. R., Sudweeks, R. R., & Barbour, M. K. (2013). Course completion rates and student perceptions of the quality and frequency of interaction in a virtual high school. *Distance Education, 34*(1), 64–83. https://doi.org/10.1080/01587919.2013.770430.

Heyman, E. (2010). Overcoming student retention issues in higher education online programs. *Online Journal of Distance Learning Administration, 13*(4). https://www.westga.edu/~distance/ojdla/winter134/heyman134.html

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). *The difference between emergency remote teaching and online learning*. EduCAUSE Review. https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning

Hoover-Dempsey, K. V., Walker, J. M. T., Sandler, H. M., Whetsel, D., Green, C. L., Wilkins, A. S., & Closson, K. (2005). Why do parents become involved? Research findings and implications. *The Elementary School Journal, 106*(2), 105–130. https://doi.org/10.1086/499194.

Kennedy, K., & Archambault, L. (2012). Offering preservice teachers field experiences in K-12 online learning: A national survey of teacher education programs. *Journal of Teacher Education, 63*(3), 185–200. https://doi.org/10.1177/0022487111433651.

Kimmons, R., Graham, C. R., & West, R. E. (2020). The PICRAT model for technology integration in teacher preparation. *Contemporary Issues in Technology and Teacher Education, 20*(1), 176–198. https://citejournal.org/volume-20/issue-1-20/general/the-picrat-model-for-technology-integration-in-teacher-preparation/

Kolb, L. (n.d.). *Triple E framework.* https://www.tripleeframework.com/

Lent, R. C. (2015). *This is disciplinary literacy: Reading, writing, thinking, and doing... content area by content area*. Thousand Oaks, CA: Corwin Press.

Lowenthal, P., Borup, J., West, R., & Archambault, L. (2020). Thinking beyond Zoom: Using asynchronous video to maintain connection and engagement during the COVID-19 pandemic. *Journal of Technology and Teacher Education, 28*(2), 383–391.

Lowes, S., & Lin, P. (2015). Learning to learn online: Using locus of control to help students become successful online learners. *Journal of Online Learning Research, 1*(1), 17–48.

McLeod, S., & Graber, J. (2019). *Harnessing technology for deeper learning*. Solution Tree Press.

Merrill, M. D. (2009). Finding e^3 (effective, efficient, and engaging) instruction. *Educational Technology, 49*(3), 15–26. https://www.jstor.org/stable/44429676

Miller, K., Riley, J., & Slay, L. (2021). School belonging matters now more than ever: Preparing teachers to foster a technology-mediated culture of care. In R. Ferdig & K. Pytash (Eds.), *What teacher educators should have learned from 2020* (pp. 21–33). https://www.learntechlib.org/primary/p/219088

Moore, M. G. (1989). Three types of interaction [Editorial]. *American Journal of Distance Education, 3*(2), 1–7. https://doi.org/10.1080/08923648909526659.

Newmann & Associates. (1996). *Authentic achievement: Restructuring schools for intellectual quality.* San Francisco, CA: Jossey-Bass.

Oviatt, D. R., Graham, C. R., Borup, J., & Davies, R. S. (2018). Online student use of a proximate community of engagement in an independent study program. *Online Learning, 22*(1), 223–251. https://doi.org/10.24059/olj.v22i1.1153.

Palvia, S., Aeron, P., Gupta, P., Mahapatra, D., Rosner, R., & Sindhi, S. (2018). Online education: Worldwide status, challenges, trends, and implications. *Journal of Global Information Technology Management, 21*(4), 233–241. https://doi.org/10.1080/1097198X.2018.1542262.

Pettyjohn, T. J. (2012). *Stakeholders' perceptions of supplemental online learning for credit recovery* (Doctoral dissertation). Georgia Southern University. Retrieved from http://digitalcommons.georgiasouthern.edu/cgi/viewcontent.cgi?article=1402&context=etd

Pulham, E. B., & Graham, C. R. (2018). Comparing K-12 online and blended teaching competencies: A literature review. *Distance Education, 39*(3), 411–432. https://doi.org/10.1080/01587919.2018.1476840.

Redmond, P., Heffernan, A., Abawi, L., Brown, A., & Henderson, R. (2018). An online engagement framework for higher education. *Online Learning, 22*(1), 183–204. https://doi.org/10.24059/olj.v22i1.1175.

Rodgers, T. (2008). Student engagement in the e-learning process and the impact on their grades. *International Journal of Cyber Society and Education, 1*(2), 143–156.

Rose, R. M., Smith, A., Johnson, K., & Glick, D. (2015). Ensuring equitable access in online and blended learning. In T. Clark & M. K. Barbour (Eds.), *Online, blended, and distance education in schools: Building successful programs* (pp. 71–83). Sterling, VA: Stylus Publishing.
Saye, J. W., & Associates. (2015). Achieving authentic pedagogy. In W. C. Parker (Ed.), *Social studies today: Research and practice* (pp. 65–72). New York, NY: Routledge.
Saye, J. W., Stoddard, J., Gerwin, D. M., Libresco, A. S., Maddox, L. E., & The Social Studies Inquiry Research Collaborative (SSIRC). (2018). Authentic pedagogy: Examining intellectual challenge in social studies classrooms. *Journal of Curriculum Studies, 50*(6), 865–884. https://doi.org/10.1080/00220272.2018.1473496.
Shackelford, J. L., & Maxwell, M. (2012). Sense of community in graduate online education: Contribution of learner to learner interaction. *The International Review of Research in Open and Distance Learning, 13*(4), 228–249.
Sinatra, G. M., Heddy, B. C., & Lombardi, D. (2015). The challenges of defining and measuring student engagement in science. *Educational Psychologist, 50*(1), 1–13. https://doi.org/10.1080/00461520.2014.1002924.
Skinner, B. F. (1958). Teaching machines. *Science, 128,* 969–977. https://www.jstor.org/stable/1755240
Taie, S., & Goldring, R. (2019). *Characteristics of public and private elementary and secondary schools in the United States: Results from the 2017–18 National Teacher and principal survey first look (NCES 2019-140*). Washington, DC: U.S. Department of Education, National Center for Education Statistics. https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2019140
Velasquez, A., Graham, C. R., & West, R. E. (2013). An investigation of practices and tools that enabled technology-mediated caring in an online high school. *The International Review of Research in Open and Distance Learning, 14*(5), 277–299. http://www.irrodl.org/index.php/irrodl/article/view/1465/2758
Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes* (M. Cole, Ed.). Cambridge, MA: Harvard University Press.
Wang, C. X. (2021). CAFE: An instructional design model to assist K-12 teachers to teach remotely during and beyond the Covid-19 pandemic. *TechTrends, 65*, 8–16. https://doi.org/10.1007/s11528-020-00555-8.
Watson, J., Murin, A., Vashaw, L., Gemin, B., & Rapp, C. (2011). Keeping pace with K-12 online learning: An annual review of policy and practice. In *Learning* (Ed.), Evergreen Education Group. http://kpk12.com/cms/wp-content/uploads/KeepingPace2011.pdf
Woodworth, J. L., Raymond, M. E., Chirbas, K., Gonzalez, M., Negassi, Y., Snow, W., & Van Donge, C. (2015). Online charter school study. https://credo.stanford.edu/pdfs/OnlineCharterStudyFinal2015.pdf

75 Student Engagement in Open, Distance, and Digital Education

Melissa Bond and Nina Bergdahl

Contents

Abstract

Engaging students in their learning, and within their learning community, is a key goal of educators. However, ongoing discussions about its nature, conceptualization, and measurement have led to a diffusion of the concept's understanding, and ability to apply it within both research and practice. This chapter draws on theoretical and empirical primary and secondary ODDE research, and provides an overview of student engagement and disengagement, particularly as they relate to educational technology. The four dimensions of behavioral, affective/emotional, cognitive, and social (dis-)engagement are presented, alongside example indicators. In addition, a bioecological model of student engagement is explored with explicit links to digital learning. The chapter concludes by providing open questions and directions for future research, including further emphasis and

M. Bond (✉)
Centre for Change and Complexity in Learning, University of South Australia, Mawson Lakes, SA, Australia
e-mail: melissa.bond@unisa.edu.au

N. Bergdahl
Department of Learning, Halmstad University: Högskolan i Halmstad, Halmstad, Sweden

Stockholm University, Kista, Sweden
e-mail: nina.bergdahl@hh.se

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_79

exploration needed on the role of social engagement in ODDE contexts, as well as disengagement as a separate construct.

Keywords

Student engagement · Disengagement · Educational technology · Digital technology · Online learning · Remote learning · Blended learning,

Introduction

Engaging students in learning is a key goal of educators, especially as disengagement has been found to profoundly affect students' cognitive development and learning outcomes (Ma, Han, Yang, & Cheng, 2015), and is a predictor of student dropout in both secondary and higher education (Finn & Zimmer, 2012). As such, student engagement has received increasing attention over the past decade (Aparicio, Iturralde, & Maseda, 2021), suffering from ongoing criticism about its continued fuzziness as a construct (Trowler, Allan, Bryk, & Din, 2021), and being described in various ways in the literature.

There has also been widespread discussion about the nature, conceptualization, and measurement of engagement, as well as the level of theorizing being undertaken, in the field of open, distance, and digital education (e.g., Bergdahl, 2020; 2022c, Bond, 2020b; Henrie, Halverson, & Graham, 2015). While research has found that using educational technology can lead to improved self-regulation and self-efficacy (Alioon & Delialioğlu, 2019), increased participation (Northey, Bucic, Chylinski, & Govind, 2015), and increased involvement in the wider educational community (Junco, 2012), educational technology research has often lacked theoretical guidance (Bergdahl, Nouri, Karunaratne, Afzaal, & Saqr, 2020; Bond, Buntins, Bedenlier, Zawacki-Richter, & Kerres, 2020; Hew, Lan, Tang, Jia, & Lo, 2019). Given the difference between on-site/learning and learning undertaken in ODDE contexts, particularly within the current climate of remote and hybrid learning, it is crucial that further attention is given to understanding the complex interplay of digital learning environments and emerging educational modes (Bergdahl, 2022b), teacher-student relationships (Bergdahl & Bond, 2021), and learning activities (Bergdahl, 2022a).

This chapter, therefore, draws from and builds on the doctoral work and ongoing research of Bond (2020a) and Bergdahl (2020), and provides an overview of the concept of student engagement, particularly as it relates to educational technology. It will then briefly outline recent student engagement and ODDE research, provide implications for practice, and suggest future research directions.

What Is Student Engagement?

The concept of student engagement arose out of a range of previous theories, which has led to discussions centering around the depth and breadth of its operationalization (e.g., Eccles, 2016; Lawson & Lawson, 2013). There is, however, widespread agreement as to its multifaceted and complex nature (Appleton, Christenson, & Furlong, 2008; Fredricks, Blumenfeld, & Paris, 2004; Kahu, 2013), with Azevedo (2015, p. 84) declaring that it is

> one of the most widely used and overgeneralized constructs found in the educational, learning, instructional, and psychological sciences.

Similarly, Kearsley and Shneiderman (1998) developed a framework for technology-based teaching and learning, based on the principles of "Relate, Create, and Donate," calling it Engagement Theory. For them, engaged learning involved active cognitive processes, such as problem-solving and decision making, based on meaningful and authentic collaborative activities.

The Community of Inquiry framework (Garrison, Anderson, & Archer, 2000) furthered understanding of these collaborative activities that promote engagement, by describing the importance of teacher presence, social presence, and cognitive presence in facilitating effective educational experiences. Community Theory (Rovai, Wighting, & Lucking, 2004; Wenger, 2008) also influenced student engagement theorizing, with its emphasis on active participation, a sense of belonging and/or a feeling of membership, and the development of trust in self, peers, and the teacher. While Self-Determination Theory (Deci & Ryan, 1985) recognizes the role that teachers and peers play in influencing levels of intrinsic and extrinsic motivation, motivation is instead seen as an antecedent to engagement, as the intent that energizes behavior (Lim, 2004; Reeve, 2012; Reschly & Christenson, 2012). However, students can engage in learning without waiting to be motivated (Reeve, 2012). Even though teachers can influence engagement directly (Bergdahl & Bond, 2021), they often try to influence engagement indirectly via motivation and risk overlooking how their learning designs facilitate engagement or trigger disengagement (Bergdahl, 2022c, d). While the constructs are related, motivation alone remains insufficient for students to engage (Bergdahl, 2022c, d).

Astin's (1984) theory of involvement was instrumental in furthering understanding of engagement. He defined involvement as the "physical and psychological energy that the student devotes to the academic experience" (p. 518), occurring along a continuum, with particular focus on active participation, interaction with peers and teachers, time-on-task, and effort, as well as their subsequent relation to satisfaction and overall achievement. Engagement can be approached as a manifestation of energy and effort in action (Filsecker & Kerres, 2014). Based on these ideas, we define student engagement as

> the energy and effort that students employ within their learning community, observable via any number of behavioral, cognitive, or affective indicators across a continuum. It is shaped by a range of structural and internal influences, including the complex interplay of relationships, learning activities, and the learning environment. The more students are engaged and empowered within their learning community, the more likely they are to channel that energy back into their learning, leading to a range of short and long-term outcomes, that can likewise further fuel engagement. (Bond et al., 2020, p. 3)

While it may seem that engagement is defined vaguely, several reviews have revealed that engagement research is consistently strongly correlated with academic success, and thus remains a core concept in educational research (Alrashidi, Phan, & Ngu, 2016; Henrie et al., 2015; Nkomo, Daniel, & Butson, 2021). It should also be pointed out that, in order for a theory to develop, an understanding of any phenomenon cannot be fixed or cemented. Thus, it should never be a vision to determine a fixed position, but rather to contribute to further understanding.

Contributing to further conceptual understanding, Wang, Fredricks, Ye, Hofkens, and Linn (2017) explored the relationship between engagement and disengagement, and concluded that these should be considered as two separate, but distinct constructs, each with its own continuum; a position supported here and discussed in greater depth within The Microsystem Level section in this chapter. When applied as a meta-concept, researchers might be less prone to explore the dimensions or the relations between the indicators of the dimensions. However, what the relationship between engagement and disengagement is at a microlevel, remains an important one to explore.

Bond (2019) proposed a bioecological model where engagement can be approached at the macro-, meso-, and microlevel, and later Bergdahl (2022b) explored engagement at the microlevel. Both articles assume that learning exists in a social reality. We therefore start by positioning engagement in a sociocultural context.

Sociocultural Positioning of Student Engagement

Student engagement does not occur within a vacuum; it is influenced and impacted by many contextual factors (Kahu, 2013; Quin, 2017). By considering the wider sociopolitical context influencing student engagement, a clearer and more holistic understanding of students and their learning can be gained (Appleton et al., 2008). Following an extensive review of student engagement literature, both theoretical and primary/secondary empirical research (Bond, 2020b; Bond & Bedenlier, 2019; Bond et al., 2020), and through conducting empirical studies (e.g., Bond, 2019), a bioecological model of student engagement was developed (see Fig. 1), based on Bronfenbrenner and colleagues' model of child development (e.g., Bronfenbrenner, 1979). This model places the student at the center of the microsystem, nested within a system of intertwined milieus; the mesosystem, representing interactions between the micro- and exosystems, as well as between microsystems; the exosystem, including wider social structures impacting on the learner; and the macrosystem, encompassing the wider political, cultural, economic, and legal systems, in which all systems are located. The remainder of this chapter will focus on the meso- and the micro-system.

The Mesosystem Level

The mesosystem level represents a student's social milieu and background, as well as their location and socioeconomic status. In some (dis-)engagement research, the reasons that students disengaged were sometimes identified in the meso-level – for

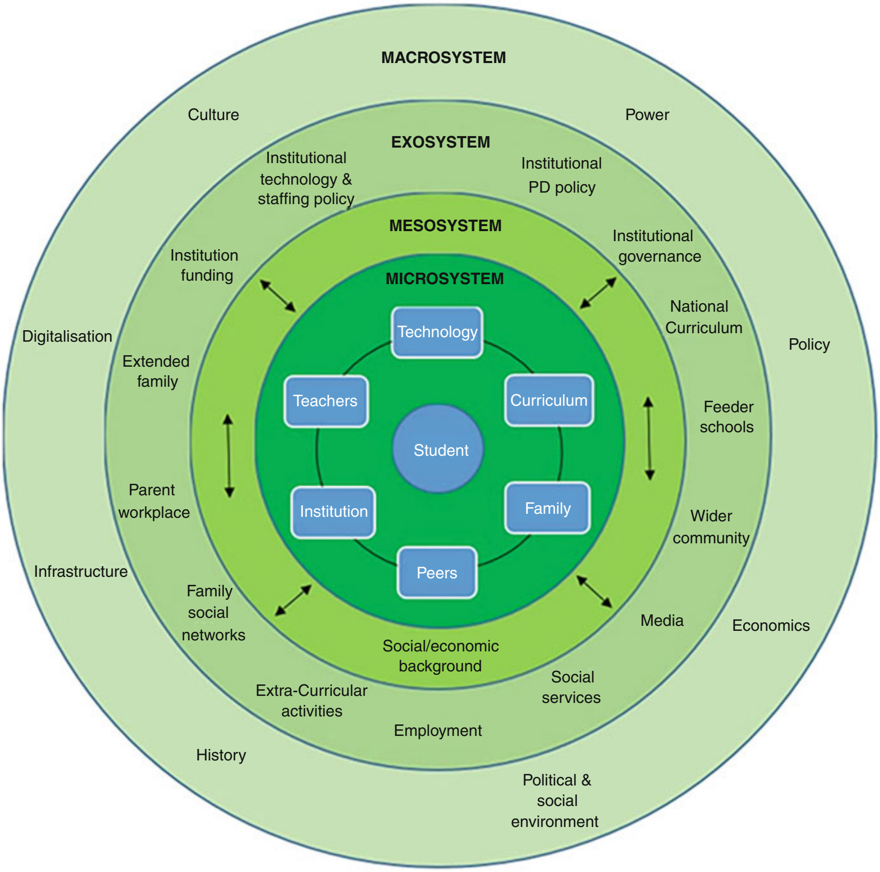


Fig. 1 Bioecological model of student engagement (Bond, 2020a, 2020b)

example, socioeconomic factors and the stress level in the family (Alexander, Entwisle, & Kabbani, 2001), the number of siblings in the family (Chiu, 2010), and parental engagement (Bond et al., 2021). Economic factors can impact on the ability of families to afford devices (Warschauer & Xu, 2018), as well as access to the internet (Bond, 2019). Despite access to technology continually growing, issues of a digital divide persist, even in countries that are considered wealthy (Bond, Bedenlier, et al., 2021; Bond et al., 2021).

With multiple influential aspects in an increasingly digital context (dis-)engagement is subject to negotiation (Bergdahl & Bond, 2021). A learning context may be comprised of the educational mode (blended, hybrid, distance, or f2f), classroom leadership (including teacher self-efficacy), student self-perceptions and profile, and the available digital and analogue resources (ibid.), which create conditions under which engagement is affected. For example, distance education with mainly asynchronous elements has been found to primarily facilitate cognitive engagement, whereas distance education characterized with mainly synchronous elements, relied on social engagement (Bergdahl & Gyllander Torkildsen, 2022). Both of these modes of education challenge the teacher to not simply roll with what is easiest to enable in that particular mode, but what benefits learning most.

Conducting a needs analysis of digital device access at the beginning of a course is therefore vital, especially in ODDE, as this can help deepen understanding of any real or potential barriers to engagement (Goodall, 2018). It is also important to be cognizant of student ownership and use of devices that are not compatible with those used by the institution, as this can impact participation and engagement (Bond, 2019), as can rules at institutions for using certain apps within courses, especially in light of the GDPR in Europe (Bond, Marín, Dolch, Bedenlier, & Zawacki-Richter, 2018). Approaching this level could, for example, be beneficial when evaluating a mode of educational delivery, or institutional interventions aimed at increasing engagement and redeeming disengagement for specific groups of students.

The Microsystem Level

The microsystem includes the students' immediate setting, for example, home or the classroom, and includes interaction with teachers, peers, authentic and worthwhile tasks (Kearsley & Shneiderman, 1998; Lim, 2004), the institution, family, and technology (Willis, Povey, Hodges, & Carroll, 2018). These external factors play a vital role in students' ongoing sense of connectedness, well-being, engagement, and success (Aldridge & McChesney, 2018). It is also important to consider the internal psychosocial influences on engagement, including motivation, skills, self-efficacy, well-being, and self-regulation (Bandura, 1995; Reschly & Christenson, 2012; Zepke, 2014), alongside their prior experiences with and level of acceptance of technology (Moos & Azevedo, 2009). This is also true of both teachers (Marcelo & Yot-Domínguez, 2018) and parents (Ihme & Senkbeil, 2017), whose attitudes to and skills with using technology can influence students (Krause, 2014).

There are (at least) two ways of approaching engagement within the microsystem level: a general level of engagement and momentary engagement. Sometimes, the general level is referred to as a macro-level (but this should not be confused with levels in the bioecological model above cf. Symonds et al., 2021). The general level (or macro-level) uses one data-point to reflect engagement in all subjects or across a full semester. The momentary (microlevel) engagement is used to reflect engagement in situ, and to capture fluctuations of student engagement in learning by comparing engagement on a day-to-day, lesson-to-lesson or activity-to-activity basis. A micro-level of engagement is useful when understanding how learning activities engage students, evaluate the effectiveness of learning designs, and can inform variations of engagement throughout the day, week, or across subjects. Conducting a Mixed Method Grounded Theory (MMGT) study, Bergdahl (2022c) approached teachers who regularly taught remote, hybrid, and distance courses across K-12 and adult learning. The teachers used a diary to reflect on students' level of engagement (by using a 1–5 scale, where one was low level and five was a high level of

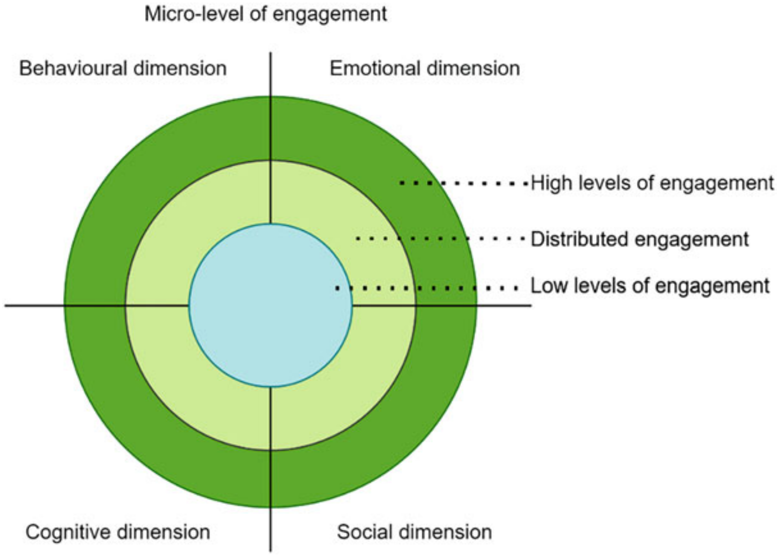


Fig. 2 Microlevel of engagement (Bergdahl, 2022c). Model viewed from above

engagement), as well as how they experienced student engagement online. Following an analysis of teacher perceptions of online engagement, a model of microlevel engagement was suggested (see Fig. 2).

Figure 2 suggests that there are qualitative aspects to engagement online, i.e., a student can display more engagement or less engagement (Bergdahl, 2022c). The highest level of engagement is visualized as three green layers. When engagement decreases, students rely on less engagement to succeed with their learning. As engagement decreases, the model reflects this with decreased green layers, for that dimension of engagement. For example, removing the outer layer in the cognitive dimension could manifest as attention being distributed (or shared) between listening to the teacher and focusing on non-learning-related activities. The teachers suggested that qualitative aspects include a degree of immediacy and responsiveness, ambivalence, having fragmented attention, and shallow learning (as opposed to deep learning). Ideally, all four engagement dimensions should be (fully) activated when immediacy and responsiveness are displayed. For example, students could be well-prepared with required equipment and materials, having completed their homework (behavioral dimension), exert the effort to master the subject, stay focused (cognitive dimension), display curiosity and aptitude to learn (emotional/affective dimension), as well as invite peers to share their reflections and contribute to a positive learning climate (social dimension). If engagement decreases in one dimension, the outer layer becomes inactive. If it decreases more, another layer is deactivated. When the inner layer is the only layer reflecting active engagement, then engagement levels are at their lowest. While students may have a desire to engage, they no longer participate in the learning activity, but may be fully engaged in something else that is not education related. The engagement 'in something else', has led to disengagement from learning. It is also important to note that each indicator of disengagement may not have a natural opposite on the engagement scale (and vice versa) (Skinner, Kindermann, & Furrer, 2009); that is, disengagement is more than the lower levels of engagement in ODDE.

One problem with disengagement is that it may spiral into withdrawal, truancy, and dropping out of education (e.g., Tomaszewska-Pękała, Marchlik, & Wrona, 2020). Overlooking disengagement may lead to a failure to uncover critical insights that could redeem disengagement and support students to re-engage (Bergdahl, 2022d). If school students' disengagement spirals into absenteeism and school dropout, for example, it has been shown that they have a hard time reentering and pursuing higher education (Department for Business Innovation and Skills, 2014).

While researchers have suggested that students could be engaged and disengaged at the same time (Fredricks, Reschly, & Christenson, 2019), further insights were needed. Building on the teachers' diaries and interviews in the MMGT study, Bergdahl (2022c) then explored how disengagement and engagement indicators co-occurred when students were reported to engage at different levels (using the 1–5 scale) (see Fig. 3). Students estimated to engage at level 1 and level 5 do not necessarily express this in the same way. For example, students at level 1 were reported to display either disengagement behavior or a combination of indicators or engagement and disengagement. The combinations varied between the estimated levels of engagement (Fig. 3 visualizes level 1 and level 5).

The following abbreviations are used in Fig. 3: Beh, Cog, Emo, Soc for behavioral, cognition, emotion, social dimensions of engagement, and D is used to indicate disengagement: i.e., DBeh for disengagement behavior.

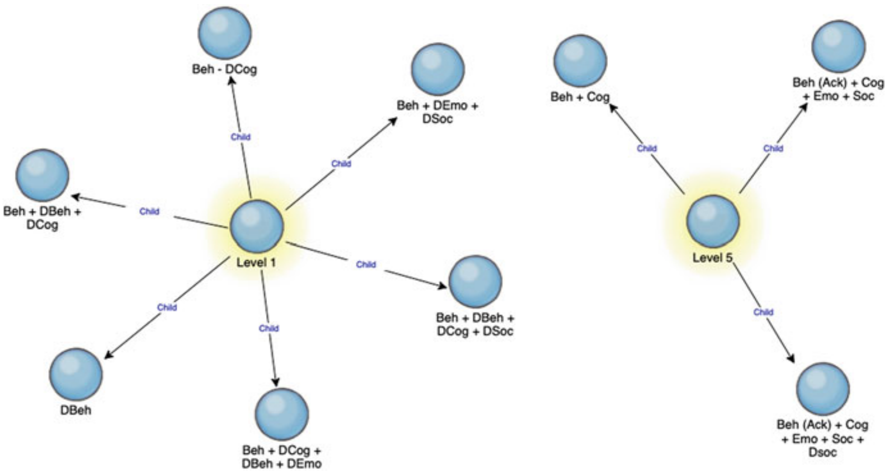


Fig. 3 Teacher reported co-occurrence of engagement and disengagement indicators at levels 1 and 5 (Bergdahl, 2022c)

Indicators of Student Engagement in ODDE

Each dimension of student engagement comprises many indicators (or facets) of engagement (see Table 1, adapted from Bergdahl et al., 2020; Bergdahl & Hietajärvi, 2022; Bond, 2020a, 2020b), as well as disengagement (see Table 2, adapted from Bergdahl et al., 2020; Bond, 2020a, 2020b), experienced as two related but distinctly separate constructs (Wang et al., 2017). Although many studies use three dimensions of student engagement— affective/emotional, cognitive, and behavioral (e.g., Fredricks et al., 2004) — we contend that social engagement plays an important role in student learning (Bergdahl, 2020; Bergdahl, 2022c, Bergdahl & Hietajärvi, 2022; Bond et al., 2021). Individual learning can be reflected using behavioral, cognitive, and emotional engagement, however, there is both individual and social knowledge-building (Stahl, 2006), as "social interaction provides essential cognitive resources for human cognitive accomplishment" (Paavlova et al., 2004, p. 546). As shown above, the MMGT study (Bergdahl, 2022c) identified quite other combinations of engagement co-occurring for highly engaged students. These could include immediacy (cognitive engagement), dedication beyond what was expected (emotional/affective engagement), and social withdrawal (emotional/affective disengagement). Social engagement was also particularly important during the COVID-19 pandemic (Bond et al., 2021) and should now be considered a critical fourth dimension of engagement (Finn & Zimmer, 2012; Linnenbrink-Garcia, Rogat, & Koskey, 2011; Wang et al., 2017), especially in ODDE contexts (Bergdahl, 2022c).

Table 1 Example engagement indicators

Behavioral engagement	Cognitive engagement	Affective engagement	Social engagement
Effort	Critical thinking	Enthusiasm	Collaborating and interacting with peers
Study habits/homework completion	Self-regulation	Interest	Collaborating and interacting with teachers
Attending live lessons	Reflection	Satisfaction	Shared knowledge building
Assuming responsibility	Deep learning	Pride	Asking for help
Participation/ involvement	Focus/ concentration	Excitement	Caring for others

Table 2 Example disengagement indicators

Behavioral disengagement	Cognitive disengagement	Affective disengagement	Social disengagement
Procrastination	Unwilling	Boredom	Feeling isolated
Absence	Apathy	Anger	Not feeling cared for
Giving up	Opposition/ rejection	Dislike	Withdrawing
Poor conduct	Avoidance	Disinterest	Social anxiety
Task incompletion	Unfocused/ inattentive	Frustration	Indifferent or negative to interaction

Social engagement relates to students' positive interaction with teachers, the learning environment, and peers, whereas affective engagement relates to students' enthusiasm, satisfaction, and enjoyment in their learning, as well as their interest and sense of belonging. Behavioral engagement relates to positive conduct, such as attending synchronous lessons, and participating in discussion forums, completing work, and persistence, whereas cognitive engagement relates to deep learning strategies, self-regulation, and understanding.

Behavioral engagement is arguably the easiest domain to measure, as these are observable indicators, such as homework completion. However, a recent scoping review of 243 studies, focused on student engagement while using educational technology in higher education (Buntins, Kerres, & Heinemann, 2021), found that behavioral learning processes were measured as the second most frequent (36.6%, $n = 90$), behind affective learning processes (57.3%, $n = 141$). Nkomo et al. (2021) also argued that measuring only one or two dimensions of engagement in isolation prevents a more holistic and nuanced understanding of student engagement to occur. Engagement is influenced by – and within – the social context it occurs (Bergdahl & Bond, 2021). Thus, engagement is situation-specific, proactive, and reactive to external and internal stimuli and influence. When students display engagement and disengagement simultaneously (Bergdahl, 2022c; Fredricks et al., 2019), cognitive and affective/emotional dimensions of engagement may drive behavioral engagement (Reschly & Christenson, 2006). Bergdahl (2022c) suggested that there seems to be complex intra- and interdimensional influences between all engagement and disengagement dimensions, which seem to affect each other (see Fig. 4).

Figure 4 reflects how an external trigger activates one dimension of disengagement (in the figure, the behavioral dimension is activated) (Bergdahl, 2022c). Even though engagement and disengagement may co-occur, full engagement cannot coexist with full disengagement. Thus, an activated section of disengagement triggers deactivation of an engagement section. For example, an easily distracted

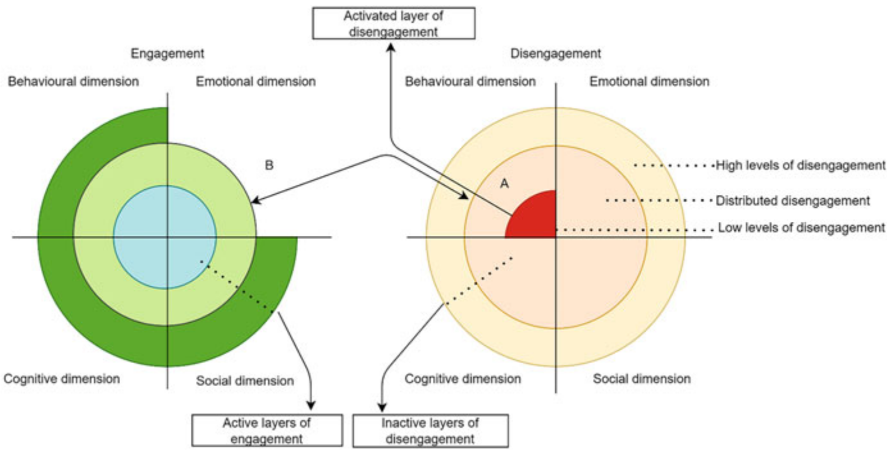


Fig. 4 Interdimensional influences on student engagement

student enters class with an open mind and willingness to learn (emotional/affective engagement) but gets distracted by a mobile phone notification. Here, the student could display behavioral and cognitive disengagement (i.e., by actively choosing to engage in unauthorized uses of digital technologies). In other situations, students could withdraw from interaction and collaboration (social disengagement) due to social insecurities (emotional/affective disengagement).

The empirical results (Bergdahl, 2022c) support previously forwarded suggestions: that emotional/affective states can trigger engagement (Reschly & Christenson, 2006) and that student engagement is "non-linear reactions and pro-actions to internal (e.g., rising and falling fatigue, interest, hunger) and external (e.g., peer comments, teacher instructions) events" (Symonds et al., 2021, p. 14). Importantly, social insecurities were identified as preventing high levels of engagement, even for students who were identified as normally being highly engaged. It is proposed that the teacher's social engagement with the (socially insecure) student could be a way forward to redeem social disengagement in class (Bergdahl, 2022c). After all, it has been found that indicators of engagement are not necessarily the ones that are significant when exploring disengagement, with the validation of a survey (Bergdahl et al., 2020) uncovering that social engagement, and social disengagement, were found to have the highest factor loadings (explanatory values) of all dimensions: indicating that the social dimension is critical critical for students in general, but disengaged students in particular.

Open Questions and Directions for Future Research

This chapter explored how engagement can be approached at different levels, by providing examples of engagement at the meso- and microlevel, as well as how both the emotional/affective and social dimension of engagement are critical for student success. Considering the tradition of exploring engagement as a three-dimensional construct, we strongly encourage researchers to include the social dimension in future research, particularly as it relates to blended and online uses of synchronous and asynchronous collaboration tools, social networking tools, and assessment tools, which are areas that have been less researched in recent years (Bergdahl, 2022b, 2022c; Bergdahl & Gyllander Torkildsen, 2022; Bond et al., 2020, Bond et al., 2021). To further develop engagement theory, the relationship between bioecological levels, for example, how the social dimension of engagement relates to student sociocultural context, and the intra- and interdimensional dynamics between and within engagement and disengagement, across modes of online delivery, need to be further clarified.

We have also discussed how engagement is easier to identify than disengagement. However, one reason for this might be the amount of previous research that has focused on engagement, as opposed to disengagement, which would then have an influential effect on further research. Disengagement can both be used to describe maladaptive behavior and to measure what does not happen, and when learning online, disengagement may be challenging to observe. For example, measuring the time to initiate work in an LMS has been shown to indicate procrastination, and decreased results and completion (Saqr et al., 2019). However, merely leaving the computer or not logging in, could also mean the computer was not working, or that the student collaborated with a peer and used another account. More research on student disengagement in online learning, that is not unidimensional, is therefore needed. Further to this is the effect of the mode of delivery (synchronous or asynchronous) in ODDE, which has been shown to affect how teachers facilitate student engagement (Bergdahl & Gyllander Torkildsen, 2022).

While we have proposed some entry points for future direction, we would also like to underline that much of the existing research has been conducted in higher education settings, while other educational settings (e.g., hybrid solutions for younger learners, blended learning in primary school, online learning in high school subjects other than STEM) remain largely overlooked (Bergdahl et al., 2020; Bond, 2020b; Bond, Bedenlier, et al., 2021; Bond et al., 2021). Further primary and secondary research that can shine a light on how engagement can be enhanced in these ODDE settings, and how disengagement can be realigned, is much needed.

References

Aldridge, J. M., & McChesney, K. (2018). The relationships between school climate and adolescent mental health and wellbeing: A systematic literature review. *International Journal of Educational Research, 88*, 121–145. https://doi.org/10.1016/j.ijer.2018.01.012.

Alexander, K. L., Entwisle, D. R., & Kabbani, N. S. (2001). The dropout process in life course perspective: Early risk factors at home and school. *Teachers College Record, 103*(5), 760–822. https://doi.org/10.1111/0161-4681.00134.

Alioon, Y., & Delialioğlu, Ö. (2019). The effect of authentic m-learning activities on student engagement and motivation. *British Journal of Educational Technology, 50*(2), 655–668. https://doi.org/10.1111/bjet.12559.

Alrashidi, O., Phan, H. P., & Ngu, B. H. (2016). Academic engagement: An overview of its definitions, dimensions, and major conceptualisations. *International Education Studies, 9*(12), 41–52. https://doi.org/10.5539/ies.v9n12p41.

Aparicio, G., Iturralde, T., & Maseda, A. (2021). A holistic bibliometric overview of the student engagement research field. *Journal of Further and Higher Education, 45*(4), 540–557. https://doi.org/10.1080/0309877X.2020.1795092.

Appleton, J. J., Christenson, S. L., & Furlong, M. J. (2008). Student engagement with school: Critical conceptual and methodological issues of the construct. *Psychology in the Schools, 45*(5), 369–386. https://doi.org/10.1002/pits.20303.

Astin, A. W. (1984). Student involvement: A developmental theory for higher education. *Journal of College Student Development, 25*(4), 297–308.

Azevedo, R. (2015). Defining and measuring engagement and learning in science: Conceptual, theoretical, methodological, and analytical issues. *Educational Psychologist, 50*(1), 84–94. https://doi.org/10.1080/00461520.2015.1004069.

Bandura, A. (1995). Exercise of personal and collective efficacy in changing societies. In A. Bandura (Ed.), *Self-efficacy in changing societies* (pp. 1–45). New York: Cambridge University Press.

Bergdahl, N. (2020). *Upper secondary student engagement and disengagement in blended learning* (Dissertation). Department of Computer and Systems Sciences. Stockholm University.

Bergdahl, N. (2022a). Adaptive professional development during the pandemic. *Designs for Learning, 10*(2022), 1–14. https://doi.org/10.16993/dfl.172.

Bergdahl, N. (2022b, in review). *Second language learning designs in online adult education*.

Bergdahl, N. (2022c). Engagement and disengagement in online learning. *Computers & Education, 188*(March), 1–19. https://doi.org/10.1016/j.compedu.2022.104561.

Bergdahl, N. (2022d). Teachers' understanding of student engagement online. [Lärares förståelse av elevers engagemang online]. *Pedagogisk Forskning i Sverige*. ISSN 1401-6788, 1–23. https://open.lnu.se/index.php/PFS/article/view/2917.

Bergdahl, N., & Bond, M. (2021). Negotiating K-12 (dis-)engagement in blended learning. *Education and Information Technologies, 27*, 1–26. https://doi.org/10.1007/s10639-021-10714-w.

Bergdahl, N., & Gyllander Torkildsen, L. (2022). Analysing visual representations of adult online learning across formats. In *The 24th Human Computer Interaction International Conference HCII 2022*, Gothenburg, Sweden, June 26–July 1, 2022. Lecture Notes in Computer Science, vol. 13309. Springer Nature.

Bergdahl, N., & Hietajärvi, L. (2022 – in review). *Social Engagement in Distance-, Remote- and Hybrid Learning*.

Bergdahl, N., Nouri, J., Karunaratne, T., Afzaal, M., & Saqr, M. (2020). Learning analytics for blended learning: A systematic review of theory, methodology, and ethical considerations. *International Journal of Learning Analytics and Artificial Intelligence for Education (IJAI), 2*(2), 46–79. https://doi.org/10.3991/ijai.v2i2.17887.

Bond, M. (2019). Flipped learning and parent engagement in secondary schools: A South Australian case study. *British Journal of Educational Technology, 50*(3), 1294–1319. https://doi.org/10.1111/bjet.12765.

Bond, M. (2020a). *Facilitating student engagement through educational technology: Current research, practices and perspectives.* Carl von Ossietzky University of Oldenburg. https://doi.org/10.13140/RG.2.2.24728.75524.

Bond, M. (2020b). Facilitating student engagement through the flipped learning approach in K-12: A systematic review. *Computers & Education, 151*, 1–36. https://doi.org/10.1016/j.compedu.2020.103819.

Bond, M., & Bedenlier, S. (2019). Facilitating student engagement through educational technology: Towards a conceptual framework. *Journal of Interactive Media in Education*, *2019*(1), Article 11, 1–14. https://doi.org/10.5334/jime.528.

Bond, M., Bedenlier, S., Marín, V. I., & Händel, M. (2021). Emergency remote teaching in higher education: Mapping the first global online semester. *International Journal of Educational Technology in Higher Education, 18*(1), 1–24. https://doi.org/10.1186/s41239-021-00282-x.

Bond, M., Bergdahl, N., Mendizabal-Espinosa, R., Kneale, D., Bolan, F., Hull, P., & Ramadani, F. (2021). *Global emergency remote education in secondary schools during the COVID-19 pandemic: A systematic review.* EPPI Centre, UCL Social Research Institute, University College London. https://eppi.ioe.ac.uk/cms/Default.aspx?tabid=3847.

Bond, M., Buntins, K., Bedenlier, S., Zawacki-Richter, O., & Kerres, M. (2020). Mapping research in student engagement and educational technology in higher education: A systematic evidence map. *International Journal of Educational Technology in Higher Education*, *17*(1), Article 2, 1–30. https://doi.org/10.1186/s41239-019-0176-8.

Bond, M., Marín, V. I., Dolch, C., Bedenlier, S., & Zawacki-Richter, O. (2018). Digital transformation in German higher education: Student and teacher perceptions and usage of digital media. *International Journal of Educational Technology in Higher Education, 15*(1), 1–20. https://doi.org/10.1186/s41239-018-0130-1.

Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Cambridge, MA: Harvard University Press.

Buntins, K., Kerres, M., & Heinemann, A. (2021). A scoping review of research instruments for measuring student engagement: In need for convergence. *International Journal of Educational Research Open, 2*(100099), 1–12. https://doi.org/10.1016/j.ijedro.2021.100099.

Chiu, M. M. (2010). Effects of inequality, family and school on mathematics achievement: Country and student differences. *Social Forces, 88*(4), 1645–1676. https://www.jstor.org/stable/40645953.

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. Springer US. https://doi.org/10.1007/978-1-4899-2271-7.

Department for Business Innovation and Skills. (2014). *Learning from Futuretrack: Dropout from higher education* (BIS Research paper no. 168). London. https://www.hecsu.ac.uk/assets/assets/documents/Futuretrack_BIS_Learning_from_futuretrack_dropout.pdf.

Eccles, J. (2016). Engagement: Where to next? *Learning and Instruction, 43*, 71–75. https://doi.org/10.1016/j.learninstruc.2016.02.003.

Filsecker, M., & Kerres, M. (2014). Engagement as a volitional construct. *Simulation & Gaming, 45*(4–5), 450–470. https://doi.org/10.1177/1046878114553569.

Finn, J., & Zimmer, K. (2012). Student engagement: What is it? Why does it matter? In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 97–131). Springer US. https://doi.org/10.1007/978-1-4614-2018-7_5.

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research, 74*(1), 59–109. https://doi.org/10.3102/00346543074001059.

Fredricks, J. A., Reschly, A. L., & Christenson, S. L. (2019). *Handbook of student engagement interventions: Working with disengaged students* (J. A. Fredricks, A. L. Reschly, & S. L. Christenson, Eds.). Elsevier.

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education, 2*(2–3), 87–105. https://doi.org/10.1016/S1096-7516(00)00016-6.

Goodall, J. (2018). A toolkit for parental engagement: From project to process. *School Leadership & Management, 38*(2), 222–238. https://doi.org/10.1080/13632434.2018.1430689.

Henrie, C. R., Halverson, L. R., & Graham, C. R. (2015). Measuring student engagement in technology-mediated learning: A review. *Computers & Education, 90*, 36–53. https://doi.org/10.1016/j.compedu.2015.09.005.

Hew, K. F., Lan, M., Tang, Y., Jia, C., & Lo, C. K. (2019). Where is the “theory” within the field of educational technology research? *British Journal of Educational Technology, 50*(3), 956–971. https://doi.org/10.1111/bjet.12770.

Ihme, J. M., & Senkbeil, M. (2017). Why adolescents cannot realistically assess their own computer-related skills. *Zeitschrift Fur Entwicklungspsychologie Und Pädagogische Psychologie, 49*(1), 24–37. https://doi.org/10.1026/0049-8637/a000164.

Junco, R. (2012). The relationship between frequency of Facebook use, participation in Facebook activities, and student engagement. *Computers & Education, 58*(1), 162–171. https://doi.org/10.1016/j.compedu.2011.08.004.

Kahu, E. R. (2013). Framing student engagement in higher education. *Studies in Higher Education, 38*(5), 758–773. https://doi.org/10.1080/03075079.2011.598505.

Kearsley, G., & Shneiderman, B. (1998). Engagement theory: A framework for technology-based teaching and learning. *Educational Technology, 38*(5), 20–23.

Krause, L. (2014). *Examining stakeholder perceptions of accessibility and utilization of Computer and Internet Technology in the Selinsgrove Area School District* (Dissertation). Drexel University.

Lawson, M. A., & Lawson, H. A. (2013). New conceptual frameworks for student engagement research, policy, and practice. *Review of Educational Research, 83*(3), 432–479. https://doi.org/10.3102/0034654313480891.

Lim, C. (2004). Engaging learners in online learning environments. *TechTrends, 48*(4), 16–23. https://link.springer.com/content/pdf/10.1007%2FBF02763440.pdf.

Linnenbrink-Garcia, L., Rogat, T. K., & Koskey, K. L. (2011). Affect and engagement during small group instruction. *Contemporary Educational Psychology, 36*(1), 13–24. https://doi.org/10.1016/j.cedpsych.2010.09.001.

Ma, J., Han, X., Yang, J., & Cheng, J. (2015). Examining the necessary conditions for engagement in an online learning environment based on learning analytics approach: The role of the instructor. *The Internet and Higher Education, 24*, 26–34. https://doi.org/10.1016/j.iheduc.2014.09.005.

Marcelo, C., & Yot-Domínguez, C. (2018). From chalk to keyboard in higher education classrooms: Changes and coherence when integrating technological knowledge into pedagogical content knowledge. *Journal of Further and Higher Education*, 1–14. https://doi.org/10.1080/0309877X.2018.1429584.

Moos, D. C., & Azevedo, R. (2009). Learning with computer-based learning environments: A literature review of computer self-efficacy. *Review of Educational Research, 79*(2), 576–600. https://doi.org/10.3102/0034654308326083.

Nkomo, L. M., Daniel, B. K., & Butson, R. J. (2021). Synthesis of student engagement with digital technologies: A systematic review of the literature. *International Journal of Educational Technology in Higher Education, 18*(1), 1–26. https://doi.org/10.1186/s41239-021-00270-1.

Northey, G., Bucic, T., Chylinski, M., & Govind, R. (2015). Increasing student engagement using asynchronous learning. *Journal of Marketing Education, 37*(3), 171–180. https://doi.org/10.1177/0273475315589814.

Paavola, S., Lipponen, L., & Hakkarainen, K. (2004). Models of innovative knowledge communities and three metaphors of learning. *Review of Educational Research, 74*(4), 557–576. https://doi.org/10.3102/00346543074004557.

Quin, D. (2017). Longitudinal and contextual associations between teacher–student relationships and student engagement. *Review of Educational Research, 87*(2), 345–387. https://doi.org/10.3102/0034654316669434.

Reeve, J. (2012). A self-determination theory perspective on student engagement. In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 149–172). Springer US. http://link.springer.com/10.1007/978-1-4614-2018-7_7.

Reschly, A., & Christenson, S. L. (2006). Promoting school completion. In G. Bear & K. Minke (Eds.), *Children's needs III: Understanding and addressing the developmental needs of children*. Bethesda, MD: National Association of School Psychologists.

Reschly, A. L., & Christenson, S. L. (2012). Jingle, jangle, and conceptual haziness: Evolution and future directions of the engagement construct. In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 3–19). Springer US. http://link.springer.com/10.1007/978-1-4614-2018-7_1.

Rovai, A. P., Wighting, M. J., & Lucking, R. (2004). The Classroom and School Community Inventory: Development, refinement, and validation of a self-report measure for educational research. *The Internet and Higher Education, 7*(4), 263–280. https://doi.org/10.1016/j.iheduc.2004.09.001.

Saqr, M., Fors, U., & Nouri, J. (2019). Time to focus on the temporal dimension of learning: a learning analytics study of the temporal patterns of students' interactions and self-regulation. *International Journal of Technology Enhanced Learning, 11*(4), 398. https://doi.org/10.1504/ijtel.2019.10020597.

Skinner, E. A., Kindermann, T. A., & Furrer, C. J. (2009). A motivational perspective on engagement and disaffection. *Educational and Psychological Measurement, 69*(3), 493–525. https://doi.org/10.1177/0013164408323233.

Stahl, G. (2006). A model of collaborative knowledge building. In *Group cognition: Computer support for building collaborative knowledge* (pp. 193–205). Cambridge, MA: MIT.

Symonds, J. E., Kaplan, A., Upadhyaya, K., Salmela-Aro, K., Torsney, B., Skinner, E., & Eccles, J. S. (pre-print, 2021). *Momentary engagement as a complex dynamic system*. PsyArXiv. https://doi.org/10.31234/osf.io/fuy7p.

Tomaszewska-Pękała, H., Marchlik, P., & Wrona, A. (2020). Reversing the trajectory of school disengagement? Lessons from the analysis of Warsaw youth's educational trajectories. *European Educational Research Journal, 19*(5), 445-462. https://doi.org/10.1177/1474904119868866.

Trowler, V., Allan, R. L., Bryk, J., & Din, R. R. (2021). Pathways to student engagement: Beyond triggers and mechanisms at the engagement interface. *Higher Education.* Advance online publication. https://doi.org/10.1007/s10734-021-00798-1.

Wang, M.-T., Fredricks, J., Ye, F., Hofkens, T., & Linn, J. S. (2017). Conceptualization and assessment of adolescents' engagement and disengagement in school. *European Journal of Psychological Assessment, 35*(4), 592–606. https://doi.org/10.1027/1015-5759/a000431.

Warschauer, M., & Xu, Y. (2018). Technology and equity in education. In J. Voogt, G. Knezek, R. Christensen, & K.-W. Lai (Eds.), *Springer international handbooks of education. Second handbook of information technology in primary and secondary education* (Vol. 5, pp. 1063–1079). Springer International Publishing. https://doi.org/10.1007/978-3-319-71054-9_76.

Wenger, E. (2008). *Communities of practice: Learning, meaning, and identity.* New York: Cambridge University Press.

Willis, L.-D., Povey, J., Hodges, J., & Carroll, A. (2018). *PES – Parent engagement in schools*. The University of Queensland, Institute for Social Science Research. https://issr.uq.edu.au/parent-engagement-schools.

Zepke, N. (2014). Student engagement research in higher education: Questioning an academic orthodoxy. *Teaching in Higher Education, 19*(6), 697–708. https://doi.org/10.1080/13562517.2014.901956.

Dimensions of Assessment in Online and Open Education in Terms of Purpose, Function and Theory

76

Daniel T. Hickey, Tripp Harris, and Hyejeong Lee

Contents

Abstract

This chapter considers the assessment of learning in open, distance, and digital education. To add new insights to the extensive body of relevant prior research literature, the chapter uses two "dimensions" of assessment to summarize and extend this work. The first dimension is assessment *function.* This includes traditional *summative* functions ("assessment *of* learning"), modern *formative* functions ("for learning"), and contemporary *transformative* functions ("*as* learning"). This also includes recently introduced *conformative* functions ("as *compliance*") and *deformative* functions ("as *sabotage*"). The second dimension is *theory of learning.* This includes *differential, cognitive-associationist, cognitive-constructivist,* and *situative/sociocultural* theories. This chapter pays particular attention to how these dimensions interact with each other in complex (and often unanticipated) ways, and briefly considers how they interact with two other

D. T. Hickey (✉) · T. Harris · H. Lee
Indiana University Learning Sciences Program, Bloomington, IN, USA
e-mail: dthickey@iu.edu; triharr@iu.edu; hle6@iu.edu

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_80

dimensions (item *format* and assessment *level,* as elaborated elsewhere) in open, distance, and digital education.

Keywords

Educational assessment · Online learning · Open learning · Distance education · Formative assessment · Achievement testing

Introduction

Learning assessment takes on new meaning in open, distance, and digital education (ODDE). When education moves from classrooms to online settings, many traditional signals for what is valued are eliminated or transformed. Furthermore, as Conrad and Openo (2018) point out in the introduction to *Assessment Strategies for Online Learning,* assessment has become increasingly critical as all education (and particularly postsecondary education) increasingly moves away from credit hours and toward learning outcomes. Similarly, the introduction of open distance learning led to a paradigm shift away from grading and certification and towards performance-based assessment and learning outcomes. These developments have helped online designers, educators, and administrators appreciate how challenging and laborious it is to enact high-quality assessment in online settings.

In transitioning to online instruction, many educators and designers struggle to transform their informal assessment of classroom discourse to the discussion forums that are the primary form of interaction in many online classes. Likewise, many educators find that when offering formative assessment (i.e., assessment "for" learning), their relatively efficient whole class feedback sessions are supplanted by laborious individualized private feedback. When administering online summative assessments, (i.e., assessment "of" prior learning), many educators struggle to replace secure "closed-book" tests. Even when using expensive and intrusive digital proctors or requiring students to come to campus or a testing center, the nature of the Internet and the proliferation of so-called "homework help" websites raises suspicions about test scores in many online educational contexts.

This chapter is intended to help readers understand these and related issues and begin to address them in specific educational contexts. The chapter builds on two dimensions of assessment discussed in a prior consideration in Hickey and Pellegrino (2005). The first dimension is assessment *purposes/function* (e.g., *formative* vs. *summative*) while the second dimension is *learning theory* (i.e., *differential, cognitive-associationist, cognitive-constructivist,* and *situative/sociocultural*). Particular attention is paid to how the two dimensions interact with one another in online and open contexts; the chapter also briefly considers how these dimensions interact with item *format* (e.g., *selected response* vs. *constructed response*) and assessment *level* (i.e., *immediate, close, proximal, distal,* and *remote*) in online settings, as elaborated in Hickey, Harris, and Lee (in review). This consideration of assessment includes the entire range of fully online and open learning environments. This includes massive open online courses (MOOCs) and other open courses as well as conventional for-credit online courses. This also includes both synchronous online formats, as well as cohorted "semi-synchronous" formats and fully asynchronous self-paced formats. This chapter does not consider assessment in traditional non-digital "correspondence-courses" using mail, broadcast radio, or television. And while developments such as computer-adaptive testing and new measurement models (e.g., Mislevy, 2018) are certainly relevant to this chapter, these are entire topics unto themselves that quickly move beyond the scope of the chapter. This chapter also does not directly consider online testing independent of online education (e.g., as in commercial achievement tests and tests for college admissions and professional licensure).

Given space limitations, this chapter does not attempt to exhaustively review the existing prior relevant research literature (sometimes characterized as "e-assessment"). Readers may wish to consult Mawhinney's (2013) systematic review, which uncovered four main themes across 10 articles including perceptions, validity and reliability, student support, and benefits of e-assessment. Covering some of the same terrain, Wei, Saab, and Admiraal's (2020) systematic review of the assessment of cognitive, behavioral, and affective learning outcomes across 65 studies uncovered 25 different approaches. Xiong and Suen (2018) reviewed the research literature on assessment in MOOCs, with a particular focus on the differences between the associationist "xMOOCs" and the connectivist "cMOOCs" described below.

Assessment Purposes/Functions

Assessment scholars have traditionally focused on the intended *purposes* of assessment. For example, the 2001 expert consensus report from the US National Research Council distinguished between the familiar *formative* ("assessment for learning"), *summative* ("assessment of learning"), and *evaluative* ("assessment of programs") purposes and cautioned against using assessments for multiple purposes (primarily because summative and evaluative purposes undermine formative purposes). Most considerations of assessment in online and open learning embrace these distinctions, and many embrace this concern.

The research literature on online formative assessment (sometimes "OFA") is particularly vast. The integrated narrative review of higher education research by Gikandi, Morrow, and Davis (2011) uncovered themes such as Vygotksky's zone of proximal development (ZPD) underpinning authentic OFA, OFA for individuals, peers, and teachers, threats to validity and reliability, and interactive formative feedback. Explicitly building on Gikandi et al., McLaughlin and Yan's (2017) narrative review included 32 more recent studies, uncovered expanded delivery formats, detailed cognitive and emotional benefits of OFA, and expanded into K-12 contexts. The systematic review by Mahanan, Talib, and Ibrahim (2021) included 10 studies in higher STEM education and uncovered evidence of the tools used, themes used, outcomes assessed, practical skills, and assessment format. As discussed in Arnold (2016), one important issue in formative assessment is the likelihood and consequences of cheating; Hickey and Harris (2021) argued that carefully "aligning" formative and summative assessments can discourage such practices by convincing students that completing formative assessments as intended is an ideal way to prepare for summative assessments.

Naturally, summative purposes are central to many of the considerations of assessment in online and open learning. Russell (2019) discussed the role of digital technologies in summative assessment in general while Russell (2018) discussed crucial issues of accessibility in this context. As elaborated in Hickey and Harris (2021) and Stadler, Kolb, and Sailer (2021), time limits are an important issue in online summative assessments. To reiterate, online test proctors are expensive and intrusive; they can also be bypassed by workarounds that proliferate online.

Meanwhile, numerous studies have shown that, despite honor-codes, many students will cheat on online assessments (e.g., LoSchiavo & Shatz, 2011); cheating is particularly likely when students assume that their classmates are doing so (Lang, 2013). Furthermore, the profusion of online "homework help" sites means that students can directly locate the answers to many items drawn from textbook publishers' item banks (sometimes, thanks to the power of modern search engines, even after such item stems and answers are reworded). With all assessment formats, using time limits and ensuring that items are not directly searchable can maximize the validity of summative assessment scores as estimates of likely transfer of that knowledge to subsequent educational, professional, and personal contexts. With selected response format, including challenging "best answer" items or ensuring that students would have to search starting from the item responses (rather than the item stem) can further enhance the trustworthiness of scores on time-limited summative assessments.

While the evaluation of courses and programs is mostly outside of the scope of this chapter, summative assessment of learning certainly plays a role in doing so. Notable consideration of using assessment in evaluations is included in many of the chapters in Azevedo and Azevedo (2018).

Conformative, Deformative, and Transformative Assessment Functions

Rather than assessment purposes, Hickey and Pellegrino (2005) argued instead for a sociocultural focus on assessment *functions* and a broader range of "learning" beyond the familiar individual behavioral or cognitive outcomes. As elaborated below, this makes it possible for a single assessment to serve multiple complementary functions. This also directs additional attention to the *consequences* of assessment practices.

To reiterate, the lack of classroom interaction means that assessments typically have a greater influence on the culture of education delivered online. Torrance (2012) demonstrated how a sociocultural perspective draws additional attention to the unintended consequences of assessment. Torrance insisted that "all assessment is formative, for student dispositions and self-identities as learners, as well as knowledge and understanding, but not necessarily in a positive way" (p. 325). In addition to the three conventional functions above, Torrance acknowledged three additional functions, each of which takes on added meaning in online and open education. *Conformative* functions occur when instruction is overly aligned to narrow curricular aims that can be readily assessed. This concern is captured by Preston's (2017) argument that competency-based approaches and the associated "mastery learning" movement of the 1980s was suppressed by the widespread embrace of constructivist theory in the 1990s, only to later resurge as "an existential threat to human learning" in the context of online education and training. Relatedly, Torrance cautioned about *deformative* functions, whereby assessment feedback and particularly low marks or scores undermine students' affinity for and identity with the assessed knowledge.

Finally, Torrance (2012) encouraged the recognition of *transformative* functions, whereby the entire assessment practice and the social construction of judgment is made transparent and used to serve broader educational goals. Arguably, Torrance's extensions shed new light on considerations of transformative functions. For example, Chaudhary and Dey (2013) discussed a "paradigm shift" away from content-based tests for grading and certification and towards a range of problem-based assessments following a broader governmental shift; for some, this is precisely the concern over conformative functions raised by Preston (2017). Alternatively, Ehlers (2013) discussed how new assessment practices might support "open learning cultures" via self-assessment, peer-assessment, "social information retrieval," e-portfolios, and rubrics. Arguably, such discussions must be informed by explicit consideration of one's underlying theory of learning, as discussed below.

Prior Learning Assessment

Within summative functions, another prominent assessment function in online and open education is *prior learning assessment and recognition* (PLAR and sometimes just PLA) whereby assessments and/or work samples or other evidence are used to award course credit. The practice is particularly prominent in continuing education contexts and is particularly relevant for older students. Conrad's significant contributions here should be noted, including two handbook chapters (2008a, 2008b), a special issue (2011), and an exploration in the context of MOOCs (2013). Other noteworthy considerations of PLA/PLAR are represented by the various chapters in Stevenson (2021). While not specifically about online and open learning, the journal *PLA Inside Out* was launched in 2012 and includes many relevant contributions.

Learning Theory

Theories of learning are really theories of knowing, as one's theory of learning must account for the nature of the knowledge that is learned. Together, assumptions about knowing and learning have profound implications for assessment. It is worth noting that different considerations of learning theory use different labels and categories. The influential 1996 handbook chapter by Greeno, Collins, and Resnick contrasted *behavioral/empiricist, cognitive/rationalist,* and *situative/pragmatist-sociohistoric* perspectives, the US National Research Council (2001) contrasted *differential, behaviorist, cognitive,* and *situative,* while Hickey and Pellegrino (2005) contrasted *empiricist*, *rationalist*, and *socioculturalist* perspectives. These categories refer to "grand theories'' (or "perspectives''), with each including more specific theories. Expanding beyond theory, Conrad and Openo (2018) summarized seven "philosophical orientations" in assessment, including *liberalism, progressivism, behaviorism, humanism, radicalism, cognitivism,* and *constructivism,* though without directly linking those philosophies to assessment practices. For reasons elaborated below, we have chosen to organize our discussion around *differential, cognitive-associationist, cognitive-constructivist,* and *situative/sociocultural* theories.

It is also worth noting that many practitioners and scholars pragmatically combine the second and third categories into an encompassing framework of "cognitive science" (e.g., Mayer & Wittrock, 1996) and that others similarly combine the last three (e.g., NRC, 2001). As elaborated below, we contend that working with different theories in the context of assessment calls for caution and careful consideration. Space limitations preclude elaboration beyond our points of departure from prevailing considerations; readers are referred to Conrad and Openo's (2018, Chap. 4) and the NRC's (2001, Chap. 3) extended discussions of learning theory and educational assessment.

Differential Theories

Differential theories emerged in the early twentieth century within efforts to uncover stable intellectual traits like IQ. Differential theories eventually came to be seen as theories of measurement rather than theories of learning, because they assumed that knowledge is whatever tests measured. These theories were gradually supplanted by behaviorism (mostly in the USA) and Gestalt theory (mostly in Europe) and now sometimes go unacknowledged (e.g., Greeno, Collins, & Resnick, 1996; Hickey & Pellegrino, 2005). While differential theories of learning and the associated theory of knowledge transfer (i.e., general transfer of general skills) live on in "classical" education, such approaches are usually delivered in traditional classroom or home-school settings (though the curricula and assessments are increasingly distributed and accessed online). However, the elaborate statistical machinery that the development of differential theories left behind lives on in modern standardized tests (NRC, 2001). While such tests have greater consequences for K-12 and professional education than for higher education and open education, they are still quite influential.

We contend that differential theories live on in an additional way that may have even larger consequences for assessment in online and open education. Bruner (1996) convinced many that a great deal of teaching was driven by *folk pedagogy,* educators' lay theories, or tacit assumptions about how students learn. While Bruner identified four distinct folk pedagogies, he was referring mostly to K-12 educators (who have almost always had some formal preparation in pedagogy and usually some exposure to scientific theories of learning). Arguably, there are many educators and designers in online and open higher education who came to their role via disciplinary expertise and who have little or no training in scientific theories of learning. In our experience, many such educators embrace a theory of learning that is loosely consistent with differential theories. This is represented in tacit assumptions that (a) their assessments capture meaningful knowledge, (b) higher scores are better, and (c) higher scores are better by any means necessary absent cheating.

Our sentiments in this regard are captured nicely in the title of the study of computing education literature by Sanders et al., (2017), Boustedt, Eckerdal, McCartney, & Zander (2017) entitled "Folk Psychology: Nobody Doesn't Like Active Learning." We share their concern that higher education has broadly and enthusiastically embraced "active learning" (as well as "student-centered learning") as a description of an instructional technique rather than a characterization of student learning. We also share their concern that many believe all active learning techniques are equally effective. As online and open learning are increasingly oriented to specific, measurable competencies, the way those competencies are gained in relationship to the way those competencies are assessed becomes more and more important.

To illustrate this nuanced difference, we invite readers to imagine two students who earn equivalent scores on performance assessments in an introductory online course. One student was taught by a part-time instructor whose evaluations (and continued employment) were based entirely on scores on assessments (whose coverage is known to the instructor) and student course evaluations. Such an instructor is likely to focus primarily on the content on those assessments to support high marks (and presumably stronger evaluations) while skimming or bypassing other content. In contrast, the other student was taught by a tenured faculty member who was more concerned with preparing students for subsequent courses and was not terribly concerned with student course evaluations. Such a faculty member would be inclined to cover all course topics equally and treat the performance assessments as "snapshots" of what the students learned. The second student likely learned more (and possibly a *lot* more), but that knowledge is not captured in the assessment scores. Our point here is that educators and assessors whose practice is not grounded in a viable scientific theory may tacitly embrace a "folk-differential" theory and assume that "learning" is whatever their assessments capture.

Cognitive-Associationist Theories

Cognitive-associationist theories are rooted in and sometimes equated with behaviorism. But outside of K-12 education of students with special needs and the education of adults with profound disabilities, behaviorist theories have relatively little influence in contemporary education. Cognitive-associationist theories emerged when some leaders of the "cognitive revolution" (e.g., Anderson, 1980) retained the core assumption of behaviorism that knowledge consists of organized structures of many small associations. This assumption and the corresponding concern with cognitive load support traditional "mastery learning" approaches and more contemporary "expository" approaches (i.e., expose students to content, give them practice, and test that knowledge). These approaches are widely used in MOOCs (typically with video and automated quizzes) and are sometimes referred to in that context as "instructivist" theories (e.g., Falkner & Sheard, 2019). Indeed, the term "xMOOC" (after the popular edX MOOC platform) was coined to distinguish instructionist MOOCs from the "cMOOCs" described below. Associationist theories underpin most (but not all) "competency-based" approaches that are widely used in online and open education, and which have significant implications for assessment in these contexts (e.g., Aram et al., (2019), Mödritscher, Neumann, & Andergassen, 2019).

Significantly for open and online learning, cognitive-associationist theories underpin most intelligent tutoring systems (ITSs). As illustrated by de Boulay (▶ Chap. 7, "Artificial Intelligence in Education and Ethics," this volume), and Drachsler (▶ Chap. 60, "The Rise of Multimodal Tutors in Education," this volume), ITSs and artificial intelligence more generally have a prominent role in open and online learning. Associationist assumptions allow ITSs to use assessment evidence to maintain and constantly update a model of what each learner knows at a given time. When paired with a model of how learning about the topic typically/optimally progresses, ITSs are able to deliver instructional content that learners are presumably most ready to learn.

Because these theories assume that specific associations transfer relatively easily to new settings where they might be used, assessment of associationist learning is relatively unproblematic. In particular, selected-response items can be used to quickly and automatically assess whether students have formed those associations. But many assume that such item formats can *only* capture evidence of these more specific associations (e.g., Hirumi, 2014). However, selected response items, particularly when developed and vetted by professionals, can require relatively sophisticated understanding and reasoning to consistently answer correctly. This issue quickly exceeds the scope of this chapter (but see Mislevy, 2018). The key arguments for the purposes of this chapter is that (a) the relationship between theories of learning and assessment format is not as straightforward as many assume, (b) the concerns over selected-response formats primarily reflect cognitive-constructivist theories of learning, and (c) the efficiency and automation afforded by selected-response formats offer advantages that should not be ignored.

Cognitive-Constructivist Theories

As argued in Greeno et al. (1996) and others, cognitive-constructivist theories are largely antithetical to associationist theories. Rather than specific associations, constructivist theories assume that knowledge consists of higher-order conceptual "schema" that the human mind (uniquely among animals) constructs when making sense of the world. Constructivist theories (a) became prominent in the 1980s, (b) are still widely embraced by many cognitive scientists and educational psychologists, (c) encompass numerous more specific theories including socio-constructivist theories, (d) have long been a driving force in calls for "alternative" assessments and assessment reforms (e.g., Wolf et al., (1991), Bixby, Glenn III, & Gardner, 1991), and (e) motivated much of the explosion of interest in formative assessment ignited by Black and Wiliam (1998/2000). Arguably, this class of theories was tacitly embraced and taken for granted by many until situative/sociocultural theories started becoming prominent around 2000.

A great deal of the discussion of assessment in open and online education embraces cognitive-constructivist and/or socio-constructivist theories. In particular, the influential community of inquiry (CoI) framework "embraces deep approaches rather than surface approaches to learning and aims to create conditions to encourage higher order cognitive processing" and "represents a process of creating deep and meaningful (collaborative-constructivist) learning experience through three interdependent elements—social presence, cognitive presence, and teaching presence" (Garrison & Akyol, 2013, p. 106). Drawing directly from CoI and constructivist theory, Conrad and Openo (2018) devoted an entire chapter to defining constructivist "authentic" assessment. They speak for many when they assert that:

> Authentic assessments, especially in blended and online learning contexts, encourage students to take a deep approach to learning, provide necessary alignment for faculty to better determine the quantity and quality of student learning, and provide institutions with the evidence necessary to respond to external pressures regarding their ability to measure student learning outcomes. (p. 55)

Furthermore, many agree with Conrad and Openo's characterization of all selected response formats as "inauthentic" and likely to encourage cheating (p. 101).

It is important to note that measurement theorists (e.g., Messick, 1994) have long pointed out that authentic and alternative assessments are "task-driven" (rather than "construct-driven"). This means that they may introduce "construct-irrelevant easiness" and "construct-irrelevant variance" which introduce significant threats to the validity of the resulting evidence to support claims of achievement and expertise. Such assessment may be capturing evidence of what students "did" rather than what they will be able to "do" in subsequent contexts. Put differently, such assessments may inadvertently capture evidence of "near-transfer" or even "zero-transfer" rather than actual transfer of problem-solving skills or "far-transfer." In terms of assessment "levels" described in Hickey and Pellegrino (2005) and Hickey et al. (in review), special interpretive care is needed to ensure that performance assessments are functioning at the *proximal* or *distal* level rather than the *immediate* or *close* level and that portfolio assessments are assigned, completed, and scored in a manner that provides valid evidence of future performance.

Pragmatically speaking, so-called "authentic" online assessments (both formative and summative) often call for relatively extensive individualized private feedback. This is in part because it is challenging to replace the traditional "whole class" feedback session that can be quite efficient in physical settings. Furthermore, the subjective nature of scoring such assessments can lead to corrosive arguments with students over grades and marks. This feedback and these arguments can take away precious instructor time for more efficient public instructor interaction and are sources of online instructor "burnout" (see Conceição & Lehman, 2011). As illustrated by the computer-adaptive assessments developed by the *Smarter Balanced Assessment Consortium* (SBAC, 2021), new psychometric models and technologies (e.g., Mislevy, 2018) now allow automated multi-part performance assessments. Nonetheless, such assessments require specialized expertise and are extremely expensive to create. While such investment may be manageable at the massive scale of MOOCs, these approaches are likely beyond the reach of most online educators for the foreseeable future.

Situative/Sociocultural Theories

This fourth category of theories is rooted in the work of the early Soviet theorist Vygotsky (1934/1987). We emphasize the situative strand of this broader class of sociocultural theories to highlight the perspective that emerged from the Institute of Research on Learning in Palo Alto, CA, from 1986 to 2000 (e.g., Greeno, 1998). We do so to distinguish this category of theories from the work of many socio-constructivist assessment theorists who also reference Vygotsky (e.g., Conrad & Openo, 2018) and have helped popularize situative/sociocultural theories among proponents of open and online education. While not explicitly citing the influence of situative theories, Siemens's (2005) new theory of *connectivism* embraces many of the same assumptions while also addressing the massive influence of the Internet on the very nature of knowing and learning. The large influence of connectivism in open learning was signaled by the introduction of the term "cMOOC" to distinguish this approach from the more expository xMOOCs described above.

According to Greeno et al. (1996), assessment within this category of theories means "assessing participation in inquiry and social practices of learning," "student participation in assessment," and "design of assessment systems" (p. 39). Some considerations of e-portfolio assessment explicitly embrace situative theories (e.g., Batson, 2011; Habib & Wittek, 2007). From our perspective, the most important implication of situative theory is the way Greeno's (1998, p. 17) "situative synthesis" reconciles the difference between individual activity and social activity. Cognitive-associationist and cognitive-constructivist theories reconcile these differences by characterizing social activity as aggregations of individual activity. However, this results in two incompatible characterizations of social activity, neither of which are capable of capturing the manner in which situative theories assume that knowledge is fundamentally "distributed" (i.e., "situated") in social, cultural, and material contexts. In contrast, the situative synthesis uses a "dialectical" approach to resolve the difference between individual and social activity. From this perspective, the way that the human mind processes information (as in associationist theories) *and* the way that humans make sense of the world around them (as in constructivist theories) are both "special cases" of socially situated activity.

As argued in Hickey and Pellegrino (2005) and Hickey (2015), applying the situative synthesis to assessment and testing similarly makes it possible to characterize the entire range of assessment practices as special cases of socially situated activity. Doing so makes it possible to frame formative and summative educational assessment as specialized forms of discourse between educators and students and to frame external achievement tests as a specialized form of discourse between disciplinary experts and test takers. While these forms of discourse are certainly peculiar (if not downright bizarre), they serve narrow and potentially necessary functions in many if not most educational ecosystems. As outlined in Hickey and Harris (2021), this also provides a coherent framework for "aligning" formative and summative functions across increasingly formal levels of assessment and makes it possible to coherently assign formative and summative functions to the same assessment. This means, for example, close-level assessments can serve a summative function for prior engagement while also serving a formative function for the same learner's understanding of targeted concepts.

Conclusion

In summary, this chapter organized selected research relevant to assessment in open and online education around the dimensions of purpose/function and learning theory. We acknowledge that this is a novel way of organizing research and insights about assessment. We further acknowledge that this organization is rooted in our underlying embrace of situative theories of knowing and learning. We contend that this organization reveals crucial interactions between these dimensions that may undermine more specific goals of assessment practices as well as the broader enterprise of education. While situative theories of knowing and learning are widely appreciated by many in open and online learning, there is relatively little consideration of them within considerations of assessment beyond the work summarized above. Our arguments about the situative synthesis are not widely known or appreciated in the assessment literature more broadly.

The primary implication of our position is one of caution regarding constructivist arguments in support of "authentic" summative assessment formats and against "traditional" selected-response formats. Summative performance and portfolio assessments can generate unsustainable demands for private instructor-student interaction and take time away from more effective formative assessment and more efficient public instructor interaction. We suggest that selected-response assessments that are well-constructed, time-limited, non-searchable, uncompromised, and automatically scored can efficiently provide valid estimates of the extent to which learning in online and open courses is likely to transfer to subsequent educational, personal, and professional contexts. We close by suggesting that this argument presents a particularly promising direction for future research on assessment in open and online education.

Acknowledgments This chapter was prepared while the first author was supported by a grant from the US National Science Foundation to Indiana University (#1915498) and while the second author was supported by a grant from the Governor's Emergency Educational Relief fund from the State of Indiana to Indiana University. This work reflects the opinions of the authors and does not reflect the opinions of the funding agencies or Indiana University.

References

Anderson, J. R. (1980). *Cognitive psychology and its implications*. San Francisco, CA: Freeman.

Aram, M., Mödritscher, F., Neumann, G., & Andergassen, M. (2019). A grading data warehouse approach to measuring and analyzing learning performance: From grading to competency-oriented assessment. In A. Azevedo & J. Azevedo (Eds.), *Handbook of research on e-assessment in higher education* (pp. 102–126). Hersey, PA: IGI Global.

Arnold, I. J. (2016). Cheating at online formative tests: Does it pay off? *The Internet and Higher Education, 29*, 98–106. https://doi.org/10.1016/j.iheduc.2016.02.001.

Azevedo, A., & Azevedo, J. (Eds.). (2018). *Handbook of research on e-assessment in higher education*. Hersey, PA: IGI Global.

Batson, T. (2011). Situated learning: A theoretical frame to guide transformational change using electronic portfolio technology. *International Journal of ePortfolio, 1*(1), 107–114. https://www.theijep.com/articleView.cfm?id=34.

Black, P., & Wiliam, D. (1998/2010). Inside the black box: Raising standards through classroom assessment. [Report] Kings College, London/*Phi Delta Kappan, 92*(1), 81–90. https://doi.org/10.1177/003172171009200119

Bruner, J. (1996). *The culture of education*. Cambridge, MA: Harvard University Press.

Chaudhary, S. V. S., & Dey, N. (2013). Assessment in open and distance learning system (ODL): A challenge. *Open Praxis, 5*(3), 207–216. https://www.learntechlib.org/p/130676/.

Conceição, S. C., & Lehman, R. M. (2011). *Managing online instructor workload: Strategies for finding balance and success*. San Francisco, CA: Jossey-Bass.

Conrad, D. (2008a). Recognizing experiential learning through prior learning assessment. In T. Evans, M. Haughey, & D. Murphy (Eds.), *International handbook of distance education* (pp. 131–146). Bingley, West Yorkshire: Emerald Group Publishing.

Conrad, D. (2008b). Situating prior learning assessment and recognition (PLAR) in an online learning environment. In T. Anderson (Ed.), *The theory and practice of online learning* (pp. 75–90). Athabasca, Edmonton: Athabasca University Press.

Conrad, D. (2011). The landscape of prior learning assessment: A sampling from a diverse field. Special issue of the *International Review of Research in Open and Distance Learning, 12*(1). https://doi.org/10.19173/irrodl.v12i1.973

Conrad, D. (2013). Pondering change and the relationship of prior learning assessment to MOOCs and knowledge in higher education. *PLA Inside Out: An International Journal on Theory, Research and Practice in Prior Learning Assessment, 2*(1) https://www.plaio.org/index.php/home/article/view/51.

Conrad, D., & Openo, J. (2018). *Assessment strategies for online learning: Engagement and authenticity.* Athabasca, Edmonton: Athabasca University Press.

Ehlers, U. D. (2013). Assessment for open learning cultures. In U. D. Ehlers (Ed.), *Open learning cultures: A guide to quality, evaluation, and assessment for future learning* (pp. 167–211). Springer. https://doi.org/10.1007/978-3-642-38174-4.

Falkner, K., & Sheard, J. (2019). Pedagogic approaches. In S. A. Fincher & A. V. Robins (Eds.), *The Cambridge handbook of computing education research* (pp. 445–480). Cambridge, MA: Cambridge University Press.

Garrison, D. R., & Akyol, Z. (2013). The community of inquiry theoretical framework. In M. G. Moore (Ed.), *Handbook of distance education* (3rd ed., pp. 104–120). Oxfordshire, England: Routledge.

Gikandi, J. W., Morrow, D., & Davis, N. E. (2011). Online formative assessment in higher education: A review of the literature. *Computers & Education, 57*(4), 2333–2351. https://doi.org/10.1016/j.compedu.2011.06.004.

Greeno, J. G. (1998). The situativity of knowing, learning, and research. *American Psychologist, 53*(1), 5–25. https://doi.org/10.1037/0003-066X.53.1.5.

Greeno, J. G., Collins, A. M., & Resnick, L. B. (1996). Cognition and learning. In D. C. Berliner & R. C. Calfee (Eds.), *Handbook of educational psychology* (pp. 15–46). New York: Macmillan.

Habib, L., & Wittek, L. (2007). The portfolio as artifact and actor. *Mind, Culture, and Activity, 14*(4), 266–282. https://doi.org/10.1080/10749030701623763.

Hickey, D. T. (2015). A situative response to the conundrum of formative assessment. *Assessment in Education: Principles, Policy & Practice, 22*(2), 202–223. https://doi.org/10.1080/0969594X.2015.1015404.

Hickey, D. T., & Harris, T. (2021). Reimagining online grading, assessment, and testing using situated cognition. *Distance Education, 42*(2), 290–309. https://doi.org/10.1080/01587919.2021.1911627.

Hickey, D. T., Harris, T., & Lee, H. (in review). Reviewing the research on assessment principles, formats, and levels in online and open learning. Accepted for review in *Educational Research Review* in September 2021.

Hickey, D. T., & Pellegrino, J. W. (2005). Theory, level, and function: Three dimensions for understanding transfer and student assessment. In J. P. Mestre (Ed.), *Transfer of learning from a modern multidisciplinary perspective* (pp. 251–293). Charlotte, NC: Information Age Publishing.

Hirumi, A. (2014). Aligning learning objectives and learner assessments: An essential precursor for grounded design. In A. Hirumi (Ed.), *Grounded designs for online and hybrid learning: Design fundamentals* (pp. 23–62). International Society for Technology in Education. ISBN: 978156484337.

Lang, J. M. (2013). *Cheating lessons*. Cambridge, MA: Harvard University Press.

LoSchiavo, F. M., & Shatz, M. A. (2011). The impact of an honor code on cheating in online courses. *MERLOT Journal of Online Learning and Teaching, 7*(2) https://jolt.merlot.org/vol7no2/loschiavo_0611.pdf.

Mahanan, M. S., Talib, C. A., & Ibrahim, N. H. (2021). Online formative assessment in higher STEM education; a systematic literature review. *Asian Journal of Assessment in Teaching and Learning, 11*(1), 47–62. https://doi.org/10.37134/ajatel.vol11.1.5.2021.

Mawhinney, K. (2013). A review of the literature on online (e)assessment. *Technology-Mediated Learning*, 9–19. https://journals.library.mun.ca/ojs/index.php/TML/article/view/831.

Mayer, R. E., & Wittrock, M. C. (1996). Problem-solving transfer. In D. C. Berliner & R. C. Calfee (Eds.), *Handbook of educational psychology* (pp. 47–62). New York, NY: Macmillan.

McLaughlin, T., & Yan, Z. (2017). Diverse delivery methods and strong psychological benefits: A review of online formative assessment. *Journal of Computer Assisted Learning, 33*(6), 562–574. https://doi.org/10.1111/jcal.12200.

Messick, S. (1994). The interplay of evidence and consequences in the validation of performance assessments. *Educational Researcher, 23*(2), 13–23. https://doi.org/10.3102/0013189X023002013.

Mislevy, R. J. (2018). *Sociocognitive foundations of educational measurement*. Oxfordshire, England: Routledge.

National Research Council. (2001). *Knowing what students know: The science and design of educational assessment*. National Academies Press. https://doi.org/10.17226/10019.

Preston, J. (2017). *Competence based education and training (CBET) and the end of human learning: The existential threat of competency*. London: Palgrave Macmillan.

Russell, M. (2018). Recent advances in the accessibility of digitally delivered educational assessments. In S. N. Elliott, R. J. Kettler, P. A. Beddow, & A. Kurz (Eds.), *A handbook of accessible instruction and testing practices* (pp. 247–262). https://doi.org/10.1007/978-3-319-71126-3_16.

Russell, M. (2019). Digital technologies: Supporting and advancing assessment practices in the classroom. In *Classroom assessment and educational measurement* (pp. 224–242). Oxfordshire, England: Routledge.

Sanders, K., Boustedt, J., Eckerdal, A., McCartney, R., & Zander, C. (2017). Folk pedagogy: Nobody doesn't like active learning. In *Proceedings of the 2017 ACM Conference on International Computing Education Research* (pp. 145–154). https://doi.org/10.1145/3105726.3106192

Siemens, G. (2005). Connectivism: A learning theory for the digital age. *International Journal of Instructional Technology and Distance Learning, 2*(1) http://www.itdl.org/Journal/Jan_05/article01.htm.

Smarter Balanced Assessment Consortium. (2021). [Website]. http://www.smarterbalanced.org/assessments/#

Stadler, M., Kolb, N., & Sailer, M. (2021). The right amount of pressure: Implementing time pressure in online exams. *Distance Education, 42*(2), 219–230. https://doi.org/10.1080/01587919.2021.1911629.

Stevenson, C. N. (2021). Leveling the educational playing field: Resources for OERs, open degree plans, and prior learning assessment. In C. N. Stevenson (Ed.), *Enhancing higher education accessibility through open education and prior learning* (pp. 165–190). IGI Global. https://doi.org/10.4018/978-1-5225-5255-0.

Torrance, H. (2012). Formative assessment at the crossroads: Conformative, deformative and transformative assessment. *Oxford Review of Education, 38*(3), 323–342. https://doi.org/10.1080/03054985.2012.689693.

Vygotsky, L. S. (1934/1987). Thinking and speech. In R. W. Rieber & A. S. Carton (Eds.), *The collected works of L.S. Vygotsky, volume 1: Problems of general psychology* (pp. 39–285). New York: Plenum Press. (Original work published 1934). https://doi.org/10.1017/S0142716400008341

Wei, X., Saab, N., & Admiraal, W. (2020). Assessment of cognitive, behavioral, and affective learning outcomes in massive open online courses: A systematic literature review. *Computers & Education, 163*, 1–24. https://doi.org/10.1016/j.compedu.2020.104097.

Wolf, D., Bixby, J., Glenn, J., III, & Gardner, H. (1991). To use their minds well: Investigating new forms of student assessment. *Review of Research in Education, 17*(1), 31–74. https://doi.org/10.2307/1167329.

Xiong, Y., & Suen, H. K. (2018). Assessment approaches in massive open online courses: Possibilities, challenges and future directions. *International Review of Education, 64*(2), 241–263. https://doi.org/10.1007/s11159-018-9710-5.

Designing Online Learning Communities

77

M. Cleveland-Innes and J. Hawryluk

Contents

Abstract

Higher education course design is moving increasingly toward constructivist, collaborative approaches for higher-order learning. A community-based approach to learning fits both this type of pedagogy and preferred learning outcomes related to critical thinking and metacognition. This is particularly necessary when moving such learning online, and the need for a community is even more important for engagement and motivation than in-person learning, where community and connection is often created organically. Online learning communities can be effectively created using the community of inquiry theoretical framework, as it intentionally makes space for learners to express their teaching, social, and cognitive presences. To support the design of effective online learning experiences, how each presence fits into the constructivist and inquiry-based approaches is explained in this chapter. As well, applications are suggested. Finally, assessment approaches are provided that are in line with the tenets of constructivism, inquiry-based learning, and hence the community of inquiry.

M. Cleveland-Innes (✉) · J. Hawryluk
Athabasca University, Athabasca, AD, Canada
e-mail: martic@athabascau.ca; shawryluk1@athabasca.edu

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_82

Keywords

Online learning · Community · Inquiry-based learning · Community of inquiry

Introduction

This chapter provides an overview of a community-based, learning-focused approach to the design, delivery, and assessment of online learning. This learning focus is supported by creating a learner-centered environment, offering dedicated support to those wishing to learn, and motivating those feeling less willing and/or less able to learn. One way to create such a learning environment is by creating community through strong facilitation and engagement processes, supported by effective information and communication technologies.

According to Bolliger, Shepherd, and Bryant (2019), faculty report that a sense of community in online courses drives both student engagement and satisfaction. Findings from 344 survey responses identify that 88% strongly agreed that community was important, 66% said community extends beyond classes, and only 37% said that there was a system in place at their institution to help online students build community (Berry, 2019). This gap for building effective community online can be filled by the most researched approach to online learning in community: the community of inquiry (CoI) theoretical framework for online and blended learning (Garrison, 2016). The CoI is now supported by two decades of research and practice and provides guidance and direction to create community that promotes not only engagement and satisfaction, but also higher-order learning, as is needed in higher education. Using constructivist, collaborative processes, this framework has been identified, of all the new techno-pedagogical education delivery models, as the model that has yielded the greatest impact in the field of distance education (Bozkurt, 2019). As the latest UNESCO report indicates, to impact the current global human rights issues, pedagogy must be rooted in cooperation and solidarity, with participants collaborating to meet this challenge (International Commission on the Futures of Education, 2021).

The Roots of Online Learning

Emerging technologies have changed the ways in which we bridge the distance between teacher and learner. From a distance education perspective, these changes also carry forward from earlier generations of distance education the unique roles for learners and teachers, broader opportunities for access to learning, and additional requirements for learner self-direction (Cunningham, 2010; Shearer et al., 2020). These enduring characteristics of distance education create a type of online learning that is pedagogically distinct from more traditional, lecture-based teaching delivery in universities. This pedagogical distinction is discussed later in this chapter in reference to the community of inquiry theoretical framework (see Fig. 1), which is

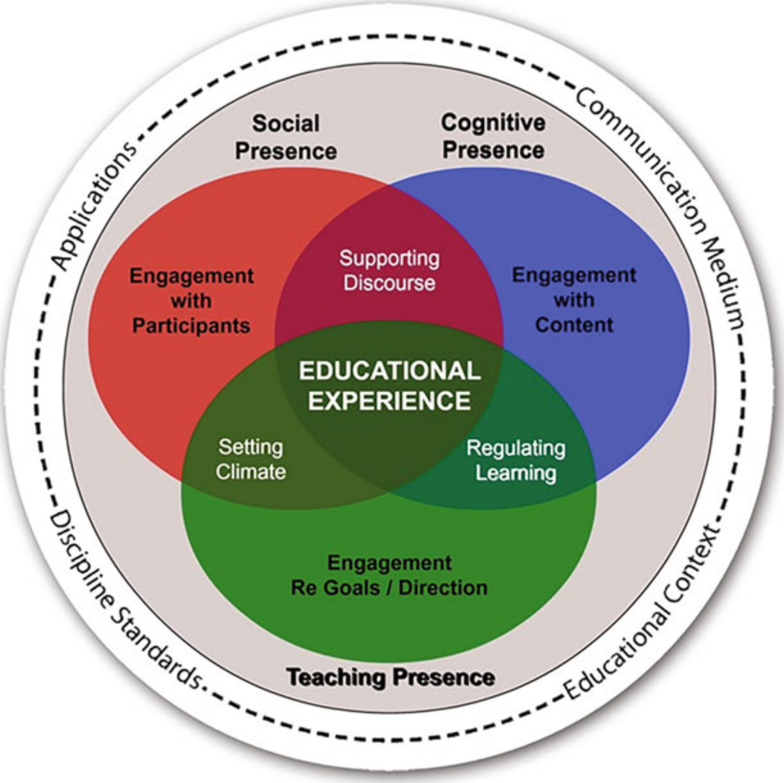


Fig. 1 The community of inquiry model. (Attribution to D.R. Garrison, University of Calgary, M. Cleveland-Innes, Athabasca University, N. Vaughan, Mount Royal University.)

used to guide the creation of high-quality, engaging online, and blended learning environments.

The following suggestions for online design describe what is required for active, engaging online learning activities (Ward, Peters, & Shelley, 2010). This applies whether the course is moving online from traditional, lecture-based, in-person delivery or arising from open and distance education. The differences, then, exist in the needed transition from current delivery models to high-quality, technology-enabled online and blended learning (Cook, 2020), described briefly at the end of this chapter, and discussed in detail other places in this book.

According to Hodges, Moore, Lockee, Trust, and Bond (2020), "what we know from research is that effective online learning results from careful instructional design and planning, using a systematic model for design and development" (p. 4). This can be considered as the central imperative of quality learning experiences in any online learning design. Broadly defined, quality sets out what counts as excellence in reference to preidentified standards. What counts as quality in a complex, community-based, online learning environment often depends upon professional subjective interpretations of these standards, rather than empirical evidence (Bektashi, 2018; Nolan-Grant, 2019; Ossiannilsson, 2020; Rovai, 2002).

Further, online quality standards rest on the definitions of community and pedagogy. Where social learning theories are seen as foundational, required, and/or an enhancement to online learning, the development of online learning communities are part of a high-quality online learning experience (Zimmerman, Altman, Simunich, Shattuck, & Burch, 2020). This community-based experience moves the online course (and program) experience beyond mere content instruction and achievement of predetermined learning outcomes. Attempts to create this experience online occurs through supported and facilitated activities such as social interaction, meaningful engagement, and shared metacognition. These aspects of online learning design were well represented in Garrison's (2016) model of online and blended communities of inquiry.

The Community of Inquiry Theoretical Framework

Originally created in the late 1990s in support of early online design with text-based discussion (Garrison, Anderson, & Archer, 2001), the community of inquiry (CoI) theoretical framework shone significant light on the need for interaction, collaboration, and connections online. Significant developments have occurred in distance and online education since the original conception of the CoI. Over the last two decades, the CoI framework has been tested, applied, and adjusted for use across delivery methods and disciplines (Befus, 2016; Bozkurt, 2019; Castellanos-Reyes, 2020). The CoI framework is known to be (1) highly effective in the learning environment for which it was originally designed; (2) a good fit with further developments through emerging technologies for learning; and (3) compatible with blended as well as online learning (Le Roux & Nagel, 2018).

Explaining the CoI framework. The CoI framework "represents a collaborative approach to inquiry that fuses personal reflection and shared discourse for a deep and meaningful learning experience" (Garrison, 2016, p. 53). The framework rests on the assumption that engaging, meaningful, educational experiences, leading to deep learning outcomes, occurs at the convergence of three presences: *cognitive*, *teaching*, and *social presence*. Presence is the human orientation to the current environment and experience. It is defined, in this application of online learning design, as a required state of alert awareness, receptivity, and connectedness to the social, cognitive, emotional, and physical workings of all individuals in reference to the collective group in the context of their learning environments (adapted from a definition by Rogers & Raider-Roth, 2006, p. 1).

These presences emerge through learner-centered teaching and learning. Both presence and learner-centered approaches produce a more active learning climate, as suggested by foundational thinkers in education (Dewey, 1933; Vygotsky, 1997). Using the collected, shared individual experiences as a significant point of reference in the construction knowledge structures is critical to both learning processes and learning outcomes. It can be considered a deliberative weaving of co-constructed understanding into individualized tapestries of knowledge. Beyond content or subject-matter expertise, engaged and active learning is seen as a key opportunity for developing competence in higher-order thinking skills (Garrison, 2016), which leads beyond content knowledge into high levels of intellectual development.

In short, the CoI requires that the learning process is explicit through meaningful engagement opportunities, where students explore multiple types of learning materials, rather than teacher-centered direct delivery of content. Drawing from the early direction of Schwab (1966), this teaching practice moves learners deliberately through active inquiry processes. According to Schwab, the active inquiry process starts by using questions and problems to stimulate thinking about the subject. When ready, teachers can invite learners to synthesize by identifying overlaps and relationships between concepts or variables. As learners advance through foundational knowledge in a particular subject, questions and/or problems are presented; learners are encouraged to discover the path to answers themselves. As knowledge and learning skill develops, learners identify the questions, problems, methods, and answers in the same subject themselves; the teacher provides guidance to shape, correct, and verify knowledge claims and facilitates learning.

Creating a community of inquiry. This multilayer pedagogical process is supported first by creating community through the original three presences of the CoI framework (social presence, cognitive presence, and teaching presence). These three presences are defined below. Figure 1 outlines the three presences and their respective subcategories, the binary overlaps, and the convergence on the educational experience.

Teaching presence, rather than "teacher presence," is so named to allow for teaching functions for both teachers and learners in a community of inquiry. While the teacher, or instructor of record, plays a leadership role, teaching presence is carefully defined to encourage and allow for peer teaching. To become an effective online teacher, one must deconstruct traditional teaching presence or traditional assumptions about effective teaching and learning, and rebuild it in reference to online teaching and learning (Richardson & Alsup, 2015).

The central organizing activity of the CoI is teaching presence created by the integration of design and organization of a course and its community, facilitation of learning, and direct instruction of content. In these activities, the teacher who is instructor of record or the temporary peer-teachers who emerge in the course at varying times for various purposes provide support for the facilitation and direction of cognitive and social processes. The generation of satisfying learning experiences among students is noted in empirical studies (Zhu, Herring, & Bonk, 2019). This satisfaction is also linked to other presences in a significant way. For example, Shea and Bidjerano (2009) report that the learner experience of teaching presence affects the emergence of social presence.

Social presence, in its most current definition, is defined as "the ability of participants to identify with the community (e.g., course of study), communicate purposefully in a trusting environment, and develop interpersonal relationships by way of projecting their individual personalities" (Garrison, 2009, p. 352). Notions of affective engagement that were part of the original definition of social presence (Garrison et al., 2001) are absent in this newer definition of social presence. This could be attributed to the increased attention being given to emotional presence, not yet identified as a fourth presence but in discussion as a critical element of CoI development and experience (Cleveland-Innes & Campbell, 2012; Dell, 2021; Lehman, 2006; Loderer, Pekrun, & Lester, 2018).

This definition of social presence mediates design thinking about student social activity, distinct from academic activity and in combination with it. The subcategories identify the design elements required, created through pedagogical processes, that will allow each respective presence to emerge. For social presence, these categories are personal expression, group cohesion, and open communication. Personal expression is expected to go beyond dialogue and interaction about course activities and content, an important part of the overlap between cognitive and social presence and between social presence and teaching presence. Personal expression means encouraging students to go beyond dialogue strictly about course activities and content into personal reflections and the presentation of self.

Group cohesion is fostered through the explicit identification and mutual agreement regarding shared purposes and the communal learning space. It emerges when represented by a sense of belonging and acceptance where individuals connect and have an affinity for other individuals in the group. This can be seen where meaningful, if short-term relationships develop, and expressions of a sense of trust and safety are noted. Open communication, the third subelement of social presence, supports both personal expression and group cohesion by allowing time and opportunity to express oneself freely and connect with others. This opportunity can be created in asynchronous virtual meeting places or in synchronous sessions.

Cognitive presence is defined as “the extent to which learners are able to construct and confirm meaning through sustained reflection and discourse in a critical community of inquiry” (Garrison et al., 2001, p. 11). While not named as academic work in the CoI, it is in this space that academic debate, deliberation, and discussion occur (Cleveland-Innes & Emes, 2005). In the overlap with social presence, discourse is supported in the course design with multiple opportunities to critically reflect and share personal meanings and applications derived from the knowledge constructed.

Cognitive presence rests on four distinct but overlapping subcategories of practical inquiry: triggering events, exploration, integration, and resolution. A triggering event begins the process of inquiry through stimulation and presentation of information, ideas, or questions new to the audience. It requires attention and thought but needs less effort than the other three categories. Exploration provides the opportunity to examine new material closely from multiple perspectives. Integration of new material is the process of constructing structures and alignments of new information, on its own and in relation to other material, to the point of deep and meaningful understanding. The fourth subcategory, called resolution, brings the reason for covering the material, answering the question, or solving the problem to a logical conclusion. These pedagogical processes supporting the resolution phase of cognitive presence brings closure, whether temporarily or as a relative, momentary

Table 1 CoI presences and conceptual subcategories

Presence	Subcategories
Social presence	Open communication Group cohesion Interpersonal expression
Cognitive presence	Triggering event Exploration of concepts and issues Integration with current knowledge and context Resolution to close inquiry
Teaching presence	Design and organization Facilitation of discourse Direct instruction

cessation of the topic at hand. The resolution phase is the temporary but definite closure of inquiry, which often ends with the identification of questions still to be answered and issues yet to be addressed.

These three presences represent the original, base model of the CoI. A fourth presence, *emotional presence,* has been suggested (Cleveland-Innes & Campbell, 2012; Stenbom, Jansson, & Hulkko, 2016). Emotional presence encapsulates the affective side of learning, originally identified as part of social presence. The element of emotion and learning has been further identified as something that permeates the model (Majeski, Stover, & Valais, 2018; Swan, 2019; Williams, 2017) (For a brief overview of the subcategories of individual presences, see Table 1).

Community-Based Design and Delivery in Three Presences

Over time, the identification and accurate measurement of the framework requirements has provided (1) a more detailed examination of the original three presences; (2) the addition of emotional presence; (3) how the presences relate to one another; and (4) how they may be applied in practice (Arbaugh et al., 2008; Cleveland-Innes, Stenbom, & Garrison, manuscript in preparation). This identification and measurement provide empirical evidence to support design and delivery applications.

Establishing deep and meaningful learning requires activity in all four components. However, Akyol and Garrison (2011) report evidence that cognitive presence requires a balance among cognitive, social, and teaching presence. Direct instruction and facilitation of cognitive activity, beyond just explaining content, is a key role for teachers using this framework. This corroborates Archibald's (2010) evidence that teaching presence and social presence explain 69% of the variance in cognitive presence. While it is beyond the scope of this chapter to consider all relational aspects of the presences, the information below identifies application suggestions specific to individual presences with implicit consideration of the other presences at play.

Applied teaching presence. Table 2 provides examples of teaching presence and applications for design and delivery. In preparing a course to be delivered as a

Table 2 Teaching presence indicators and applications for design

Subcategories	Indicators	Applications
Design and organization	I clearly communicate important due dates/time frames for learning activities I clearly communicate important course goals, including explicit teaching about collaborative constructivist learning, design, and metacognitive goals I clearly communicate important course topics I provide clear instructions on how to participate in course learning activities, including explicit teaching about collaborative constructivist learning design	Ensure all course activities and deadlines are available online and send reminders via text, twitter, and encourage peer support check-ins Provide an explicit syllabus with clear course learning objectives and with links to materials As needed and allowed via institutional regulation, provide regular review and adjustment of course goals and content Make CoI design and delivery requirements explicit to students
Facilitation	My actions reinforce the development of a sense of community among course participants I help to identify areas of agreement and disagreement on course topics in a way that facilitates learning I encourage course participants to explore new concepts in my course I provide opportunities for learners to take on the role of teacher when the opportunity arises I keep course participants engaged and participating in productive dialogue I am helpful in guiding the class toward understanding course topics in a way that helps students clarify his/her thinking	Link course content and students' ideas through text and talk Brainstorm and agree to interaction and activity norms Acknowledge and encourage participation in structured and self-directed learning activities Ask questions Allow/assign presentation Share your own analysis and interpretation of course content Acknowledge and redirect as needed using humor, encouragement, and excitement
Direct instruction	I provide feedback in a timely fashion I provide feedback that helps learners understand strengths and weaknesses relative to the course goals and objectives I help to focus discussion on relevant issues in a way that helps students to learn	Open course segments and content areas with advanced organizers that prepare students for next steps Summarize course segments and content areas with reference to activities and individual student contributions Validate student actions and guide with direction and inquiry Maintain presence through regular and frequent interaction with individuals and group

Adapted from Cleveland-Innes, 2019, p. 93

community of inquiry, the design and organization subcategory of teaching presence is enacted. Key to this phase of the design are openings for students to offer suggested adjustments to the course. The choice of learning materials, pedagogical processes that include both teaching and learning activities, pacing, and assessment are critical elements of teaching presence. It is in the purview of the instructor of record to choose how much of each design and organization component will be handled individually by the teacher and what, and how much, responsibility for each component may be shared with the students. Feng, Xie, and Liu (2017) suggest that "different levels of presence should be emphasized at different stages of the course" (p. 181). This is also true for differing amounts of student input into the design and organization of the course over time. Teachers that observe learners' behavior and engagement continuously are able to adjust the learning design according to the emerging learner behavior patterns.

Facilitation in this framework is focused on supporting the learning process; learning, to be thought of as a verb in this case, indicates actions related to the process of learning or transformational engagement. In reference to teaching presence in the CoI theoretical framework, facilitation "ensures social presence is established among community members and, in turn, that cognitive processes are directed to personally meaningful and educationally worthwhile outcomes" (Vaughan, Cleveland-Innes, & Garrison, 2013, p. 37). For example, it is important that the need for social connections is made explicit and important by the teacher. This can be done, for example, by telling students about each other and drawing connections between what students are doing or saying.

Direct instruction concentrates on content as the subject matter of the course. Here, learning outcomes are the focus and the learning definition is a noun: knowledge or skill gained from the process of learning. Providing an explicit syllabus that outlines well-articulated learning outcomes is a key to supporting the acquisition of learning outcomes; it is a shared map for every member of the community. These outcomes are then linked to assignments or any activity that engages students in ways that move them toward achieving those outcomes.

Applied social presence. Table 3 demonstrates topics of focus for social presence in reference to the subcategories that support the definition of social presence. The indicators provide the student orientation to learning adherents of the CoI required in each subcategory of social presence. Ways to apply these goals are identified in the table. These application suggestions are derived from instructor feedback at development workshops, research literature about teaching and learning, and the authors' experiences designing and teaching with the CoI framework.

For all presences, and their subcategories, explicit discussion of the hopes and expectations in each category is essential. Instructors should ideally start each course with a review of required learning outcomes and the requirements of each element in the community of inquiry. They should allow time for student reaction about the CoI and feedback regarding clarification or concerns. It is important that instructors set operational norms for community activity such as informal rules for sessions.

Personal expression is the offering of salience of oneself and, in return, expecting to see salience of the other person with whom one is engaged in the interaction (Kreijns, Van Acker, Vermeulen, & Van Buuren, 2014). This can begin with introductions in an online café space, populated first by the instructor and requested of students. Instructors can start with a pre-course survey asking students to identify

Table 3 Social presence indicators and applications for design

Subcategories	Indicators	Applications
Personal expression	I create opportunities to allow learners to form distinct impressions of some other course participants I create opportunities for students to get to know other learners to create belonging I try to model online or web-based communication as an excellent medium for interaction	Provide and support online spaces and structured activities that encourage and support social interaction Facilitate relationship development among students through group activities and assignments Respond in a timely and personal way to student posts, emails, and other digital communications
Open communication	I create opportunities for learners to develop comfort about interacting with other course participants I try to ensure learners feel comfortable conversing online or in person in my course I work to ensure learners feel comfortable participating in course discussions	Discuss social presence, its value to learning, and set norms for social and academic interaction Review and discuss course climate as it evolves Encourage, validate, and support all students in the presentation of thoughts, feelings, and interpretations
Group cohesion	I work to ensure learners feel comfortable disagreeing with other course participants while still maintaining a sense of trust I work to ensure learners feel their point of view is acknowledged by other course participants I create to ensure that online or in-person discussions can help learners to develop a sense of collaboration	Provide opportunity for individuals to present their ideas, engage in interaction one to one, and work and interact in small and large groups Discuss, work toward consensus, and continue to verify and adjust group norms during the course Use deliberative dialogue principles that include acceptance and validation of everyone's ideas in group norms Make explicit the value of deliberative dialogue and collaborative learning

Adapted from Cleveland-Innes, 2019, p. 94

their background in the subject matter, if any, and their own individual goals for completing the course – both the activity goals and the completion goals. Instructors should acknowledge and validate text or spoken personal expressions that students offer, noting similarities in geographic or occupational places.

The second subcategory of social presence, open communication, is both required for and fostered by personal expression. Open could be seen here as an euphemism for accepting and inclusive. It is represented by actions and opportunities for "continuing a thread, quoting from others' messages, referring explicitly to others' messages, asking questions and getting feedback, complimenting or expressing appreciation, and expressing agreement" (Kreijns et al., p. 9). As suggested in the organizational literature, open communication allows community members to interact with each other and share experiences and information (Cherrington, 1989).

Group cohesion is the extent to which the students in a CoI are connected to one another. Like all sound structures, physical or social, the strength of the system or structures rests on the strength of the connections among the elements. Cohesive groups share a common purpose, and all participate in appropriate and supportive ways. Conflict is dealt with respectfully and openly and is accepted as a normal part of the human experience. Members can express feelings, share the leadership of the group, and operate in a space where the rules of operation are transparent, explicit, and agreed upon.

Applied cognitive presence. Table 4 offers application suggestions for design and delivery in each of the four subcategories that define cognitive presence. The indicators represent the teacher's observational perspective of student activity and interaction representing cognitive presence in each of the four subcategories. Design and delivery opportunities can support these elements of cognitive presence. The application suggestions provided here are derived from feedback at development workshops, literature reviewing online learning, and the first author's experience designing and teaching with the CoI framework.

In the first consideration of designing a trigger event, inquiry learning requires provision of a focal point for cognitive activity. Questions or problems are two examples of such triggers that stimulate curious attention to course content. "The instructor can bring readings, and other self-regulated student activity, to life by bringing attention to key points. This can be done with visuals, stories, questions, problems and presentation of information" (Vaughan et al., 2013, p. 40).

Cognitive presence will continue where design and delivery engages students in exploring the content reviewed in the triggering event. Problems and questions may be explored, by the individual and/or in the community, through reflection and discourse. Integration describes the accommodation and assimilation of the new insights into existing understandings and principles of practice. Resolution refers to the closure of the inquiry for that section or content, problem, or question. Often a temporary situation, this process includes providing a summary, feedback, and suggestions about what else needs to be considered.

Although listed and presented in a linear fashion, these four subcategories of cognitive presence can occur in almost any order. For example, resolution can cause a return to any of the three other places of practical inquiry. Also, part of design is determining how much time to spend in, for example, triggering thought about seminal concepts in a course as opposed to requiring exploration of the topic or integration with other topics and, finally, resolving the issue or solving the problem.

Applied emotional presence. According to Lehman (2006), "Distance education researchers are beginning to incorporate into their research the idea of the role of emotion in creating presence and are influencing the direction of the field" (p. 13). Now seen as a recent rendition of distance education, online learning research identifies the value of emotion in learning in the design and delivery of blended and online learning (Cleveland-Innes & Campbell, 2012; Dell, 2021; Majeski et al., 2018).

Teaching with emotional presence involves encouraging learners to engage with understanding, acceptance, and transparency about their learning-related emotion and that of others. In this way, negative emotion can be minimized as a deterrent to

Table 4 Cognitive presence indicators and applications for design

Subcategories	Indicators	Applications
Triggering event	I encourage exploration and motivation to explore content-related questions I integrate course activities that pique students' curiosity I pose problems and question prompts that increase student interest in course content	Share your passion and points of interest in reference to the subject matter and everyday life Use varied and unique materials and approaches to engaging students with learning material Use problem-based learning processes that support engagement and higher levels of intellectual development
Exploration	I facilitate online discussions in a way that helps students appreciate different perspectives I create opportunities for brainstorming and finding relevant information that helps learners seek resolution to content-related questions I provide a variety of information sources to help learners explore problems posed in my course	Provide opportunities for application of knowledge outside the class environment Offer opportunity for peer facilitation of forums exploring new topics Provide opportunities to search for content outside course materials Offer library orientation and search skills training for valuable subject-related resources
Integration	I provide opportunities for reflection on course content and discussion that help learners to understand fundamental concepts I create opportunities for learners to combine information to explore questions raised in course activities I select learning activities that help learners to construct explanations/solutions	Student-driven material choices allow for high engagement with content-related integration and synthesis Self-directed, actively created learning assignments provide students the opportunity to master and apply content in creative ways Discussion and application of knowledge is facilitated as a regular part of course activities
Resolution	I create course components to build conditions for learners to describe ways to test and apply the knowledge learned I create opportunities for reflection that helps learners apply the knowledge created in my course to his/her work or other non-class-related activities I provide opportunities for learners to develop solutions to relevant problems that can be applied in practice	Respond in a timely fashion to provide synergy between posts and individuals as course segments ad topics are summarized and closed Course activities and assignments require reflection, application, and critique of course material

Adapted from Cleveland-Innes, 2019, p. 94

learning and used where possible as a motivation for learning. Table 5 provides introductory possibilities for leveraging emotion in support of learning. In the teachers' CoI self-assessment, emotions identified empirically as part of each sub-category within the presences are outlined.

Table 5 Emotional indicators and applications for design

Subcategories	Indicators	Applications
Related to teaching presence	In my role as instructor, I demonstrate (role model) emotion in my presentations and/or when facilitating discussions, online or in person I acknowledge the emotion expressed by the learners in my course	Model expressions of emotional response in written and oral communications Acknowledge and support student expressions of emotional response in written and oral communications
Related to social presence	I create space for learners to feel comfortable expressing emotion through the online medium or in the in-person classroom I create space to ensure emotion is expressed, online or in person, among the learners in my course	Make explicit the acceptable use of emoticons and emotional language as part of the course learning environment Encourage, acknowledge, and support expressions of emotion during course activities
Related to cognitive presence	I find myself responding emotionally about ideas or learning activities in my course I communicate that expressing emotion in relation to sharing ideas is acceptable in my course	Emotion is identified as a regular part of human existence including learning and thinking Emotional experience and expression are shared, acknowledged, and accepted among all members of the learning community

Adapted from Cleveland-Innes, 2019, p. 95

The original CoI measurement instrument was designed to measure the student experience. The self-assessment tool presented below uses transposed indicators of each presence to assess the teacher's point of view. This self-assessment is offered for individual self-evaluation of current teaching practices. It can also be used as reference for CoI instructional design and delivery.

CoI and Learning Assessment

In the CoI, the emergence of the social, cognitive, and teaching presences fit well with the constructivist, collaborative perspective where the learners are actively participating in their learning. This environment is needed to create a context for sustained discourse, creating a platform for higher-order, deep, and meaningful learning to emerge (Akyol & Garrison, 2011) as is needed in higher education.

Assessment of learning within the community of inquiry framework is not conducted only on specific learning outcomes, but also on the process by which learning occurs (Akyol & Garrison, 2011; Conrad & Openo, 2018). In the CoI framework, the presences are critical for community, inquiry, and deep learning to develop (Vaughan et al., 2013). This is not rote learning or surface learning, and as such is contextual, problem based, and in need of multiple inputs and perspectives. Such learning involves a process to access higher-order learning, and takes advantage of metacognition and reflection to do so.

With this type of deep, contextualized learning that involves critical thinking, the learner needs to be at the center, involving learner teaching presence, whether in design elements, direct instruction, or facilitation (Vaughan et al., 2013). Peer assessment, self-assessment, use of rubrics, and instructor formative feedback can be used to encourage learner engagement in the construction of knowledge. Particularly focusing on the meaningful contributions to discourse (Akyol & Garrison, 2011), specific reflection or feedback activities may include those such as peer assessment on another learner's discussion forum facilitation or presentation of a given topic, self-reflections on what has been learned through the process of a given learning activity, or instructor feedback on the learner's contributions.

One important piece in the community of inquiry, and in the constructivist approach, is that learning is contextualized, and to create such a context, and to ensure that the inquiry process is at play, authentic and personally meaningful problems for the learner should be included in the inquiry process (Ertmer & Newby, 2013). Therefore, the learner's ability to choose the topic or even the assignment can help support the learner's full identification with the project. This can situate the learner in a position of a growing expert, in need of other perspectives and inputs to fully resolve the inquiry.

Higher-order learning is a challenge to assess as part of the formal assignment structures (Akyol & Garrison, 2011). Naturally, the products created can be assessed against how well they meet the specific learning outcomes. However, assessment of discourse contributions and reflections on the learning process can also be a way to assess higher-order learning. Instructors specifically need to acknowledge and validate contributions that exhibit critical reflection and critical analysis, key artifacts of higher-order thinking.

Conclusion

Why move higher education course design to community-based learning? Learning communities support learner engagement and satisfaction, as well as deep learning outcomes. While this is true for all modes of teaching and learning design and delivery, the strategies for creating a sense of community online are quite different (Mullinix, 2018). Community is also a powerful tool in support of inquiry-based learning. Creating communities of inquiry in blended and online learning is one of the most researched pedagogical approaches in universities and colleges. The original Garrison et al. (2001) article explaining this framework has been cited in the scholarly literature over 4000 times. Much of the early research focused on understanding social presence (Richardson & Swan, 2003) as a new way to approach teaching beyond strict transmission models of delivery. A significant amount of research has also been done to measure the components of this framework and how they operate in reference to one another (Arbaugh et al., 2008; Garrison, Cleveland-Innes, & Fung, 2010).

A recent analysis of the literature identified that in measuring and applying the community of inquiry, "the most frequently used and the one adopted the most commonly in the literature is the CoI survey instrument developed by Arbaugh et al. (2008)" (Olpak, Yagci, & Basarmak, 2016, p. 1090). This chapter offers rationale, and application suggestions, for serious consideration of the CoI as a contemporary framework for online design and delivery, in support of deep and meaningful learning.

References

Akyol, Z., & Garrison, D. R. (2011). Understanding cognitive presence in an online and blended community of inquiry: Assessing outcomes and processes for deep approaches to learning. *British Journal of Educational Technology, 42*(2), 233–250.

Arbaugh, J. B., Cleveland-Innes, M., Diaz, S. R., Garrison, D. R., Ice, P., Richardson, J. C., & Swan, K. P. (2008). Developing a community of inquiry instrument: Testing a measure of the community of inquiry framework using a multi-institutional sample. *The Internet and Higher Education, 11*(3), 133–136. https://doi.org/10.1016/j.iheduc.2008.06.003.

Archibald, D. (2010). Fostering the development of cognitive presence: Initial findings using the community of inquiry survey instrument. *The Internet and Higher Education, 13*(1–2), 73–74.

Befus, M. (2016). Conducting a multivocal thematic synthesis on an extensive body of literature. *Canadian Journal of Learning and Technology, 42*(2).

Bektashi, L. (2018). Community of inquiry framework in online learning: Use of technology. *Technology and the Curriculum: Summer, 2018*.

Berry, S. (2019). Faculty perspectives on online learning: The instructor's role in creating community. *Online Learning, 23*(4), 181–191.

Bolliger, D. U., Shepherd, C. E., & Bryant, H. V. (2019). Faculty members' perceptions of online program community and their efforts to sustain it. *British Journal of Educational Technology, 50*(6), 3283–3299.

Bozkurt, A. (2019). Intellectual roots of distance education: A progressive knowledge domain analysis. *Distance Education, 40*(4), 497–514.

Castellanos-Reyes, D. (2020). 20 years of the community of inquiry framework. *TechTrends: Linking Research & Practice to Improve Learning, 64*(4), 557–560.

Cherrington, D. J. (1989). *Organisational behaviour*. London, England: Allyn & Bacon.

Cleveland-Innes, M. (2019). The community of inquiry theoretical framework: Designing collaborative online and blended learning. In H. Beetham & R. Sharpe (Eds.), *Rethinking pedagogy for a digital age: Principles and practices of design* (3rd ed., pp. 85–102). Routledge. https://doi.org/10.4324/9781351252805.

Cleveland-Innes, M., & Campbell, P. (2012). Emotional presence, learning, and the online learning environment. *International Review of Research in Open & Distance Learning, 13*(4), 269–292.

Cleveland-Innes, M. F., & Emes, C. (2005). Social and academic interaction in higher education contexts and the effect on deep learning. *NASPA Journal, 42*(2), 241–262.

Cleveland-Innes, M.F., Stenbom, S., & Garrison, D.R., Eds. (manuscript in preparation). *The design of digital learning environments: Online and blended applications of the community of inquiry.* New York, NY: Routledge.

Conrad, D., & Openo, J. (2018). *Assessment strategies for online learning: Engagement and authenticity.* Alberta, Canada: Athabasca University Press. https://doi.org/10.15215/aupress/9781771992329.01.

Cook, K. C. (2020). An argument for pedagogy-driven online education. In *Online education* (pp. 49–66). New York, NY: Routledge.

Cunningham, J. (2010). Self-direction: A critical tool in distance learning. *Common Ground Journal, 7*(2), 89–100.

Dell, D. (2021). *Emotional presence indicators in an online Community of Inquiry: A scoping review and Delphi study of student and facilitator experience*. Doctoral dissertation, Athabasca University.

Dewey, J. (1933). *How we think: A restatement of the relation of reflective thinking to the educative process*. Boston, MA: D.C. Heath & Co Publishers.
Ertmer, P. A., & Newby, T. J. (2013). Behaviorism, cognitivism, constructivism: Comparing critical features from an instructional design perspective. *Performance Improvement Quarterly, 26*(2), 43–71.
Feng, X., Xie, J., & Liu, Y. (2017). Using the community of inquiry framework to scaffold online tutoring. *The International Review of Research in Open and Distance Learning, 18*(2), 162–188.
Garrison, D. R. (2009). Communities of inquiry in online learning: Social, teaching and cognitive presence. In C. Howard et al. (Eds.), *Encyclopedia of distance and online learning* (2nd ed., pp. 352–355). Hershey, PA: IGI Global.
Garrison, D. (2016). *E-learning in the 21st century: A framework for research and practice*. New York, NY: Routledge.
Garrison, D. R., Anderson, T., & Archer, W. (2001). Critical thinking, cognitive presence, and computer conferencing in distance education. *American Journal of Distance Education, 15*(1), 7–23.
Garrison, D. R., Cleveland-Innes, M., & Fung, T. S. (2010). Exploring causal relationships among teaching, cognitive and social presence: Student perceptions of the community of inquiry framework. *The Internet and Higher Education, 13*(1–2), 31–36.
Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). The difference between emergency remote teaching and online learning. *Educause Review, 27*(1), 1–9.
International Commission on the Futures of Education. (2021). *Reimagining our futures together: A new social contract for education*. Paris, France: UNESCO.
Kreijns, K., Van Acker, F., Vermeulen, M., & Van Buuren, H. (2014). Community of inquiry: Social presence revisited. *E-learning and Digital Media, 11*(1), 5–18.
Le Roux, I., & Nagel, L. (2018). Seeking the best blend for deep learning in a flipped classroom–viewing student perceptions through the community of inquiry lens. *International Journal of Educational Technology in Higher Education, 15*(1), 1–28.
Lehman, R. (2006). The role of emotion in creating instructor and learner presence in the distance education experience. *Journal of Cognitive Affective Learning*, 12–26.
Loderer, K., Pekrun, R., & Lester, J. C. (2018). Beyond cold technology: A systematic review and meta-analysis on emotions in technology-based learning environments. *Learning and Instruction*. https://doi.org/10.1016/j.learninstruc.2018.08.002.
Majeski, R. A., Stover, M., & Valais, T. (2018). The community of inquiry and emotional presence. *Adult Learning, 29*(2), 53–61. https://doi.org/10.1177/1045159518758696.
Mullinix, B. B. (2018). Creating online community: Tools promoting choice, voice and connectivity. In *ANNUAL* (p. 119).
Nolan-Grant, C. R. (2019). The community of inquiry framework as learning design model: A case study in postgraduate online education. *Research in Learning Technology, 27*. https://doi.org/10.25304/rlt.v27.2240.
Olpak, Y. Z., Yagci, M., & Basarmak, U. (2016). Determination of perception of community of inquiry. *Educational Research and Reviews, 11*(12), 1085–1092.
Ossiannilsson, E. (2020). Quality models for open, flexible, and online learning. *Journal of Computer Science Research, 2*(4). https://doi.org/10.30564/jcsr.v2i4.2357.
Richardson, C., & Alsup, J. (2015). From the classroom to the keyboard: How seven teachers created their online teacher identities. *International Review of Research in Open and Distance Learning, 16*(1).
Richardson, J., & Swan, K. (2003). Examining social presence in online courses in relation to students' perceived learning and satisfaction. *Journal of Asynchronous Learning Networks, 7*, 68–88.
Rogers, C. R., & Raider-Roth, M. B. (2006). Presence in teaching. *Teachers and Teaching: Theory and Practice, 12*(3), 265–287.
Rovai, A. P. (2002). Building sense of community at a distance. *The International Review of Research in Open and Distributed Learning, 3*(1).

Schwab, J. J. (1966). Teaching and learning as inquiry and the contribution of television. In W. McBride (Ed.), *Inquiry: Implications for televised instruction*. Washington, DC: National Education Association.

Shea, P., & Bidjerano, T. (2009). Cognitive presence and online learner engagement: A cluster analysis of the community of inquiry framework. *Journal of Computing in Higher Education, 21*(3), 199.

Shearer, R. L., Aldemir, T., Hitchcock, J., Resig, J., Driver, J., & Kohler, M. (2020). What students want: A vision of a future online learning experience grounded in distance education theory. *American Journal of Distance Education, 34*(1), 36–52.

Stenbom, S., Jansson, M., & Hulkko, A. (2016). Revising the community of inquiry framework for the analysis of one-to-one online learning relationships. *The International Review of Research in Open and Distributed Learning, 17*(3). https://doi.org/10.19173/irrodl.v17i3.2068.

Swan, K. (2019). Social construction of knowledge and the community of inquiry framework. In *Open and distance education theory revisited* (pp. 57–65). Springer.

Vaughan, N. D., Cleveland-Innes, M., & Garrison, D. R. (2013). *Teaching in blended learning environments: Creating and sustaining communities of inquiry*. Alberta, Canada: Athabasca University Press.

Vygotsky, L. S. (1997). *The collected works of LS Vygotsky: Problems of the theory and history of psychology* (Vol. 3). Springer Science & Business Media.

Ward, M. E., Peters, G., & Shelley, K. (2010). Student and faculty perceptions of the quality of online learning experiences. *The International Review of Research in Open and Distance Learning, 11*(3), 57–77.

Williams, L. S. (2017). The managed heart: Adult learners and emotional presence online. *Journal of Continuing Higher Education, 65*(2), 124–131. https://doi.org/10.1080/07377363.2017.1320204.

Zhu, M., Herring, S. C., & Bonk, C. J. (2019). Exploring presence in online learning through three forms of computer-mediated discourse analysis. *Distance Education, 40*(2), 205–225.

Zimmerman, W., Altman, B., Simunich, B., Shattuck, K., & Burch, B. (2020). Evaluating online course quality: A study on implementation of course quality standards. *Online Learning, 24*(4), 147–163.

78 Synergies Among the Pillars

Designing for Computer-Supported Collaborative Learning

Cindy E. Hmelo-Silver and Heisawn Jeong

Contents

Abstract

Computer-Supported Collaborative Learning (CSCL) research has become pervasive in STEM (science, technology, engineering, and mathematics) education over the last several decades. Guided by sociocultural and social constructivist theories of learning, CSCL focuses on shared meaning making and is influenced by the three pillars of CSCL: enabling technologies, pedagogical designs, and modes of collaboration. This chapter identifies different approaches to CSCL that involve different combinations of these pillars. Based on an extensive literature review, we identify four distinct clusters that represent these different combinations. Focusing on two of these clusters, this chapter (1) identifies robust themes in this field and (2) discusses the positive outcomes associated with these aspects of CSCL. Outcomes include learning gains, process improvements, and affective outcomes. Across clusters, results demonstrate that scaffolding and feedback in different combinations are important for positive outcomes. However, feedback

C. E. Hmelo-Silver (✉)
Center for Research on Learning and Technology, Indiana University, Bloomington, IN, USA
e-mail: chmelosi@indiana.edu

H. Jeong
Hallym University, Chuncheon, South Korea
e-mail: heis@hallym.ac.kr

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_83

that is poorly timed or excessive sometimes impedes learning and affective outcomes. Moreover, different combinations are used with learners at different ages and learning goals. Designing CSCL for different learning environments requires considering the complex system of learning environments that emerge from the interaction among the learning contexts, learner characteristics, and learning activities.

Keywords

CSCL · Pedagogy · Collaborative learning · Technology

Introduction

Many contemporary theorists characterize learning as that which is fundamentally social rather than individual (Danish & Gresalfi, 2018). Advances in computer technologies have enabled diverse modes of collaboration and set the stage for Computer-Supported Collaborative Learning (CSCL). CSCL refers to collaborative learning that is mediated in some way by computer technology (Stahl, Koschmann, & Suthers, 2014). It rests on three major pillars: the technologies that support and enable CSCL, the pedagogical designs that apply CSCL to learning, and the modes in which learners collaborate. In describing the goal of research in CSCL, Miyake (2007) argued that to understand how CSCL research was fulfilling its goals, it is essential that research on learning "takes collaboration seriously, and implements and evaluates technological support to materialize effective learning designs" (p. 248). This addresses these three key foundations of CSCL. Similarly, Roschelle, Bakia, Toyama, and Patton (2011) have argued that we need to understand the compound resources at play in complex learning environments. By looking at different combinations of CSCL design elements, we move closer to being able to understand how to design for CSCL in different contexts. In this chapter, we will consider how different combinations of these pillars affect the outcomes of CSCL research with a focus on science, technology, engineering, and mathematics (STEM) education, where much CSCL research has been conducted (Jeong & Hmelo-Silver, 2012).

CSCL: An Overview

CSCL is consistent with a connected and ubiquitous vision of learning that takes advantage of unique affordances of technology (Miyake, 2007). Technology can lead to fundamental changes in teaching and learning practices, particularly in providing opportunities for students as engaged participants, working collaboratively in meaningful tasks (Roschelle, 2013). In particular, technology can enable new possibilities for interaction and feedback, communication, scaffolding, as well as providing meaningful tasks (e.g., simulations) and audiences.

The pillars of CSCL, what Kirschner and Erkens (2013) called the tryptic, are the technology, the pedagogy, and what they call the social aspects of learning, which includes the mode of collaboration. CSCL environments may be synchronous, that is, with learners collaborating at the same time, or asynchronous, with learners collaborating at different times. Synchronous collaboration can be at a distance, as in web conferences, or it can be face-to-face. An example of synchronous face-to-face CSCL is secondary school students discussing simulations in their classroom together (e.g., Echeverría et al., 2012; Sinha, Rogat, Adams-Wiggins, & Hmelo-Silver, 2015), whereas an asynchronous CSCL design can involve learners distributed across time and space (e.g., Yukawa, 2006). This review takes a broad view of technology, with the perspective that the computer-supported component of CSCL is used as an inextricable part of collaborative learning in a variety of contexts. Thus, we include technologies that serve a range of functions in CSCL (Jeong & Hmelo-Silver, 2016) and go beyond serving as communication channels.

Within CSCL, the focus is on learning through technology-mediated collaboration as a coordinated effort to build shared knowledge (Roschelle, 2013; Suthers, 2006). Although the CSCL community has largely focused on social constructivist and sociocultural approaches to CSCL (Stahl et al., 2014), a broad range of theoretical perspectives can apply (Hmelo-Silver & Jeong, 2021; Jeong, Hmelo-Silver, & Yu, 2014). An inclusive view of CSCL also needs to consider other theoretical frameworks such as information processing (Jeong et al., 2014). Still, in an earlier review of CSCL, a general constructivist orientation or sociocultural framework accounted for the majority of the CSCL articles (Jeong et al., 2014). Thus, we ground our discussion of the theoretical basis for CSCL in these constructivist and sociocultural frameworks, as they have been the dominant paradigm. In particular, we focus on what affordances are needed for technology to support CSCL.

Within this paradigm, *constructivism* refers to a broad range of theoretical approaches that emphasize active learner processing and knowledge construction either in individual or collaborative settings (Chi & Wylie, 2014). Social constructivism tends to emphasize how knowledge is socially constructed and leads to individual learning. *Sociocultural theory* refers to a family of theories such as Vygotskian approaches, distributed and/or situated cognition, or activity theory that emphasizes the fundamental role of tools, activities, social norms, and systems (Danish & Gresalfi, 2018). These theories consider the role of tools as mediators of learning as well as a means of providing support for task completion. An important but subtle distinction between social constructivism and sociocultural theory is that the former views the social context as an influence on individual learning, whereas the latter considers participation in the sociocultural context part of learning.

These theoretical perspectives help in considering how to design for CSCL, in particular, thinking about the functions that might be addressed in different CSCL designs. Jeong and Hmelo-Silver (2016) proposed seven affordances of CSCL for learning. Affordances refer to the ways that technology can provide opportunities for particular kinds of functions that mediate learning. CSCL technologies provide learners opportunities to (1) engage in a joint task, (2) communicate, (3) share resources, (4) engage in productive collaborative learning processes, (5) engage in co-construction, (6) monitor and regulate collaborative learning, and (7) find and build groups and communities. Different combinations of these functions can be used in CSCL designs to support a range of instructional designs and pedagogical approaches.

Effects of CSCL on Learning

Recent meta-analyses suggest that CSCL has significant effects on student learning (Chen, Wang, Kirschner, & Tsai, 2018; Jeong, Hmelo-Silver, & Jo, 2019; Vogel, Wecker, Kollar, & Fischer, 2017). Chen et al. (2018) examined the role of collaboration, computer use, and overall CSCL environments on learning. They found overall moderate effects of CSCL on learning outcomes and social interaction with large effects on group tasks. Vogel et al. (2017) restricted their meta-analysis to scaffolding with CSCL scripts. Their results demonstrated small effects on knowledge gains and a moderate effect on collaboration skills. However, they found that scripts were particularly effective for learning domain knowledge when they prompted learners to engage in activities that built on the contribution of other group members or when they provided additional content-specific support. Jeong et al. (2019) restricted their meta-analysis of CSCL to research in STEM education domains but found a similar overall moderate effect size, similar to Chen et al. (2018). They did find, however, that effect sizes were moderated by types of technology and pedagogy, education levels of learners, and modes of collaboration. There were also interactions among these moderator variables. For example, representational tools (e.g., simulations, modeling tools) were more effective in face-to-face than in asynchronous settings as was inquiry learning. The use of scripts and discussion boards were more effective in asynchronous settings.

The results across these meta-analyses suggest that CSCL is effective overall. However, these studies also noted different factors that moderated the effectiveness of these approaches. Jeong, Hmelo-Silver, & Jo (2019) drew from a larger corpus of CSCL research that included research with a larger variety of research methods that were coded for types of technologies, pedagogies, and collaboration mode (McKeown et al., 2017). This meta-synthesis found that there was not just one CSCL but rather four unique interpretable clusters of CSCL designs (presented in order of largest clusters):

- **Face-to-Face Inquiry with Dynamic Feedback** – face-to-face collaboration, inquiry and exploration pedagogies, and dynamic or other tools.
- **Asynchronous Teacher-Structured Discussion** – asynchronous collaboration, discussion or teacher-structured pedagogies, and asynchronous communication technologies.
- **Online Generative Inquiry** – asynchronous or face-to-face collaboration, inquiry and exploration or teacher-structured pedagogies, and sharing and co-construction technology.

- **Synchronous Collaboration** – synchronous collaboration and communication technologies.

Space precludes discussing all these in detail, and thus we focus on the two inquiry-oriented clusters, the first and the third largest, to show how CSCL has been used in different learning designs. We summarize these and provide examples next.

Face-to-Face Collaborative Inquiry with Dynamic Feedback (F2FCI). This cluster emphasizes face-to-face collaboration with inquiry and exploration pedagogies using dynamic technological tools such as simulations, games, and immersive technology. In addition, a substantial number of the papers in this cluster also used sharing and co-construction tools. Within the cluster, the majority of papers were in K-12. The inquiry pedagogy was generally supported by rich task contexts such as simulations and games as authentic contexts for inquiry.

Outcomes. Learning under this type of CSCL led to significant learning gains, promoted student engagement, and supported positive process outcomes such as critical thinking and reasoning skills. These outcomes cut across quantitative and qualitative studies, disciplinary content, and education levels. K-12 math students improved their problem-solving skills (Gallardo-Virgen & DeVillar, 2011; Roschelle, Rafanan, Estrella, Nussbaum, & Claro, 2010; Sao Pedro, Baker, & Rodrigo, 2014), conceptual understanding in mathematics and physics (Lai & White, 2012; Turcotte, 2012), and group collaboration and communication skills (Chen, Looi, Lin, Shao, & Chan, 2012). In physics, positive effects on learning gains were found in primary and secondary education (Turcotte, 2012; Echeverría et al., 2012, respectively). Primary students experienced positive learning gains and improved critical thinking skills from designing digital science games in an integrated biology and computer science curriculum (Yang & Chang, 2013). Primary students who were guided either with awareness tools or scripts learned more about photosynthesis through a drawing task than students in a control condition (Gijlers, Weinberger, van Dijk, Bollen, & van Joolingen, 2013). Students in both experimental conditions engaged in higher quality discourse than control participants.

F2FCI research also highlighted positive effects on student engagement and affective measures at multiple education levels. Primary students using handheld devices in an authentic outdoor learning task were enthusiastic and developed great interest in the assignment (Avraamidou, 2013). Secondary biology students who participated in a CSCL review game were more engaged than students in the control group who participated in traditional paper and pencil review sessions with CSCL support (Annetta, Minogue, Holmes, & Cheng, 2009). Additionally, computer science secondary and tertiary students felt empowered in their own learning (Tsai, Tsai, & Hwang, 2012).

Furthermore, lessons using dynamic technologies with inquiry and exploration pedagogies promoted meaningful interactions between elementary students, which in turn led to greater learning outcomes (Lai & White, 2012). For example, students engaged in high-quality interaction patterns, which entailed discussing the problem, task delegation, and helping each other in turn complete more assignments correctly than students with poor communication and collaboration (Chen et al., 2012).

Similarly, in the domain of ecology, primary science students engaged in an augmented reality mobile inquiry learning activity produced greater knowledge construction interactions than those in the control group (Chiang, Yang, & Hwang, 2014).

Factors that support effectiveness. Overarching themes that emerged from this cluster are that (1) pedagogies that support guided collaborative inquiry and (2) rich problem contexts that establish a joint task promote positive outcomes (Avraamidou, 2013; Chiang et al., 2014; Jaakkola & Nurmi, 2008; Kong, Yeung, & Wu, 2009; Kuo, Hwang, & Lee, 2012; Lai & White, 2012; Loke et al., 2012; Santos-Martin, Alonso-Martínez, Carrasco, & Arnaltes, 2012; Tsai et al., 2012; Yang & Chang, 2013). Authentic problem contexts could be set in games and simulations (e.g., Echeverría et al., 2012; Nelson & Ketelhut, 2008). One way that facilitators provided guided instruction was by giving assistance and feedback throughout collaborative inquiry and by providing authentic problems for problem-based learning (Avraamidou, 2013; Santos-Martin et al., 2012). A similar approach was taken with case-based instruction by developing workshops for pharmacy students to simulate real-life scenarios (Loke et al., 2012).

Instructors provided guided instruction ranging from very open-ended to more highly structured. For example, undergraduate and graduate students were given very open-ended guidelines as they engaged in mobile learning outside of the classroom (Tsai et al., 2012), whereas secondary-level students were provided more facilitation in a student-driven augmented reality game to help them learn electrostatics (Echeverría et al., 2012). Even greater structure was provided for primary grade students who were given systematic processes to follow as they engaged with highly organized inquiry learning to help them with knowledge sharing (Chiang et al., 2014). In a grade 5/6 study of Knowledge Forum, teacher and researcher questions were helpful in advancing student thinking (Turcotte, 2012).

In comparing task awareness tools with process-support scripts, Gijlers et al. (2013) found that support in the form of a script led to more interactive talk and differences in the ways that elementary school learners engaged with the task of drawing the photosynthesis process. The awareness tools, which prompted students about objects that were missing from their drawings, led students to go back to the concepts in their resource text, whereas students in the scripted condition were more likely to integrate elements from their individual drawings into a shared drawing. Guided instruction also took the form of companion worksheets with primary students (Jaakkola & Nurmi, 2008; Lai & White, 2012).

Closely tied to the theme of guided inquiry is feedback (Hmelo-Silver et al., 2007). In studies with F2FCI with dynamic feedback, participants at a variety of educational levels received immediate feedback on a task or problem from facilitators (Avraamidou, 2013; Kong et al., 2009; Santos-Martin et al., 2012), peers (Chen et al., 2012; Chiang et al., 2014; Gallardo-Virgen & DeVillar, 2011; Kuo et al., 2012; Lai & White, 2012), and/or software (Chen et al., 2012; Echeverría et al., 2012; Holmes, 2007; Loke et al., 2012; Roschelle et al., 2010). Software feedback could include direct hints or prompts or be more indirect in providing changes in the state of a simulation or game in response to learner actions. Teachers noted elementary student achievement and success with technology use required active teacher feedback (Chiang et al., 2014; Kong et al., 2009).

Factors that inhibit effectiveness. Collaborative tasks are particularly complex as Gijlers et al. (2013) also demonstrated in their control condition, and they require support. The factors that may inhibit student learning and engagement are related to feedback. An example of the importance of informative feedback emerged from two studies with primary students and teachers. When teachers lack content expertise, the technology itself needs to have that content feedback embedded or risk leaving student questions unanswered, as in an example of using software for learning about electrical circuits (Kong et al., 2009). This is also a problem when a teacher is working with several groups and cannot provide consistent active feedback for each group (Chiang et al., 2014; Kong et al., 2009), or for students who have specific questions about technology or content, and the teacher is unable to answer (Kong et al., 2009).

Although this concern with the lack of consistent, active feedback only emerged between these two studies with primary students, they are pedagogical and technological concerns applicable at all educational levels. Technologies can be used to provide content feedback in such situations, but as Turcotte (2012) noted, just because technology provides affordances for particular kinds of activity such as elaborated explanations, learners do not always take advantage of those affordances.

Summary and implications. Among these papers, there was a trend for students to be collaboratively engaged with authentic problems and their learning nurtured by guided instruction, feedback, and discussion. Together, these combinations were associated with significant learning gains, positive student engagement, meaningful interactions between students, and improved group collaboration and communication skills.

Simulation tools and augmented reality games allow students opportunities for practice, feedback, and revision as they collaboratively engage with disciplinary content and practices without the time or expense of physical tools. Learning with authentic problems was supported by opportunities for guided inquiry and immediate feedback from the tools and discussion (i.e., Echeverría et al., 2012; Holmes, 2007). Technology played a role in helping students to work in settings that are more authentic and have opportunities to directly test their ideas and solutions, with the tools providing dynamic feedback. The main difference between the higher education and K-12 school environments was the control retained by the instructor. When this design was used in higher education, students had greater autonomy than primary and secondary education students. Question remained, however, about how much information needs to be embedded in the technology and how to help teachers support their students.

Online Generative Inquiry (OGI). This cluster of articles was primarily concerned with integrated learning environments (e.g., learning management systems) or online sharing and co-construction technologies (e.g., wikis, participatory technologies). Asynchronous collaboration with inquiry and exploration pedagogies was a main focus, but collaboration and pedagogy were more varied than in some of the other clusters. By their nature, integrated environments offered instructors and students a variety of tools that could be used to collaborate asynchronously or in face-to-face environments. Most OGI papers examined learners in higher education, again suggesting some connection between learner education level and collaboration types, consistent with the Jeong et al. (2019) meta-analysis. Communication and discussion occurred through sharing/co-construction tools and integrated environments that allowed direct communication through built-in chat tools or discussion forums.

Outcomes. Research in this cluster primarily reported process gains as well as some learning gains. The positive process gains highlighted in this cluster included metacognitive skills supported by a knowledge-building environment (Pifarre & Cobos, 2010) and improved reasoning and collaboration via e-learning environments or wikis (Huang & Nakazawa, 2010). In an undergraduate statistics course, student report writing was completed individually or collectively via a wiki (Neumann & Hood, 2009). There were no differences in terms of final report quality, but students who collaborated within wikis were more engaged and had higher attendance than those who worked alone. However, this technology is not without its challenges, as some students reported dissatisfaction with using the technology, and task completion was negatively affected by low group member participation in some instances (Neumann & Hood, 2009).

Learning gains in this cluster were not uniform. On one hand, collaborative use of a multimedia-enriched concept map produced greater short- and long-term retention scores than a control group that received regular instruction and worked on assignments individually (Marée, van Bruggen, & Jochems, 2013). However, another study found no differences between the final grades of a group that collaborated through wikis and a group that worked independently with a word processor, despite positive engagement (Neumann & Hood, 2009). Mixed learning gains were reported in Krause, Stark, and Mandl (2009) that examined learning gains with students working individually versus pairs, and with some students receiving automatic adaptive feedback in an asynchronous statistics class. In this example, students who received feedback performed better than those who did not. Feedback tended to reduce the gap in outcomes between students with low and high prior knowledge.

Factors that support effectiveness. A wiki co-construction environment demonstrated that students reported more interaction with peers than with their instructor and that the instructor moved to more of a moderator role, allowing students to initiate interactions (Huang & Nakazawa, 2010). Students also noted the importance of receiving public feedback about revisions within the wiki where these could be discussed by group members, instead of privately or over other media, allowing the feedback to function as collaborative scaffolding and an anchor for their discussions. In using representational tools, Marée et al. (2013) found that undergraduate science students could learn more with less teacher guidance using multimedia-enriched concept maps with embedded instructions for collaboration.

This OGI research also offered some promising implications about specific technologies and pedagogical practices. For example, in asynchronous discussion threads (i.e., a specific technology), particularly when students act as facilitators (i.e., a pedagogical practice), they need to understand different types of thread patterns and how questioning, summarizing, pointing, and resolving may affect discussion thread development and closure (Chan, Hew, & Cheung, 2009). Pedagogically, in ICT courses, it is important to integrate the technology being discussed so participants better understand its purpose and also how to use it themselves (Goktas & Demirel, 2012). Krause et al. (2009) supported the notion that feedback, whether from instructors or peers, may promote more reflection, especially when it offers explanations that encourage deeper understanding. Therefore, regardless of the source, feedback should be thoughtful and thorough and encourage students to think beyond remembering information. Pifarre and Cobos (2010) demonstrated the importance of scaffolds in improving peer questioning and co-regulation.

Many of these papers investigated how students used and perceived specific technology. These suggest that the use of collaborative group activities, instructors' timely feedback, and support materials embedded within an integrated system all related to student satisfaction with a variety of STEM-related vocational e-learning courses (Inayat, ul Amin, Inayat, & Salim, 2013). Similar to the F2FCI cluster, when guided instruction and immediate feedback are integrated within these pedagogies and technologies, it can lead to improved student learning (Krause et al., 2009; Marée et al., 2013) and task completion (Hämäläinen & Arvaja, 2009).

Although scripts might be effective for task completion, they do not necessarily avoid variability in collaboration processes among groups. In a study of university students engaging in case-based learning, Hämäläinen and Arvaja (2009) still found differences in frequencies and meaningfulness of collaborative activity with five out of the seven groups showing unequal participation or one group member being dominant. Thus, the structure applied by a script may not be sufficient to promote uniformly productive collaboration.

Factors that inhibit effectiveness. Again, feedback was mentioned in relation to factors that inhibit effectiveness. Consistent with findings in other clusters, a lack of feedback can negatively affect students' learning outcomes (Krause et al., 2009). Meanwhile, too much feedback, or using facilitation techniques that resolve conflicts or summarize key points, can lead to discussions closing prematurely (Chan et al., 2009). Without enough guidance regarding the importance of positive collaboration, students may have high task activity, but not necessarily high-quality collaboration (Hämäläinen & Arvaja, 2009).

Summary and Implications. Timely guidance from teachers and peers plays an important role in increasing student outcomes as well as favorable perceptions of the environment. The results for this cluster also highlighted the importance of keeping the guidance at an optimal level; there is a delicate balance between too much and not enough feedback or guidance.

In contrast to F2FCI, which also supported inquiry and exploration, communication modalities in this cluster make students' thinking visible in ways that a face-to-face classroom may not allow. Teachers can thus follow persistent threads of synchronous and asynchronous discussion along with the artifacts being created. This gives teachers opportunities for ongoing formative assessment. More speculatively, it may also provide grist for student reflection on these ongoing interactions in ways that face-to-face discussions that are more ephemeral may not. This may be particularly important in higher education contexts with their larger class sizes that might otherwise offer fewer opportunities for discussion and feedback.

Open Questions and Directions for Future Research

It is clear that the three pillars of CSCL – collaboration, technology, and pedagogy – are used in different combinations to design effective learning environments. However, we need to better understand how to design for the balance between developing appropriate structures and supporting student agency in ambitious learning practices promoted by CSCL (Glazewski & Hmelo-Silver, 2019). This is particularly important in being able to support diverse learners (Uttamchandani, Bhimdiwala, & Hmelo-Silver, 2020). We review this in the context of the major issues this chapter has identified.

First, feedback and support are themes that run through all the clusters, whether the feedback is from the teacher or peers or from tools. Much research has focused on teachers and software but less has addressed ways to support high-quality peer feedback (De Wever, Van Keer, Schellens, & Valcke, 2010). Certainly, research on scripts and roles may be one way to provide such support for good quality peer feedback, but these kinds of interventions tend to focus on process support rather than on feedback. CSCL environments should provide feedback for students and information that allows teachers to support multiple groups (Chiang et al., 2014; Kong et al., 2009). Questions about feedback consider both the timing and quality. Poorly timed feedback that does not address appropriate content, skills, or practices may impede learning. As the reference to synergy in the title suggests, it is important to think about feedback and support as part of the CSCL system of technologies, pedagogies, and collaboration modes. It is important to consider which aspects of feedback and support should be fixed and which should be adaptive.

Second, certain technologies lend themselves better to particular communication channels and/or pedagogical goals. Dynamic representational tools are generally used in face-to-face environments as the F2FCI cluster demonstrates (e.g., Lai & White, 2012; Nelson & Ketelhut, 2008). We conjecture that the rapid cycles of activity and engagement with such tools lend themselves to the immediacy of being in the same place at the same time. Additionally, the tools allow for deictic referencing as learners can easily point to phenomena on-screen and observe the gestures of others.

Our meta-analysis (Jeong et al., 2019) showed that effect sizes were larger when dynamic representational tools were used in face-to-face settings. Similarly, the use of sharing and co-construction tools dominated the OGI cluster. These tools may be more critical for online environments because learners' interaction channels are limited and thus need to be mediated by communication tools. When communicating and collaborating with these tools, learners need to be more explicit about their actions and contributions, which can provide a chance for reflections. Knowledge co-construction can be fostered when learners can articulate their ideas more clearly and make their contribution explicit.

Third, different learning environments are used for different learners. We found that CSCL involving younger learners tends to involve face-to-face collaboration rather than online collaborations. Online collaboration requires dealing with a broader range of communication modalities and as such may be used for more mature learners (Jeong & Hmelo-Silver, 2012). We do not know if it is because of better self-regulated learning skills for older learners or more convenience or available technology. In general, the trend seems to be for more structure and face-to-face collaboration for younger learners. Moreover, face-to-face CSCL is more commonly used for younger learners, perhaps due to the need for social presence in this population as they tend to be in the same physical space. In addition, technology tools can add to the cognitive demands on learners and pose increasing challenges for regulation that may be difficult for younger learners. However, these challenges are not unique to younger learners. There is a large body of literature that suggests that creating social presence and self-regulated learning is challenging even for more mature learners in online environments (e.g., Garrison, 2007; Järvelä & Hadwin, 2013).

Fourth, CSCL tasks are important, whether providing rich contexts or opportunities for joint construction of artifacts, particularly in those clusters that focus on inquiry and explanation. For example, in F2FCI, the establishment of rich task contexts was supported by the use of technology (e.g., simulations, games, and devices) and collaborative inquiry pedagogy (e.g., Chiang et al., 2014; Lai & White, 2012; Santos-Martin et al., 2012).

These authentic joint tasks promoted positive outcomes. The technology used here allowed learners to engage with tasks that were fundamentally different from what they could do without the CSCL technology. For example, the dynamic feedback from a game or simulation is immediate and is a consequence of particular learner actions. Paper cases that might be used in problem-based learning, for example, only provide predefined resources. In contrast, the OGI cluster uses the affordances of tools that allow construction of shared artifacts such as wikis (Huang & Nakazawa, 2010; Neumann & Hood, 2009), creating a website (Barchard & Pace, 2010), or collaborative concept mapping (Marée et al., 2013).

The last question that research on synthesis of CSCL needs to ask is what does it mean for CSCL to be effective? From different theoretical perspectives and research designs, this can mean many things, making the synthesis process challenging. It may mean CSCL is a black box that can produce content gains measured as pre- to posttest achievement (e.g., Echeverría et al., 2012; Kong et al., 2009; Pifarre & Cobos, 2010). However, it can also mean collective effectiveness such as in the research on knowledge building that focuses on collaborative improvement of community knowledge (e.g., van Aalst, 2009; van Aalst & Chan, 2007). Other authors examine the quality of discourse and patterns of collaboration processes broadly defined (e.g., Sinha et al., 2015; Van Amelsvoort, Andriessen, & Kanselaar, 2007). Still others focus on affective outcomes and learner satisfaction (e.g., Loke et al., 2012; So & Brush, 2008). Much of the research uses multiple measures (e.g., Gijlers et al., 2013; Shaw, 2013). In this chapter, we have treated what it means for CSCL to be effective broadly, but we also need to make sure that we make sense of the broad range of outcomes studied in CSCL in a coherent manner.

Together, these themes suggest overarching questions about needing to connect design features and contextual factors. Examining relationships among processes, outcomes, learner characteristics, instructional goals, and design features is critical for understanding more about "what works for whom and under what circumstances" and enabling designers to tailor CSCL designs to the intended settings.

Implications for ODDE

CSCL as a complex system. At the start, we noted the importance of considering the compound resources used in CSCL (Roschelle et al., 2011). There is no one-size-fits-all solution, and how CSCL is used in different ODDE environments needs to be tailored to the particular level of the learners and the learning goals. Designers will need to consider how the collaboration modes, technology, and pedagogical choices fit together in ways that are more than the sum of their parts. CSCL is an essential part of the complex system that emerges in enacting learning environments.

Considerations for practice. Helping stakeholders become aware of the usefulness of CSCL is a first step in implementing evidence-based practices. This includes reporting on CSCL in practitioner venues and publications. In addition, professional development is important for instructors in order to effectively implement CSCL. Facilitating CSCL requires mastering the technology, tailoring it to tasks, and providing adequate scaffolds that can be differentiated for student skills and prior knowledge.

Conclusions

It is clear that there are different technology-pedagogy-collaboration modes for different learners. We need models that help guide researchers and practitioners in how these CSCL pillars may be synergistically combined, providing the compound resources in appropriate combinations. One way to accomplish this might be to think about the function needed for a set of learning goals and considering how they might be distributed among these pillars. Jeong and Hmelo-Silver (2016), for example, have proposed that technologies serve seven distinct functions in CSCL such as establishing a joint task, providing communication channels, sharing resources, engaging in productive collaborative processes, supporting co-construction, monitoring and regulation, and forming groups and communities. These functions or affordances highlight different ways technology supports are contingent upon collaboration and pedagogy. Further work is needed to better understand how these functions might be used as part of a theory of design for CSCL and the implications for ODDE. The current chapter begins to address these important questions about CSCL and the complexity of these learning environments.

Cross-References

▶ Asynchronous Tools for Interaction and Collaboration
▶ Designing Online Learning Communities
▶ Designing Online Learning Environments to Support Problem-Based Learning
▶ Serious Games and Game-Based Learning
▶ Synchronous Tools for Interaction and Collaboration

Acknowledgments This work was supported by the US National Science Foundation [Grant No 1249492] and the National Research Foundation of Korea [Grant No NRF-2016R1D1A1B03935697]. We thank Jessica McKeown for her contributions to this synthesis. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the funding agencies.

References

Annetta, L. A., Minogue, J., Holmes, S. Y., & Cheng, M. T. (2009). Investigating the impact of video games on high school students' engagement and learning about genetics. *Computers & Education, 53*, 74–85.

Avraamidou, L. (2013). The use of mobile technologies in project-based science: A case study. *Journal of Computers in Mathematics and Science Teaching, 32*, 361–379.

Barchard, K. A., & Pace, L. A. (2010). Evaluating the effectiveness of collaborative computer-intensive projects in an undergraduate psychometrics course. *Interactive Learning Environments, 18*, 309–317.

Chan, J. C. C., Hew, K. F., & Cheung, W. S. (2009). Asynchronous online discussion thread development: examining growth patterns and peer-facilitation techniques. *Journal of Computer Assisted Learning, 25*(5), 438–452.

Chen, J., Wang, M., Kirschner, P. A., & Tsai, C.-C. (2018). The role of collaboration, computer use, learning environments, and supporting strategies in CSCL: A meta-analysis. *Review of Educational Research.* https://doi.org/10.3102/0034654318791584.

Chen, Y. H., Looi, C. K., Lin, C. P., Shao, Y. J., & Chan, T. W. (2012). Utilizing a collaborative cross number puzzle game to develop the computing ability of addition and subtraction. *Educational Technology & Society, 15*, 354–366.

Chi, M. T. H., & Wylie, R. (2014). The ICAP framework: Linking cognitive engagement to active learning outcomes. *Educational Psychologist, 49*(4), 219–243.

Chiang, T. H. C., Yang, S. J. H., & Hwang, G. (2014). Students' online interactive patterns in augmented reality-based inquiry activities. *Computers & Education, 78*, 97–108.

Danish, J. A., & Gresalfi, M. (2018). Cognitive and sociocultural perspectives on learning: Tensions and synergy in the learning sciences. In F. Fischer, C. E. Hmelo-Silver, S. R. Goldman, & P. Reimann (Eds.), *International handbook of the learning sciences* (pp. 33–43). New York, NY: Routledge.

De Wever, B., Van Keer, H., Schellens, T., & Valcke, M. (2010). Structuring asynchronous discussion groups: Comparing scripting by assigning roles with regulation by cross-age peer tutors. *Learning and Instruction, 20*, 349–360.

Echeverría, A., Améstica, M., Gil, F., Nussbaum, M., Barrios, E., & Leclerc, S. (2012). Exploring different technological platforms for supporting co-located collaborative games in the classroom. *Computers in Human Behavior, 28*, 1170–1177.

Gallardo-Virgen, J. A., & DeVillar, R. A. (2011). Sharing, talking, and learning in the elementary school science classroom: Benefits of innovative design and collaborative learning in computer-integrated settings. *Computers in the Schools, 28*, 278–290.

Garrison, D. R. (2007). Online community of inquiry review: Social, cognitive, and teaching presence issues. *Journal of Asynchronous Learning Networks, 11*, 61–72.
Gijlers, H., Weinberger, A., van Dijk, A. M., Bollen, L., & van Joolingen, W. (2013). Collaborative drawing on a shared digital canvas in elementary science education: The effects of script and task awareness support. *International Journal of Computer-Supported Collaborative Learning, 8*(4), 427–453.
Glazewski, K. D., & Hmelo-Silver, C. E. (2019). Scaffolding and Supporting Use of Information for Ambitious Learning Practices. *Information and Learning Sciences, 120*(1/2), 39–58.
Goktas, Y., & Demirel, T. (2012). Blog-enhanced ICT courses: Examining their effects on prospective teachers' ICT competencies and perceptions. *Computers & Education, 58*, 908–917.
Hämäläinen, R., & Arvaja, M. (2009). Scripted collaboration and group-based variations in a higher education CSCL context. *Scandinavian Journal of Educational Research, 53*, 1–16.
Hmelo-Silver, C. E., & Jeong, H. (2021). Benefits and challenges of interdisciplinarity in CSCL research: A view from the literature. *Frontiers in Psychology, 11*(3754), 11. https://doi.org/10.3389/fpsyg.2020.579986.
Hmelo-Silver, C. E., Duncan, R. G., Chinn, & C. A. (2007). Scaffolding and achievement in problem-based and inquiry learning: A response to Kirschner, Sweller, and Clark (2006). *Educational Psychologist, 42*, 99–107.
Holmes, J. (2007). Designing agents to support learning by explaining. *Computers & Education, 48*, 523–547.
Huang, W. H. D., & Nakazawa, K. (2010). An empirical analysis on how learners interact in wiki in a graduate level online course. *Interactive Learning Environments, 18*, 233–244.
Inayat, I., ul Amin, R., Inayat, Z., & Salim, S. S. (2013). Effects of collaborative web based vocational education and training (VET) on learning outcomes. *Computers & Education, 68*, 153–166.
Jaakkola, T., & Nurmi, S. (2008). Fostering elementary school students' understanding of simple electricity by combining simulation and laboratory activities. *Journal of Computer Assisted Learning, 24*, 271–283.
Järvelä, S., & Hadwin, A. F. (2013). New frontiers: Regulating learning in CSCL. *Educational Psychologist, 48*(1), 25–39.
Jeong, H., & Hmelo-Silver, C. (2012). Technology supports in CSCL. In J. van Aalst, K. Thompson, M. J. Jacobson, & P. Reimann (Eds.), *The future of learning: Proceedings of the 10th international conference of the learning sciences (ICLS 2012) – Volume 1, Full papers* (pp. 339–346). ISLS. Sydney, Australia.
Jeong, H., & Hmelo-Silver, C. E. (2016). Seven affordances of CSCL technology: How can technology support collaborative learning. *Educational Psychologist, 51*, 247–265.
Jeong, H., Hmelo-Silver, C. E., & Jo, K. (2019). Ten years of computer-supported collaborative learning: A meta-analysis of CSCL in STEM education during 2005–2014. *Educational Research Review*, 1–17.
Jeong, H., Hmelo-Silver, C. E., & Yu, Y. (2014). An examination of CSCL methodological practices and the influence of theoretical frameworks 2005–2009. *International Journal of Computer-Supported Collaborative Learning, 9*(3), 305–334.
Kirschner, P. A., & Erkens, G. (2013). Toward a framework for CSCL research. *Educational Psychologist, 48*, 1–8.
Kong, S. C., Yeung, Y. Y., & Wu, X. Q. (2009). An experience of teaching for learning by observation: Remote-controlled experiments on electrical circuits. *Computers & Education, 52*, 702–717.
Krause, U. M., Stark, R., & Mandl, H. (2009). The effects of cooperative learning and feedback on e-learning in statistics. *Learning and Instruction, 19*, 158–170.
Kuo, F. R., Hwang, G. J., & Lee, C. C. (2012). A hybrid approach to promoting students' web-based problem-solving competence and learning attitude. *Computers & Education, 58*, 351–364.
Lai, K., & White, T. (2012). Exploring quadrilaterals in a small group computing environment. *Computers & Education, 59*, 963–973.

Loke, S. K., Al-Sallami, H. S., Wright, D. F., McDonald, J., Jadhav, S., & Duffull, S. B. (2012). Challenges in integrating a complex systems computer simulation in class: An educational design research. *Australasian Journal of Educational Technology, 28*, 671–683.

Marée, T. J., van Bruggen, J. M., & Jochems, W. M. (2013). Effective self-regulated science learning through multimedia-enriched skeleton concept maps. *Research in Science & Technological Education, 31*, 16–30.

McKeown, J., Hmelo-Silver, C. E., Jeong, H., Hartley, K., Faulkner, R., & Emmanuel, N. (2017). A meta-synthesis of CSCL literature in STEM education. In B. K. Smith, M. Borge, E. Mercier, & K.-Y. Lim (Eds.), *Proceedings of CSCL 2017*. Philadelphia, PA: International Society of the Learning Sciences.

Miyake, N. (2007). Computer supported collaborative learning. In R. Andrews & C. Haythornwaite (Eds.), *Sage handbook of E-learning research* (pp. 248–266). London, UK: Sage.

Nelson, B. C., & Ketelhut, D. J. (2008). Exploring embedded guidance and self-efficacy in educational multi-user virtual environments. *International Journal of Computer-Supported Collaborative Learning, 3*, 413–427.

Neumann, D. L., & Hood, M. (2009). The effects of using a wiki on student engagement and learning of report writing skills in a university statistics course. *Australasian Journal of Educational Technology, 25*, 382–398.

Pifarre, M., & Cobos, R. (2010). Promoting metacognitive skills through peer scaffolding in a CSCL environment. *International Journal of Computer-Supported Collaborative Learning, 5*, 237–253.

Roschelle, J. (2013). Special issue on CSCL: Discussion. *Educational Psychologist, 48*, 67–70.

Roschelle, J., Bakia, M., Toyama, Y., & Patton, C. (2011). Eight issues for learning scientists about education and the economy. *Journal of the Learning Sciences, 20*, 3–49.

Roschelle, J., Rafanan, K., Estrella, G., Nussbaum, M., & Claro, S. (2010). From handheld collaborative tool to effective classroom module: Embedding CSCL in a broader design framework. *Computers & Education, 55*, 1018–1026.

Santos-Martin, D., Alonso-Martínez, J., Carrasco, J. E. G., & Arnaltes, S. (2012). Problem-based learning in wind energy using virtual and real setups. *IEEE Transactions on Education, 55*, 126–134.

Sao Pedro, M., Baker, R. S., & Rodrigo, M. M. T. (2014). Carelessness and affect in an intelligent tutoring system for mathematics. *International Journal of Artificial Intelligence in Education, 24*(2), 189–210.

Shaw, R. S. (2013). The relationships among group size, participation, and performance of programming language learning supported with online forums. *Computers & Education, 62*, 196–207.

Sinha, S., Rogat, T., Adams-Wiggins, K. R., & Hmelo-Silver, C. E. (2015). Collaborative group engagement in a computer-supported inquiry learning environment. *International Journal of Computer-Supported Collaborative Learning, 10*, 273–307.

So, H. J., & Brush, T. A. (2008). Student perceptions of collaborative learning, social presence and satisfaction in a blended learning environment: Relationships and critical factors. *Computers & Education, 51*, 318–336.

Stahl, G., Koschmann, T., & Suthers, D. D. (2014). Computer-supported collaborative learning. In R. K. Sawyer (Ed.), *Cambridge handbook of the learning sciences* (2nd ed., pp. 479–500). New York, NY: Cambridge University Press.

Suthers, D. D. (2006). Technology affordances for intersubjective meaning making: A research agenda for CSCL. *International Journal of Computer-Supported Collaborative Learning, 1*, 315–337.

Tsai, P. S., Tsai, C. C., & Hwang, G. J. (2012). Developing a survey for assessing preferences in constructivist context-aware ubiquitous learning environments. *Journal of Computer Assisted Learning, 28*, 250–264.

Turcotte, S. (2012). Computer-supported collaborative inquiry on buoyancy: A discourse analysis supporting the "Pieces" position on conceptual change. *Journal of Science Education and Technology, 21*, 808–825.

Uttamchandani, S., Bhimdiwala, A., & Hmelo-Silver, C. E. (2020). Finding a place for equity in CSCL: Ambitious learning practices as a lever for sustained educational change. *International Journal of Computer-Supported Collaborative Learning., 15*, 373–382.

van Aalst, J. (2009). Distinguishing knowledge-sharing, knowledge-construction, and knowledge-creation discourses. *International Journal of Computer-Supported Collaborative Learning, 4*, 259–287.

van Aalst, J., & Chan, C. K. (2007). Student-directed assessment of knowledge building using electronic portfolios. *Journal of the Learning Sciences, 16*, 175–220.

Van Amelsvoort, M., Andriessen, J., & Kanselaar, G. (2007). Representational tools in computer-supported collaborative argumentation-based learning: How dyads work with constructed and inspected argumentative diagrams. *Journal of the Learning Sciences, 16*, 485–521.

Vogel, F., Wecker, C., Kollar, I., & Fischer, F. (2017). Socio-cognitive scaffolding with computer-supported collaboration scripts: A meta-analysis. *Educational Psychology Review, 29*, 477–511.

Yang, Y. T. C., & Chang, C. H. (2013). Empowering students through digital game authorship: Enhancing concentration, critical thinking, and academic achievement. *Computers & Education, 68*, 334–344.

Yukawa, J. (2006). Co-reflection in online learning: Collaborative critical thinking as narrative. *International Journal of Computer-Supported Collaborative Learning, 1*(2), 203–228.

Informal Learning in Digital Contexts

79

Jon Dron and Terry Anderson

Contents

Abstract

Governments, business leaders, educators, students, and parents realize the need to inculcate a culture of lifelong learning – learning that spans geography, time, and lifespan. This learning has both formal and informal components. In this chapter, we examine the conceptual basis upon which informal learning is defined and some of the tools and techniques used to support informal learning. We overview the rapid development in information and communications technologies that not only creates opportunities for learners, teachers, and researchers but also challenges us to create equitable and culturally appropriate tools and contexts in which high-quality, continuous learning is available to all.

J. Dron
Faculty of Science & Technology, Athabasca University, Athabasca, AB, Canada
e-mail: jond@athabascau.ca

T. Anderson (✉)
Athabasca University, Edmonton, AB, Canada

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_84

Keywords

Informal learning · Formal learning · Credentials · Personal learning environments · Informal social learning · Incidental learning

Introduction

Before we examine the ways that informal learning is transformed by digital contexts, we must understand what "informal learning" means. Unfortunately, the term has been used by many authors over many years to stand in for a variety of different and sometimes contradictory ideas, approaches, and activities, a fact bemoaned by many (e.g., Eraut, 2004; Livingstone, 2001; Rogoff, Callanan, Gutiérrez, & Erickson, 2016; Schugurensky, 2000).

As Colley, Hodkinson, and Malcom (2002) wryly observed, many authors simply define informal learning as "not formal." Others attempt contestable definitions, for instance, described informal learning as unstructured, experiential, and non-institutional, begging the question as to what structured, non-experiential, and institutional learning might be, and ignoring the fact that informal learning also occurs in institutions. Schugurensky (2000) identified three forms of informal learning: (1) self-directed learning in which a learner acts with intention and awareness of their learning objectives to acquire specific and usually self-defined knowledge competencies; (2) incidental learning in which learning occurs outside of the intent of the learner, but they are conscious of the newly acquired knowledge; and (3) socialization, in which one acquires knowledge without intent or even awareness that they are learning. However, these can occur in nonsocial learning, too, and all such ways of learning also occur in formal settings, so it still fails to identify what is distinctive. Eraut (2004) sees dimensions of implicit, reactive, and deliberative learning that broadly equate to Shugurensky's socialization, incidental, and self-directed categories, but, as he noted, there is a fuzzy continuum between formal and informal that admits many exceptions and where counterexamples can easily be found. Though recognizing the problem, Erault sidesteps resolving it.

We believe that the fuzziness of the term's application is due in part to a common failure to adequately explain what is meant by *formal learning*. Formal learning is easily recognized in its most archetypal forms as what takes place in educational institutions. However, much learning in formal settings occurs that is hard to describe as formal, enabled through encounters in corridors, inadvertent modelling of roles in the classroom, or discussions in canteens. The lines dividing formal and informal can be hard to discern even at a structural level. Is in-service training formal? Or taking part in a MOOC? Or taking piano lessons? Does it make a difference if those lessons result in grades certified by a government, an academy or by a private educational company? Some authors have used the term *non-formal* to characterize kinds of learning that appear to straddle the borders of formal and informal, but this negative definition simply evades the issue. Further confusion often arises through confounding informal learning with related but orthogonal terms such as *self-directed learning, self-regulated learning, lifelong learning, incidental learning, implicit learning,* and *tacit learning*, all of which may occur in a formal as well as informal contexts.

In the absence of clear defining characteristics, formal learning may better be characterized using Wittgensteinian family resemblances: common traits that may, individually, be shared by informal learning but that, in sufficient numbers, allow us to characterize the learning as more or less formal. Formal learning tends to be externally regulated: frequently in process, nearly always in goals. It usually involves rites of passage such as enrollment, progression, and certification. Formal learning usually follows timelines, rules, customs, and norms. There is often some social or external sanction involved, most notably in the form of certification, not just of learners but of their teachers, textbooks, and institutions. Formal learning often involves rituals – specified or normal ways of doing things. Formal learning normally has a purpose, often expressed as goals, objectives, or outcomes, and is nearly always intentional. The presence or absence of any of these characteristics does not define learning as formal but, when enough of them occur together, it usually is.

Informal learning may also be recognized by clusters of family resemblances. Informal learning is typically self-directed and self-regulated. It may, however, also emerge through shared practices, interests, or goals within a group or network of people (such as those in a workplace or club) or simply through acting in the world. Much is incidental, the result of performing an activity or practice in which learning is not the primary goal but a side effect of doing something else. There may be occasions when informal learners actively seek knowledge, tuition, or guidance, or where they may intentionally perform an activity in order to learn, but it is often just-in-time and short-lived. There are seldom extrinsic measures or rules for it to follow. It is rarely timetabled. It is often open-ended, without a clear beginning or end. Informal learning may occur at any time and any place, including during a formal learning event. Any of these characteristics may occur in a formal learning setting, too, but a large-enough cluster of resemblances leads us to describe it as informal.

Informal and formal learning are not mutually exclusive categories: they lie on a continuum, with much fuzziness at the boundaries. Within a learning trajectory that might, as a whole, be characterized as formal, we may engage in much learning that is not, observing things around us, engaging with others and making connections between ideas at times and places far removed from a formal setting. Similarly, formal elements may play a role in informal learning, as a catalyst, sometimes as a component of it and, sometimes, as we shall see, as a means of certifying it.

To help distinguish more clearly between them, we characterize the learning spectrum from informal to formal as having two distinct but related dimensions: incidental (intentional) and self-directed (dependent) (see Fig. 1). We note that the halfway point between self-directed and dependent is mostly occupied by social ways of learning, in which we are co-participants, both directing and being directed by others.

Table 1 provides some illustrative examples of values for each of the dimensions for a range of learning activities, noting that these are highly contingent, depending on many contextual, personal, and pedagogical variables that may lead to different

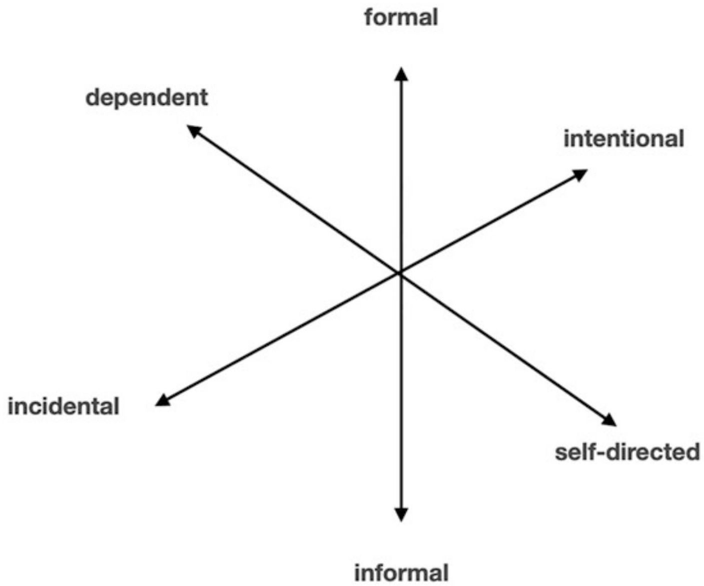


Fig. 1 Related dimensions of formal and informal learning

Table 1 Examples of applying the informal learning dimensions

Learning activity	Informal/ formal	Intentional/ incidental	Self-directed/ dependent
PhD study	Largely formal	Intentional	Largely self-directed
Improving skills on an instrument while learning to play a tune	Informal	Fairly incidental	Self-directed
Practicing scales	Fairly informal	Intentional	Self-directed
Attending a lecture	Very formal	Very intentional	Very dependent
Following a YouTube tutorial	Informal	Intentional	Fairly dependent
Learning while chatting in a cafe	Very informal	Very incidental	Partly self-directed
Performing a problem-based exercise set by a tutor	Formal	Intentional	Fairly self-directed
Learning how people in a discipline think by attending a lecture and observing the lecturer's attitude (the hidden curriculum)	Formal	Incidental	Largely self-directed

categorizations under different conditions. A learner's trajectory over the course of a sustained learning activity may take them through any or all of the dimensions of informality, intentionality, and self-directedness at different times as well as, occasionally, simultaneously.

Digital Contexts Are Different

It has been claimed that, when Einstein was asked for his telephone number, he looked it up in a phone book, observing "Why should I memorize something when I know where to find it?" Our "phone book" today is many billions of times bigger than Einstein's paper catalogue. There are few facts that cannot be found within seconds, as well as countless fictions, half-truths, and abject falsehoods. Equally, we can connect with countless millions of other people. In pre-digital times, we inhabited one environment at a time and learned through our interactions with it. Now, we inhabit many environments between which we can switch at will, and much of the time, our actions are recorded, our interactions are reified, and the things we share may persist indefinitely. We are thus not just dwellers in these environments but active creators of them. Digital learning is different, and so are our learning needs as we have less need-to-know information but instead know where to find it and what to do with it.

The abundance of connections and semmingly limitless availability of information enabled by the Internet has both created new opportunities for learning as well as a greater need for it. We are not enjoying the ease and luxury of idle time as expected by early technology proponents. As the Red Queen in *Through the Looking Glass* put it, "it takes all the running you can do, to keep in the same place. If you want to get somewhere else, you must run at least twice as fast as that!" (Carroll, 1871). This is a necessary feature of technological change. Technologies build upon and from other technologies (Arthur, 2009), and each new technology creates new adjacent possible empty niches (Kauffman, 2019) for newer technologies to fill. Thus, technological growth follows an exponential curve and has done so over many millennia.

In order to "run faster" today, we must be able to access and use more knowledge, become better or differently skilled, and be more motivated to learn. Formal learning that occurs episodically, usually early in life, and that is often removed from its context of application, is not enough. Worse, students are often rewarded for learning as instructors intend and punished for failing to do so, especially through grades and credentials, which can reliably sap away any intrinsic motivation that learners may feel to learn more (Kohn, 1999; Ryan & Deci, 2017). Informal learning that is chosen, or incidental to other things we choose to do that can occur at any time or place, is inherently motivating, meeting needs for competence, autonomy, and, in most cases, relatedness, which are the three cornerstones on which intrinsic motivation depends (Ryan & Deci, 2017). Combined with the cornucopia of knowledge and connections with others that the Internet provides, informal learning is well positioned as the primary means to achieve lifelong learning. However, there is a Faustian bargain to all technologies (Postman, 1998). With each problem a technology solves, new problems are created.

The Darker Sides of Digital Technologies

The abundance of learning opportunities in cyberspace can be overwhelming and threatening rather than inviting participation in informal learning. Social overload

(McCarthy & Saegert, 1978) was first measured in real-life contexts in which demands of social interaction strain and stress individuals. Although much online informal learning takes place in nonsocial contexts (such as an information search on Wikipedia), systems like Reddit, social networks, and MOOCs use both human and technological inducements to motivate learning. Such systems may create psychological stress in which the perceived demand for reciprocity, desire for social attention, or other social responsibilities become stressful and can lead to abandonment of the learning projects. Cognitive overload occurs when the learners' cognitive, memory, or temporal restrictions preclude effective processing, storage, and utilization of that information (Roetzel, 2019). Systems overload occurs when the complexity of the systems – especially related to overabundance of features and options – impairs learners' cognitive abilities and more importantly their learning efficacy (Fu, Li, Liu, Pirkkalainen, & Salo, 2020). The abundance of information, with no guarantee of consistency, veracity, or efficiency in support of learning, may also lead learners to confusion or inaction. Thus, provision of opportunity itself and pressure from both live peers and motivational algorithms can hinder as well as motivate informal learners.

Though individual motivation is critical, it is not the only factor limiting learning and receiving benefits from that learning. Social factors including fairness, self-efficacy, opportunity, financial resources, time, and support also impact an individual's capacity and agency for successful learning. Issues of access to hardware and network connectivity for informal learning become increasingly important both for individuals and families and for government policy (Boyadjieva & Ilieva-Trichkova, 2018). Equally, the skills to effectively use ever-changing tools become a new learning hurdle (Iordache, Mariën, & Baelden, 2017).

Without guidance by experts and without all the resources available in institutions, informal learners using the Internet may sometimes face insurmountable barriers and difficulties. Without the continued filtering, critical thinking, expert help, process support, and resources of formal learning, informal learners may pursue false or unfruitful paths, may fail to see important aspects of what they are learning, may stumble when faced with resource or cognitive barriers, and may wander without a rudder in a sea of conflicting opinions, truths, half-truths, and lies.

In the rest of this chapter, we provide some thoughts and recommendations for introducing many of the benefits of informal learning into a formal setting and approaches to informal learning that reduce some of the risks.

Informal Learning in a Digital Context

Social Informal Learning

Much learning is social in nature. We acquire new knowledge and skill by asking questions, observing and copying behaviors we see demonstrated by others, having to explain ourselves or instruct others, and observing how others react to our behaviors. This type of learning, sometimes referred to as "social informal learning," has been the subject of considerable research in learning organizations (e.g., Crans, Bude, Beausaert, & Segers, 2021) and is well-supported online.

An Example: Reddit

One of the most popular tools for online social informal learning is the Reddit system that combines peer support, question and answer, game motivation, access to more knowledgeable others, and recommendation tools – all with free (ad-supported) access. Although there are many thousands of subreddits (delineating topics of interest that can be subscribed and contributed to), among the most popular are the following:

- r/LifeProTips through which redditors share good ways of doing things, tips, or maxims
- r/explainlikeim5, where experts give advice to beginners in simple words
- r/ExplainLikeImPhD, where more detailed explanations are given
- r/noStupidQuestions, where people can seek advice on any subject
- r/changemyview where people post contentious opinions and others argue against them

This is just a tiny fraction of the many learning-oriented uses of the site, many of which relate to highly specific skills and interests as well as those that are more general.

In a study of subreddits that they refer to as "learning in the wild," Del Valle, Gruzd, Kumar, and Gilbert (2020) showed "that informal learning processes . . . are determined by the reciprocal and transitive nature of communicative ties among their members (p. 51)." They also found "that moderators play a key role in fostering interactions (p. 51)." Importantly, rules and norms emerge from members themselves as "new users are able to see and imitate observed practices (p. 53)" and "learning becomes an unregulated, incidental, and experiential process (p. 54)." The authors conclude that factors critical to success in these environments are "visibility, easy entry, lack of testing/examination, anonymity, access to gurus and notoriety—all available with minimal reference to gender, race, formal education, or social economic status."

Other popular learning support tools of this nature include Quora, Slashdot, Discourse, and the StackExchange family of sites. Countless other independent forums support specialist interests, from owners of a particular brand of camera to stamp collectors. Some are huge. For example, the Amazon-owned Goodreads boasts millions of members, sharing and discussing books. Other more general purpose social media such as Facebook or Twitter serve many additional purposes that have also been shown to support "learning in the wild" (Kumar & Gruzd, 2019).

These sites are heavily used by students on formal courses as a means to complete work set by their instructors and, often, as a means to discuss other aspects of the course. Some may disrupt formal learning: there are subreddits dedicated to support for homework (r/HomeworkHelp) as well as ways of cheating on online proctored exams (r/cheatonlineproctor), for example.

Haythornthwaite et al. (2018) developed a coding schema that "contributes a content analysis schema for learning through social media, and an understanding of how knowledge, ideas, and resources are shared in open, online learning forums" (p. 219). This eight-point coding scheme extends and expands the popular COI model (Garrison, Anderson, & Archer, 2000) and coding scheme to this "informal" context. They add a potentially affective component (negative, positive, or neutral explanation, and positive or negative socializing) to the COI codes that documents the increased role of affect and commitment in informal learning – learners are not induced to remain, contribute, and learn by reason of paying a large tuition fee, fear of failure, desire for high grades, or other affective challenges associated with learning in formal education.

The Power of the Collective

Many of these systems benefit from recommender systems, filters, and other tools that aggregate, analyze, and produce views of digital information, from simple "thumbs-up" ratings to full-blown deep learning systems that delve into the content of messages and seek patterns to supply recommendations. What results is a cyborg entity that employs the aggregated behaviors of individuals in a crowd to shape their environment and to provide structure and influence in that environment that we have previously described as a collective (Dron & Anderson, 2009). Karma points (indicators of reputation, gained by having made what the crowd considers to be useful posts in a given area) and up-down ratings on Reddit, StackExchange, Quora, or SlashDot, for example, are used to provide ranking and emphasis for posts and their answers, resulting (in principle) in higher quality, more relevant posts being displayed more prominently.

Though seldom perfect, the algorithms and interfaces often succeed in providing useful recommendations despite vulnerability to gaming by those seeking attention and to the Matthew Effect (the rich get richer while the poor get poorer) that can result in inequitable power distribution among users. Collectives can thus play roles similar to that of a traditional teacher, guiding learners toward help that best suits their needs and interests. However, they are not always *good* teachers. In general-purpose social systems such as Facebook or Twitter, the intent of individuals may only rarely be to learn, and the algorithms may be more concerned with driving engagement or serving the needs of advertisers than with the support of learning. This can result in, among other things, active promotion of false, misleading, or biased content that may be counterproductive to learning. As Dron (2002) found, collectives only make good teachers when the communities on which they are based intend to learn and when the algorithms are not at odds with that intent.

Self-Teaching Resources

Teach-yourself books, manuals, and articles have long been a popular genre among intentional informal learners and remain so. However, to a large extent, they have been replaced by online resources, many of which are free or ad-supported. Online informal learners may dip into hundreds of relevant articles, courses, videos, and even books, picking and choosing those that most closely match their needs, interests, skills, and tastes, providing support at unprecedented scale. Many of these mirror forms of teaching conventionally found in formal learning, including in many MOOCs that may bear almost all the trappings of traditional institutional teaching. However, without the coercion, formal enrollment, and accreditation frameworks of institutions, the ways in which they are used for learning may be anything but formal. Similarly, many governments, institutions, development agencies, and charitable foundations now support authors and multimedia companies to produce open educational resources (OERs) for formal learning that equally support informal learners.

An Example: Online Videos for Informal Learning

Few readers of this chapter will not have watched a video from YouTube, Vimeo, or another video repository to help them learn something. These videos offer tremendous opportunity at affordable cost to learn long sequences (e.g., a 20-part video series on learning to play the dulcimer) as well as short knowledge insights (e.g., how to clean a clogged drain) and ongoing routine activities (e.g., exercise classes). The 2021 Pew study of adult Americans found that 81% are YouTube users (Auxier & Anderson, 2021) of whom 86% found YouTube videos useful for informal learning (Smith, Toor, & Van Kessel, 2018).

In many ways, these videos substitute student-content interaction (watching the videos) for student-teacher interaction of the classroom. This substitution exponentially reduces cost through capacity to be used and re-used while increasing access through Internet distribution. In a 2017 study of 29,386 comments posted by viewers of 150 education-related videos, Lee, Osop, Goh, and Kelni (2017) concluded that YouTube can support a variety of learning and social affordances.

As Song and Bonk (2016) observe, informal learning must have a “fun” factor as the absence of external motivation may weaken desire to engage in hard work associated with learning challenging information or behaviors. Analyzing the behavior of thousands of participants in a MOOC, Breslow et al. (2013) found a high preference for video rather than text and images among learners. Though sometimes a more time-consuming way to learn simple tasks, videos are often more engaging than static text and images.

Rosenthal (2018) measured both students and community residents use and frequency of watching YouTube videos related to science topics – a type of “free choice science learning.” They concluded that the value of videos that enhance science knowledge of learners is conditioned by their general interest in science, the perceived value of science learning, as well as the entertainment value of the video. However, perhaps the most compelling evidence of YouTube efficacy for informal learning comes from reports from development agencies of rural villagers using the videos to repair water pumps and other equipment provided by donor agencies that, in the past, often sat idle for lack of expertise in repair and maintenance (Change for Children, 2021).

Supporting the Informal Learning Process

Self-directed learning has long been studied as a component of success in formal education. The converse is also true. We have decades of research on the efficacy of collaborative and cooperative learning in formal education (e.g., Johnson & Johnson, 2008; Slavin, 1996), for the use of experiential learning designs (Lewis & Williams, 1994), the value of a supervisor or mentor (Allen, Witt, & Wheeless, 2006), and other approaches that originated in classrooms. We also note the value of informal learning that arises within effective communities of practice (Viskovic, 2005). All such options are available online, through purpose-built collaboration/cooperation tools like Slack, Github, or email, as well as systems created to support ad-hoc transient learning networks of informal as well as formal learners (Sloep et al., 2007).

Supportive Physical Contexts

Contextual factors can greatly influence informal learning. For example, in a study of antecedents of informal learning among classroom teachers, Kyndt, Gijbels, Grosemans, and Donche (2016) found that just creating a space and supporting teachers gathering in a common staff room was perceived as critical for peer support, modelling, and problem solving. Similar support can occur online, through tools such as Microsoft Teams, Zoom, or Slack, or more personal instant messaging apps like Signal, Telegram, or iMessage.

Having time to learn is essential. Those whose time is curtailed by external factors including employment, family, and external social demands may have problems in maximizing their informal learning. Place-based learning usually takes time, not just spent learning, but on traveling to libraries, colleges, or other locations where it can occur. Online informal learners can learn wherever and whenever they need to learn, including through mobile phones or streaming audio while traveling.

Sharing and Reflecting

Effective learning involves more than just reading, watching, engaging, and doing. Yeo (2008) argues that informal workplace learning “is an inductive process of reflection and action, often linked to the learning of others and integrated into daily routines” (p. 318). Mature self-directed learners will often perform many of these roles themselves or seek others who can help, often through online collectives and communities to which they belong. Through engagement in social media and, for some kinds of learning, feedback inherent in the process itself can fulfill some of those roles. Finally, online informal learners benefit from managerial support and scaffolding, especially for reflection and sharing Ellinger (2005).

Moore and Klein (2020) reported that instructional designers tasked with supporting learning of all types within their organization found that sharing of information and resources was perceived as the most effective support for informal learning. One of the most effective ways to achieve such engagement is thus to share one’s learning in a public or semi-public online space, thereby not only reflecting on, demonstrating, and reinforcing the learning but also inviting feedback and support. This is one of the cornerstones of complexivist pedagogical approaches (▶ Chap. 10, "Pedagogical Paradigms in Open and Distance Education," by Dron and Anderson, this volume). The Internet makes such sharing easy and benefits from scale. Rather than simply sharing what we learn with those close to us, we can share with anyone and everyone, and they can respond.

The archetypal tool for open sharing is the blog. Though often considered an elderly technology in an age dominated by huge social media platforms and proprietary organizational tool suites, blogs and similar tools still account for a majority of websites, albeit that most are in the long tail. Larger social platforms with public sharing defaults such as Twitter, Tumblr, YouTube, or TikTok and less open social networks like Pinterest and Facebook are also used to share the outputs and process of learning, often including links to blogs. While only a fraction of these are intentionally part of a learning process, the scale of the Internet means that millions of posts are made every day that, directly or indirectly, contributing to the informal learning of millions (Dron & Anderson, 2014).

Blogs and similar tools are also common in formal learning, especially when using complexivist-inspired pedagogies (Dron & Anderson, 2014). By mixing the formal and informal, students may make the formal more personal and more integrated with their broader learning journeys. The persistence of content on the web allows ideas and even formal courses to grow and evolve, year on year, through contributions from both enrolled students and interested informal learners, all teaching one another while they learn (Lockridge, Levine, & Funes, 2014).

Tracking Progress

Informal learning, whether intentional or not, is likely to be ineffective unless the learner monitors, analyzes, and reflects on the learning process. This includes not only measuring the productivity of learning tasks but also the monitoring of affective indicators such as boredom, impatience, tiredness, etc. Digital tools can support this. In a professional informal learning context, Littlejohn (2017) believed learning analytics could be used to find expertise, see current interest and level of activity and progress, and provide "a reflective mirror on their own learning activity relative and independent of self-set goals." The key to all of these visualizations, comparisons, and monitoring efforts is that the result be fed back in useful formats and in a timely fashion to the learner.

Most learning analytics research and development has, so far, focused on its role as an instrument of student management in formal learning. As Klamma (2013) observed, there are many biases and pedagogical assumptions embedded in its use, notably including an objectivist focus on formal learning outcomes. There may, though, be value in capturing aspects of informal learning in the workplace through analysis of interactions on mobile and social systems, and even through analysis of video recordings, using social network analysis and AI tools that seek pedagogical patterns in interactions (ibid, De Laat & Schreurs, 2013). Beyond academia and some workplace settings, the surveillance that many learning analytics systems require may be deemed unacceptable, especially for incidental informal learning. However, tools that support the discovery of learning interactions within social networks and forums, identifying community goals, tasks, and connections, have been used to good effect (e.g., Petrushyna, Klamma, & Kravcik, 2015), and work continues to automatically identify learning activities and interactions in open, online environments (e.g., Rizk & Rodriguez, 2021).

There are also plentiful tools to support the informal learner in more deliberately structuring and recording their learning. For example, bookmarking systems such as Pocket, Instapaper, or simpler tools built into web browsers can help learners collect, organize, and share resources of interest. Note-taking tools like Evernote, OneNote, Google Keep, or Joplin can serve not only as a repository of ideas, a learning journal, or a record keeping system but can also be used to collect and share and organize links, media, and digital artefacts. Such tools provide significant parts of what has become known as a personal learning environment (PLE). For some, the PLE is no more than a dashboard on a hosted service that brings together different tools and data within a formal system, often incorporating social media artefacts and interactions. For others, it may constitute the entire physical and virtual space that a learner inhabits.

Some researchers, such as Dabbagh and Kitsantas (2012), have explored the possibilities for PLEs to bring formal and informal learning together. They describe the value the PLE brings to the learner, as a means of integrating and accommodating what they learn in all settings. They also bring value to the teacher by making such learning visible and allowing teachers to accommodate and capitalize on knowledge of their students. Yen, Tu, Sujo-Montes, Harati, and Rodas (2019) provided compelling evidence that level of initiative, sense of control, and level of self-reflection are all highly supported by PLEs in both formal and (especially) informal learning. Analytics tools have also been used to help identify learning progress in PLEs (Klamma, 2013).

More recent initiatives, most notably in the conceptualization of the NGDLE (next-generation learning environment) have focused on a diversity of tools and systems that straddle the boundaries of formal and informal learning (Brown, Dehoney, & Millichap, 2015) and that celebrate a diversity of ways and means for learners to learn. While institutions may develop systems and tools for teaching, learners may provide and integrate their own and record lifelong learning journeys in learning record stores (LRSs) provided by institutions or, perhaps, through blockchain technologies that they own and control. This combination of PLE and institutional teaching systems results in shared ownership of the formal learning space.

Credentialing Informal Learning

Credentials for informal learning may be valuable for a few reasons. First, learners are often interested in demonstrating and being recognized for their informal learning accomplishments. Second, many formal education institutions are interested in assisting their learners and increasing market share by attracting learners with ways that their informal learning can be used to shorten and thus reduce the length and cost of their formal education. Finally, both employers and governments are interested in encouraging lifelong learning and finding ways to assess the relevance and veracity of this learning.

Though highly valued, “qualification outcomes [must] be relevant, understood, and trusted—and not just by learners, but by governments, institutions and employers” (Noonan, 2019, p. 8). Maintaining relevance is particularly challenging in contexts of rapid technological, political, and social change. Each of these stakeholders also have come to realize that traditional institutionally published credentials are soon dated, often arbitrary in terms of what and how credentials are awarded and are not scalable, transportable, accessible, or persistent.

A number of digital technologies have been developed to support both delivery and the credentialing of informal learning. These are dealt with at length in this volume including in ▶ Chaps. 47, “Accreditation and Recognition of Prior Learning in Higher Education,” by Conrad, ▶ 69, “Digital Credential Evolution,” by West and Cheng.

Challenge Assessments

Assessment can be more completely decoupled from the learning process. The long history of challenge assessment stretches back to the University of London in the nineteenth Century, which offered examinations to students who had already acquired sufficient knowledge, whether through formal study, informal learning, or both, providing credentials for successful completion of the exam (Namie, 1989). Athabasca University and others continue this tradition to this day, offering a variety of ways in addition to summative exams to meet the challenge.

Storing and Sharing Credentials

When credentials for learning come from multiple sources, institutional and otherwise, it may be hard to keep a track of them, especially when they are micro-credentials, badges, and similar small-scale awards. A centralized system is one effective way to do this because it provides assurance of authenticity. However, over a learner’s lifetime, centralized systems are vulnerable to possible disappearance for many reasons, including attack, insolvency, and obsolescence. In addition, as noted by Bozkurt and Ucar (2020), providers of central systems often have vested interest in gatekeeping and maintaining control of transactions and value – controls that might favor or handicap learners, groups of learners, or certain institutions. Thus, the development of a variety of blockchain applications for both formal and informal learner accreditation are distributed across the network, so they are less vulnerable to attack or decay, their authenticity is less open to questioning, and they are owned by the learners themselves.

The use of blockchain expands the usefulness and functionality, visibility, immutability, and reliability for both microcredentials and e-portfolios and formal learning accreditation. However, despite the hype and support for blockchain use in education by some educational technologists, Bozkurt and Ucar (2020) noted a variety of concerns, many dealing with the inherent technological complexity but an equal number related to throughput, manageability, scale, adoption, and the variety of chains available. These are nascent technologies that may be even more short-lived than the centralized systems they replace.

Conclusion

Opportunities for and participation in informal learning have expanded exponentially with increase of access to and activity on digital networks – and they will continue to expand. We also can expect that formal learning systems will increase the use of informal learning resources and tools within their formal curriculum. This will create opportunities (and pressures) to develop new systems that take advantage of the accessibility, motivational benefits, and low costs associated with informal learning while retaining the structure and credentialing of formal learning.

Virtually, all learning has an informal element, insofar as what is learned is never static, is constantly reinterpreted and reintegrated after the intentional or unintentional acts that brought it about, and is always integrated by an individual with what they already know. Similarly, much informal learning relies upon at least some formal teaching, whether it be through the use of tutorials, MOOCs, teach-yourself books or websites, or simply watching a YouTube video intended to impart knowledge.

Formal teaching has weaknesses that informal learning can redress. Much formal teaching is low in value because learners have already (whether formally or informally) learned what is being taught. While reframing, rehearsing, and reflecting on existing knowledge can be valuable, it may bore students. Much formal teaching is also actively demotivating, due mainly to the locus of control not being the learner and consequent effects on the learning. Though learners may deliberately delegate control to others from time to time (such as when watching a video tutorial), informal learning is primarily controlled by the learner.

Good teachers already know about their students' informal as well as formal learning, giving freedom to explore areas of interest, utilizing rather than ignoring what students bring to the classroom. They learn what their students know and contextualize how and what they teach to meet their diverse needs, interests, and skills. There is therefore much to be said for helping students to develop skills of sharing their informal learning, through blogs and similar tools, in spaces that the students themselves own but that can be accessed by teachers and fellow learners, and/or through sharing via an institutional LRS. By integrating informal learning, rather than being a sage on the stage or a guide on the side, the teacher becomes a co-traveler, supporting rather than directing the learner's learning journey. This complexivist approach (▶ Chap. 10, "Pedagogical Paradigms in Open and Distance Education," by Dron and Anderson, this volume) recognizes students as active teachers of one another, as individual agents with unique needs, and as people with lives outside the classroom.

Today's digital, networked infrastructure greatly expands the opportunities for informal learning. The means to value, assess, promote, and incorporate this learning into dominant social, commercial, and institutional structures provides both challenge and opportunity for learners, educators, and researchers.

References

Allen, M., Witt, P. L., & Wheeless, L. R. (2006). The role of teacher immediacy as a motivational factor in student learning: Using meta-analysis to test a causal model. *Communication Education, 55*(1), 21–31.

Arthur, W. B. (2009). *The nature of technology: What it is and how it evolves* (Kindle ed.). New York, NY: Free Press.

Auxier, B., & Anderson, M. (2021). Social media use in 2021. Pew Research Centre. https://www.pewresearch.org/internet/2021/04/07/social-media-use-in-2021/

Boyadjieva, P., & Ilieva-Trichkova, P. (2018). Lifelong learning as an emancipation process: A capability approach. In *The Palgrave international handbook on adult and lifelong education and learning* (pp. 267–288). London: Palgrave Macmillan.

Bozkurt, A., & Ucar, H. (2020). *Blockchain technology as a bridging infrastructure among formal, non-formal, and informal learning processes* [Chapter]. Blockchain Technology Applications in Education. IGI Global. https://doi.org/10.4018/978-1-5225-9478-9.ch001.

Breslow, L., Pritchard, D. E., DeBoer, J., Stump, G. S., Ho, A. D., & Seaton, D. T. (2013). Studying learning in the Worldwide Classroom Research into edX's First MOOC. *Research & Practice in Assessment, 8*, 13–25.

Brown, M., Dehoney, J., & Millichap, N. (2015). *The next generation digital learning environment, a report on research*. EDUCAUSE Learning Initiative Paper.

Carroll, L. (1871). *Through the looking glass*. London,UK: Macmillan.

Change for Children. (2021). Technology for sustainable water resource governance. https://changeforchildren.org/project/technology-for-sustainable-water-resource-governance/

Colley, H., Hodkinson, P., & Malcolm, J. (2002). Non-formal learning: Mapping the conceptual terrain, a consultation report, University of Leeds, UK.

Crans, S., Bude, V., Beausaert, S., & Segers, M. (2021). Social informal learning and the role of learning climate: Toward a better understanding of the social side of learning among consultants. *Human Resource Development Quarterly, n/a*(n/a), 1–29. https://doi.org/10.1002/hrdq.21429.

Dabbagh, N., & Kitsantas, A. (2012). Personal learning environments, social media, and self-regulated learning: A natural formula for connecting formal and informal learning. *The Internet and Higher Education, 15*(1), 3–8.

De Laat, M., & Schreurs, B. (2013). Visualizing informal professional development networks: Building a case for learning analytics in the workplace. *American Behavioral Scientist, 57*(10), 1421–1438.

Del Valle, M. E., Gruzd, A., Kumar, P., & Gilbert, S. (2020). Learning in the wild: Understanding networked ties in Reddit. In N. B. Dohn, P. Jandrić, T. Ryberg, & M. de Laat (Eds.), *Mobility, data and learner agency in networked learning* (pp. 51–68). Springer International Publishing. https://doi.org/10.1007/978-3-030-36911-8_4.

Dron, J. (2002). Achieving self-organisation in network-based learning environments. (Ph.D., University of Brighton).

Dron, J., & Anderson, T. (2009). On the design of collective applications. In *The proceedings of computational science and engineering, 2009*, Volume 4 (pp. 368–374). https://doi.org/10.1109/CSE.2009.469.

Dron, J., & Anderson, T. (2014). *Teaching crowds: Learning & social media*. Athabasca, AB: Athabasca University Press. http://teachingcrowds.ca

Ellinger, A. D. (2005). Contextual factors influencing informal learning in a workplace setting: The case of "reinventing itself company". *Human Resource Development Quarterly, 16*(3), 389–415.

Eraut, M. (2004). Informal learning in the workplace. *Studies in Continuing Education, 26*(2), 247–273.

Fu, S., Li, H., Liu, Y., Pirkkalainen, H., & Salo, M. (2020). Social media overload, exhaustion, and use discontinuance: Examining the effects of information overload, system feature overload,

and social overload. *Information Processing & Management, 57*(6), 102307. https://doi.org/10.1016/j.ipm.2020.102307.
Garrison, R., Anderson, T., & Archer, W. (2000). Critical thinking in text-based environment: Computer conferencing in higher education. *The Internet and Higher Education, 2*(2), 87–105.
Haythornthwaite, C., Kumar, P., Gruzd, A., Gilbert, S., del Valle, M. E., & Paulin, D. (2018). Learning in the wild: Coding for learning and practice on Reddit. *Learning, Media and Technology, 43*(3), 219–235. https://doi.org/10.1080/17439884.2018.1498356.
Iordache, C., Mariën, I., & Baelden, D. (2017). Developing digital skills and competences: A quick-scan analysis of 13 digital literacy models. *Italian Journal of Sociology of Education, 9*(1), 6–30.
Johnson, D. W., & Johnson, R. T. (2008). Cooperation and the use of technology. In J. Spector, M. van Merrill, & M. Driscoll (Eds.), *Handbook of research on educational communications and technology* (pp. 410–423). New York, NY: Erlbaum.
Kauffman, S. A. (2019). *A world beyond physics: The emergence and evolution of life*. Oxford University Press.
Klamma, R. (2013). Community learning analytics – Challenges and opportunities. Lecture Notes in Computer Science, pp. 284–293. https://doi.org/10.1007/978-3-642-41175-5_29.
Kohn, A. (1999). *Punished by rewards: The trouble with gold stars, incentive plans, A's, praise, and other bribes*. Houghton Mifflin Harcourt.
Kumar, P., & Gruzd, A. (2019, January). Social media for informal learning: A case of# Twitterstorians. In *Proceedings of the 52nd Hawaii International Conference on System Sciences*.
Kyndt, E., Gijbels, D., Grosemans, I., & Donche, V. (2016). Teachers' everyday professional development: Mapping informal learning activities, antecedents, and learning outcomes. *Review of Educational Research, 86*(4), 1111–1150. https://doi.org/10.3102/0034654315627864.
Lee, C. S., Osop, H., Goh, D. H.-L., & Kelni, G. (2017). Making sense of comments on YouTube educational videos: A self-directed learning perspective. *Online Information Review, 41*(5), 611–625.
Lewis, L. H., & Williams, C. J. (1994). Experiential learning: Past and present. *New Directions for Adult and Continuing Education, 1994*(62), 5–16.
Littlejohn, A. (2017). Learning and work: Professional learning analytics. In C. Lang, G. Siemens, A. Wise, G. Siemens, & D. Gasevic (Eds.), *Handbook of learning analytics* (1st ed., pp. 269–277). Society for Learning Analytics Research. https://doi.org/10.18608/hla17.023.
Livingstone, D. W. (2001). Adults' informal learning: Definitions, findings, gaps and future research. *WALL working paper 21, new approaches to lifelong learning,* Ontario Institute for Studies in education*,* University of Toronto*,* Toronto.
Lockridge, R. L., Levine, A., & Funes, M. (2014). A DS106 thing happened on the way to the 3M Tech Forum. *Journal of Interactive Media in Education, 2014*(2), Art. 6. https://doi.org/10.5334/jime.ag.
McCarthy, D., & Saegert, S. (1978). Residential density, social overload, and social withdrawal. *Human Ecology, 6*(3), 253–272. https://doi.org/10.1007/BF00889026.
Moore, A. L., & Klein, J. D. (2020). Facilitating informal learning at work. *TechTrends, 64*(2), 219–228.
Namie, Y. (1989). *The role of the University of London Colonial Examinations between 1900 and 1939: With special reference to Mauritius, the Gold Coast and Ceylon* (Doctoral dissertation, Institute of Education, University of London).
Noonan, P. (2019). Review of the Australian qualifications framework. https://www.dese.gov.au/system/files/documents/document-file/2020-12/071-australian-children-s-education-and-care-quality-authority.pdf
Petrushyna, Z., Klamma, R., & Kravcik, M. (2015). On modeling learning communities. In *European Conference on Technology Enhanced Learning* (pp. 254–267). Springer.
Postman, N. (1998). Five things we need to know about technological change. Denver, CO, Mar 28. https://web.cs.ucdavis.edu/~rogaway/classes/188/materials/postman.pdf.

Rizk, A., & Rodriguez, A. (2021). A framework for informal learning analytics: Evidence from the literacy domain. In *Hawaii International Conference on System Sciences*.

Roetzel, P. G. (2019). Information overload in the information age: A review of the literature from business administration, business psychology, and related disciplines with a bibliometric approach and framework development. *Business Research, 12*(2), 479–522. https://doi.org/10.1007/s40685-018-0069-z.

Rogoff, B., Callanan, M., Gutiérrez, K. D., & Erickson, F. (2016). The organization of informal learning. *Review of Research in Education, 40*(1), 356–401.

Rosenthal, S. (2018). Motivations to seek science videos on YouTube: Free-choice learning in a connected society. *International Journal of Science Education, Part B, 8*(1), 22–39. https://doi.org/10.1080/21548455.2017.1371357.

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. New York, NY: Guilford Publications.

Schugurensky, D. (2000). *The forms of informal learning: Towards a conceptualization of the field* (Working paper). Centre for the Study of Education and Work, OISE/UT. https://tspace.library.utoronto.ca/handle/1807/2733

Slavin, R. E. (1996). Research on cooperative learning and achievement: What we know, what we need to know. *Contemporary Educational Psychology, 21*(1), 43–69.

Sloep, P., Kester, L., Brouns, F., Van Rosmalen, P., De Vries, F., De Croock, M., & Koper, R. (2007). Ad hoc transient communities to enhance social interaction and spread tutor responsibilities. In V. Uskov (Ed.), *Sixth international conference on web-based education WBE 2007* (pp. 548–554). Chamonix, France: Acta Press.

Smith, A., Toor, S., & Van Kessel, P. (2018, November 7). Many turn to YouTube for children's content, News, How-To Lessons. *Pew Research Center: Internet, Science & Tech*. https://www.pewresearch.org/internet/2018/11/07/many-turn-to-youtube-for-childrens-content-news-how-to-lessons/

Song, D., & Bonk, C. J. (2016). Motivational factors in self-directed informal learning from online learning resources. Cogent Education, 3(1), 1205838. https://doi.org/10.1080/2331186X.2016.1205838

Viskovic, A. R. (2005). 'Community of practice as a framework for supporting tertiary teachers' informal workplace learning. *Journal of Vocational Education and Training, 57*(3), 389–410.

Yen, C.-J., Tu, C.-H., Sujo-Montes, L. E., Harati, H., & Rodas, C. R. (2019). Using personal learning environment (PLE) management to support digital lifelong learning. *International Journal of Online Pedagogy and Course Design (IJOPCD), 9*(3), 13–31.

Yeo, R. (2008). How does learning (not) take place in problem-based learning activities in workplace contexts? *Human Resource Development International, 11*(3), 317–330. https://doi.org/10.1080/13678860802102609.

Instructional Quality and Learning Design of Massive Open Online Courses 80

Christian M. Stracke, Daniel Burgos, and Ahmed Tlili

Contents

Abstract

This chapter analyzes the instructional quality and learning design of different categories of online courses and their history, with a special focus on massive open online courses (MOOCs). Online courses have a long tradition that has gained public attention, broad interest, and huge numbers of participants thanks to the introduction of free MOOCs accessible online for all interested learners worldwide. In this chapter, we first define MOOCs, their characteristics, and history. Afterward, theoretical frameworks and practical instruments and tools based on scientific research are presented. From the beginning, the quality of MOOCs (and of online courses in general) has been debated. That led to

C. M. Stracke (✉)
Center for Higher Education (BZH), University of Bonn, Bonn, Germany
e-mail: stracke@opening-up.education

D. Burgos
Research Institute for Innovation & Technology in Education (UNIR iTED), Universidad Internacional de La Rioja (UNIR), Logroño, La Rioja, Spain

A. Tlili
Smart Learning Institute, Beijing Normal University, Beijing, China

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6_95

discussions about the learning design and outcomes of MOOCs, which we introduce in the next section. Key research findings and practical validated instruments for designing and evaluating MOOCs (and online courses in general) are presented. Then following, the key benefits of MOOCs and the main arguments and scenarios for their usage are summarized. Based on our analysis of the research results, practices, and standards, a framework for categories and types of (massive open) online courses is proposed, called the typologies of online courses (TOC) framework. As part of the global community for open educational resources (OER) and in combination with the UNESCO recommendation on OER, MOOCs can play a significant role in achieving the SDG4 of the United Nations: inclusive and equitable quality education for all. This is true in particular during times of public lockdowns, such as during the ongoing COVID-19 pandemic.

Keywords

Digital learning and open education · Typologies of online courses framework · Educational impact and evaluation · Open educational resources (OER) · United Nations SDG4 (inclusive and equity quality education for all) · COVID-19 pandemic and new normal · Emergency remote education

Introduction

The world, educational systems, and all individual learners have globally experienced a dramatic interruption and changes due to the COVID-19 outbreak (Stracke et al., 2022a; WHO, 2020). The pandemic represented a threat to daily life and all communities and societies, which was caused in particular by lockdowns (UNESCO, 2020, 2021). The consequences for educational opportunities were severe, including for higher-education institutions without any digital expertise and infrastructure (OECD, 2021a, 2021b; UNESCO et al., 2020, 2021; United Nations, 2020; UNICEF & The World Bank, 2020, 2021). Currently, research has started to analyze this impact and offered solutions for different regions and countries (Stracke et al., 2021, 2022). From one day to another, digital learning became the "new normal" during the lockdowns, and educators, learners, parents, and policymakers have necessarily made unexpected adjustments and experienced new ways of teaching/learning, often for the first time.

Online courses can provide an answer in these difficult situations to continue the right of education for all. However, their learning design has to be carefully developed to be different from face-to-face education in order to achieve high instructional quality (Bozkurt & Stracke, 2022). This chapter analyzes the specific pedagogical and design requirements for massive open online courses (MOOCs) as a particular type of online course. In addition, we discuss these principles/requirements, online platforms, and the relevant standards in a broad way to be applicable for online courses in general, as there are no specific platforms or standards for MOOCs.

After these discussions, we synthesize our findings into the typologies of online courses (TOC) framework and discuss identified benefits of MOOCs and the reasons for believing that MOOCs (and online courses in general) can strongly contribute to achieving the sustainable development goals (SDG) of the United Nations (2015) and in particular SDG4: "[e]nsure inclusive and equitable quality education and promote lifelong learning opportunities for all."

History and Characteristics of MOOCs

The term MOOCs originated in Canada and was first coined in 2008 by Dave Cormier and Bryan Alexander, describing an open online course "Connectivism and Connective Knowledge" at the University of Manitoba. This course was designed by Stephen Downes and George Siemens and was provided to 25 fee-paying students on campus and to 2300 other students from the general public free of charges (Daniel, 2012; deWaard, 2011; Siemens, 2013). The course content was provided through RSS feeds. The concept "all-at-onceness" was used to describe the complexity of MOOCs, implying the use of platforms and social networks, such as Moodle, Skype, Twitter, blogs, and chatrooms, for the distribution of knowledge and learning (Koutropoulos & Hogue, 2012; Levy, 2011).

MOOCs did not receive much attention between 2008 and 2011 (Stracke & Bozkurt, 2019), but this changed when the Stanford University course "Introduction to Artificial Intelligence" was provided. This course, taught by Sebastian Thrun and Peter Norvig, was considered the first successful MOOC, with more than 160,000 people around the world signing up to learn together through a learning management system. Students at the university and online thus had the same content and assessment materials, regardless of prior knowledge, collegiate experience, or socioeconomic status (Cheal, 2013).

After their success, Thrun and Norvig founded the company Udacity, which provides a platform that any university can use to offer MOOCs, stating the motivation behind this as "having done this, I can't teach at Stanford again. I feel like there's a red pill and a blue pill, and you can take the blue pill and go back to your classroom and lecture to your 20 students. But I've taken the red pill, and I've seen Wonderland." Later, on May 2, 2012, MIT and Harvard University announced a joint project called EdX that aims to provide free courses online.

The definition of MOOCs has also evolved over time since it was first added as an entry in Wikipedia in 2011, where it was defined as:

> A Massive Open Online Course (MOOC) is a course where the participants are distributed and course materials also are dispersed across the web. This is possible only if the course is open, and works significantly better if the course is large. The course is not a gathering, but rather a way of connecting distributed instructors and learners across a common topic or field of discourse.

Now, after the rapid development of MOOCS and after 1400 edits on Wikipedia, the definition reads as:

> An online course aimed at unlimited participation and open access via the web. In addition to traditional course materials such as filmed lectures, readings, and problem sets, many MOOCs provide interactive user forums to support community interactions between students, professors, and teaching assistants (TAs). MOOCs are a recent development in distance education, which was first introduced in 2008 and emerged as a popular mode of learning in 2012.

Despite the fact that MOOCs are open in nature, there is a continuous debate over whether they are open educational resources (OERs) – a debate that persists in the literature. For instance, Stracke, Downes, Conole, Burgos, and Nascimbeni (2019) stated that OERs are published under an open license, which is not the case for most MOOCs. However, MOOCs could be composed of several OERs. In the same vein, Tlili et al. (2020) supported this idea, claiming that even sustainability models for OERs are different than those found in MOOCs.

Frameworks, Instruments, and Tools for MOOCs

Several theoretical frameworks and practical instruments and tools based on scientific research are developed and presented in this third section. Here, we will broaden our view for online courses in general, as most platforms providing MOOCs are not distinguishing between MOOCs and online courses. Furthermore, the standardization bodies for technology-enhanced learning have not (yet) developed any specific standards for MOOCs, so we discuss key standards relevant for online courses in general.

Online Courses: Their Platforms and Current Practices

Online courses and learning have become mainstream and significantly popular since the 2000s (Garrett et al., 2020). This has been particularly true for higher education, where online courses have become more popular and mainstream. However, according to Baldwin, Ching, and Friesen (2018), the designers of online courses typically follow the traditional face-to-face ADDIE model, which is considered a limitation to the effectiveness of online courses. The ADDIE model represents five stages of the design process: analyze, design, develop, implement, and evaluate. Online course designers are distinct from those who design face-to-face courses mainly due to their different priorities. Online course designers prioritize and promote more interactions among learners than in physical courses. However, online course designers focus on facilitating learners' interactions and fail to address special needs or offer self-assessment (Bolliger & Martin, 2021). While the popularity of online courses and learning has significantly increased over the years (Shah, 2020), there is still a significant gap in broad and longitudinal studies that address online courses and learning. This chapter will therefore summarize the current practices of multiple platforms that offer online courses and claim to be leaders in the context of the number of learners, courses, and quality.

Class Central is an online course platform that claims to be "the #1 Search Engine for MOOCs." The platform contains more than 50,000 courses from several universities (Class Central, 2021). However, the courses in the platform can only be filtered by basic categories, such as collections (self-curated), providers, rankings, and subjects (Class Central, 2021).

Unlike Class Central, Udemy, another giant MOOC platform, offers more courses and better filters. Udemy provides more than 183,000 video-based online courses that users can search through and select by topic. However, within the single topic category, there are other categories, including price, language, levels, features, ratings, subtitles, and video duration (Udemy, 2021). The features category also offers other categories, including coding exercises, subtitles, practice tests, and quizzes.

Another online platform is edX, which follows a similar structure as Udemy but only offers 3000 online courses (edX, 2021). Like Udemy, one can only select one of the subjects listed on the landing page or select courses directly from the navigation bar. However, with edX, one can also select from several categories from search results, including the program, provider, subject, language, learning type, and availability.

Coursera offers about 5000 online courses and has a landing page where users can directly search for a course or select direct links to degrees, goals, providers, skills, certificates, subjects, and free courses (Coursera, 2021). Coursera allows users to choose from several categories in the search results, including the level, language, skills, duration, partners, subject, and learning products (Coursera, 2021).

Other online course platforms including the Khan Academy (2021) provide fewer categories and filter options for users. For instance, in its MOOC List, one can only search between subjects and formal conditions (MOOC List, 2021). FutureLearn also differentiates its courses by their sizes such that they only have categories for short courses, micro-credentials and programs, expert tracks, and online degrees (FutureLearn, 2021). Fordham University offers online learning and is distinguished as Google's highest-ranking, but its courses are only categorized into three types: synchronous online courses, asynchronous online courses, and hybrid/blended online courses (Fordham University, 2021). A comparison of the definitions and categorizations for online courses used by the mentioned online platforms is shown in Table 1 below: The first column "Categories" presents the clusters, while the other columns list the assigned selection criteria and terms used by the analyzed platforms.

One can identify that the online platforms use varying terminologies as well as the types and number of categories. Most of the platforms distinguish the courses by their content and target audience, meaning they categorize their courses depending on the topics or subjects being taught, the duration or size of the content, and which levels or languages are addressed for the given audience. It is surprising to discover that most of the online platforms do not categorize their courses according to the

Table 1 A comparison of categories for searching and differentiating online courses in popular online/MOOC platforms

Categories	class central	Udemy	edX	Coursera	Khan Academy	MOOC List	FutureLearn	Fordham University
Objectives				Goals				
Target group		Levels Languages (foreign) subtitles	Program Level Language	Skills Language Level	Levels Languages (foreign) subtitles	Formal conditions		
Pedagogies			Learning type					Modes
Content	Subjects Collections (self-curated)	Topics Duration Price	Subject Availability	Certificates Degrees Subjects Duration Learning products	Topics Duration	Subjects	Sizes	
Assessment		Quizzes Coding exercises Practice tests			Quizzes Coding exercises Practice tests			
Context	Providers	Price	Providers/ partners	Free courses Providers/ partners	Price			
Evaluation	Rankings	Ratings			Ratings			

design or technologies used. Additionally, categorization based on objectives and pedagogies is rarely used, with the two appearing only once and twice, respectively, in the evaluated platforms. While scientific research and articles suggest that didactics and educational dimensions are critical for online platforms, the data from the online platforms indicates this is not a focus for MOOC providers.

The subsequent section introduces and analyzes current norms and standards relevant for online courses and learning to broaden the comparison with the collected data.

Standards and Norms for Online Learning, Courses, and MOOCs

There is a wide range of terminologies related to norms, guidelines, and standards. This chapter distinguishes between norms created by the two de-jure standardization bodies – the International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC) – legitimated by the national governments and supranational institutions (such as the EU), with guidelines created by institutions or individuals and standards created by authorities. Multiple national and regional standards have been published and made available, such as the International Association for K–12 Online Learning (2011). This name is highly misleading since one may assume that they are developed by an international group or association when, in fact, they are merely a replica of the national United States Standards developed by American authors only (International Association for K–12 Online Learning, 2011).

The Institute of Electrical and Electronics Engineers (IEEE) was the first international body to develop international standards that were relevant for online courses. IEEE developed the IEEE Std 1484.1 standard, which specified all the elements of a learning technology system architecture (LTSA) (IEEE, 2003). The architecture also highlighted the relationships between the components in an entirely technology-independent description. Such a technology-independent description is the biggest advantage of this standard (and many others): It allows the standard to be valid for a longer period of time. Through this technology independence, IEEE 1484.1 is still surprisingly useful and adequate currently, despite the fact that it was developed 18 years ago and several technological advances have been made since that time. It presents and defines the components of an online course or a digital environment and their relationships as shown in Fig. 1.

Another international standard developed in 2003, the same year as IEEE 1484.1, was the IMS Learning Design (LD), developed by the IMS Global Learning Consortium Inc., founded on the educational modeling language (EML) as shown in Fig. 2: It presents all elements relevant for the learning design of online or digital courses. It follows the narrative of a stage play and related terms. The IMS LD was extended by Publicly Available Specification (PAS) 1032-2, including three more components: experience, context, and metadata (PAS 1032-2, 2004).

However, there is only one legal, de-jure standard for online courses and digital learning that is approved internationally and is implemented broadly as a norm: It

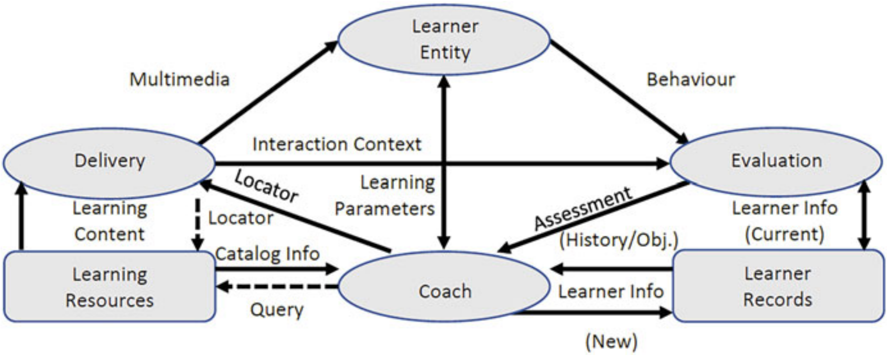


Fig. 1 IEEE 1484.1: The LTSA system components (IEEE, 2003)

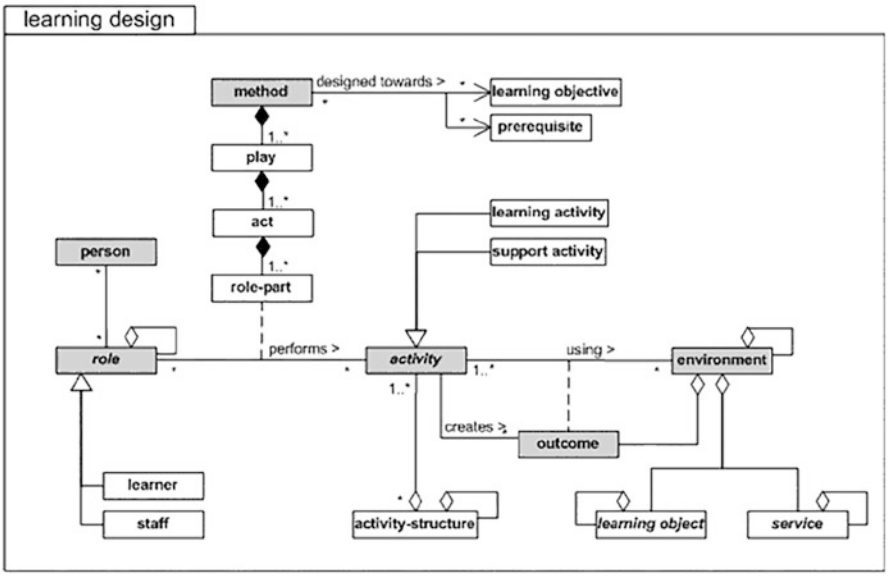


Fig. 2 IMS Learning Designs (IMS, 2003)

is the peculiar international quality norm ISO/IEC 40180 (2017), which was developed and approved by all national delegations from the International Standardization Organization (ISO) and the International Electrotechnical Commission (IEC). In the following, we briefly introduce it due to its unique importance as a global norm and its adoption as a national norm in more than 60 countries worldwide.

ISO/IEC 40180 was developed as a regular revision of the prior ISO/IEC 19796-1 (2005) that had been published as the first e-learning norm by IEC and ISO. The norm was developed in the international standardization committee SC36 by IEC and ISO, managed by Convenor Christian M. Stracke, and approved by all national delegations from about 60 nations in consensus.

ISO/IEC 40180 defines a quality reference framework (QRF) for e-learning. It is important to distinguish this QRF developed by SC36 from the specific QRF for MOOCs developed by MOOQ and described in the following section of this book chapter: MOOQ decided to use the same abbreviation (QRF) for its quality reference framework for MOOCs (Stracke et al., 2018a) since it is based on the QRF by SC36 contained in ISO/IEC 40180 (ISO, 2017).

The QRF of ISO/IEC 40180 contains two core models: the QRF descriptive model, and the QRF quality model.

Figure 3 presents the QRF Quality Model with its seven dimensions (called process categories, in dark gray) and related 38 processes (in light gray). The QRF quality model covers and integrates all dimensions and processes that are relevant for online courses and learning. It is most important to understand that the QRF quality model presents them only as potential options and that, for all processes, it must be decided whether they are relevant for the given situation, target group, and institutional and learning objectives.

If a process is selected as relevant, then it has to be defined according the QRF descriptive model that is shown in Fig. 4. The QRF descriptive model is a master template for describing and defining all selected processes that are relevant in a given task and situation, such as designing an online course.

Figure 5 presents an illustrative example for the usage of the QRF descriptive model: It is a definition of the process "Concept of the contents" (CD.2) from the process category "Conception/Design."

Since ISO/IEC 40180 provides a complete view of all the possible dimensions and processes using its 7 dimensions and 38 processes, it is used as the foundation of categorizing online courses. Overall, the main benefit of ISO/IEC 40180 is the introduction of a common terminology and structure for online courses and technology-enhanced learning. It allows all involved stakeholders to discuss the requirements and achievements for the needs analysis, conception, realization, and evaluation of any online course and technology-enhanced learning opportunity.

As stated above, the QRF by SC36 should not be confused with the QRF by MOOQ, which is based on the QRF by SC36 and is described in the following section.

Quality, Learning Design, and Outcomes of MOOCs

In the previous section, we discussed the wide variety in how MOOC and online course providers have recently sought to categorize their courses. In contrast, researchers have differentiated and analyzed the difference in MOOCs from the very beginning (Stracke & Bozkurt, 2019).

Since the first MOOCs, the quality of learning within MOOCs was discussed by learners, designers, and researchers along with questions about their educational impact and achievements (Liyanagunawardena, Adams, & Williams, 2013; Stracke,

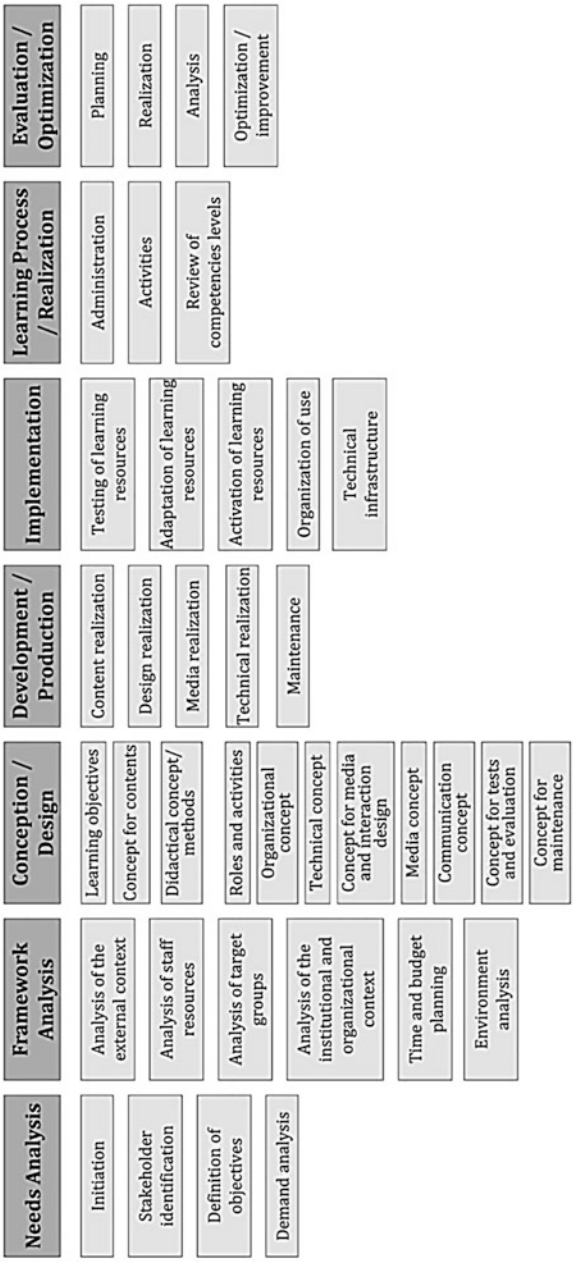


Fig. 3 ISO/IEC 40180: QRF Quality Model (ISO, 2017)

ID	Category	Process	Description	Relation
Sub-processes/ Sub-aspects				
Objective				
Method				
Result				
Actors				
Metrics/Criteria				
Standards				
Annotation/Example				

Fig. 4 ISO/IEC 40180: QRF Descriptive Model (ISO, 2017)

ID	Category	Process Name	Description	Relations
CD.2	Conception/Design	Concept of the contents	Concept of learning and teaching contents	*NA.4 Demand analysis* *FA.2 Qualifications*
Sub-processes/ Sub-aspects	Content selection Content Design			
Objective	1 Learner Demand: The goal is to provide content adapted to the needs and demand of the learner. 2 Adaptation: Each course shall provide different content presentation formats and entry points based on the user experience.			
Method	A prototype of the content shall be provided to a group of learners' representatives. In a consensus process, the contents shall be prioritized and agreed on. For each course, classify groups of learners according to their learning type. Adapt presentation format and methods according to these learning types.			
Result	1 Documentation of planned and agreed contents 2 Periodically, evaluate learning performance of different learners (test groups).			
Actors	Curriculum designer, didactic experts, institution accreditation authority, teacher, learners' representatives			
Metrics/Criteria	The content are measured based on their relevance, importance, exemplarity, ...			
Standards	Higher Education Standards			
Annotation/Example				

Fig. 5 ISO/IEC 40180: Example of a defined process CD.2 (ISO, 2017)

2019; Stracke & Trisolini, 2021; Veletsianos & Shepherdson, 2016; Zawacki-Richter, Bozkurt, Alturki, & Aldraiweesh, 2018). A repeated criticism was the high dropout rate of MOOCs, but it could be clarified that these relatively high figures are not always caused by low quality but by an inaccurate comparison to face-to-face (offline) courses: The dropout rate, for example, is not a valid measurement metric for MOOCs due to their different target groups and the various learning objectives for different students, many of whom only want to get an overview and not finish and pass a complete course (Stracke, 2017a).

In the beginning, quality discussions followed the identified types of MOOCs that were distinguished by their designs, specific learning objectives, and pedagogical approaches (Davidson, 2013; Stracke, 2017b). That led to two main schools of thought for MOOCs: the cMOOCs and xMOOCs.

On the one hand, cMOOCs were designed to promote collaborative learning processes and network building among all MOOC learners. It was labeled cMOOC due to the so-called "connectivism" that was promoted as a new theory from the very first MOOC "Connectivism and Connective Knowledge" (CCK08) (Bozkurt, Kilgore, & Crosslin, 2018). Today, it is evident that this MOOC type has not created a new pedagogical design theory but is following well-established learning designs from constructivism with a focus on social communication, collaborative exchange, and common learning processes (Stracke et al., 2019). On the other hand, xMOOCs transferred traditional classroom teaching to broad audiences online. It was labeled xMOOC, with "x" symbolizing an extension, as that is what Harvard University used to mark the online courses in its lectures catalogue. In addition, several other types of MOOCs were proposed, but the differentiations between these proposed types are always difficult to discern and are outweighed by the overlaps in MOOCs combining different design approaches (Stracke et al., 2019; Zawacki-Richter et al., 2018).

Another attempt to structure the quality discussion related to MOOCs was the focus on the four abbreviations of massive, open, online, and courses. However, all four criteria are often not realized, and each can be questioned as mandatory conditions for current online courses labeled as MOOCs (Stracke et al., 2019). Only the scalability with large amounts of online learners is unique for MOOCs, but this does not present a pedagogical innovation or new learning style but instead a potential condition that has to carefully be addressed in the learning design.

Thus, a categorization of MOOC types has attempted several times, but we argue such attempts can be discarded, as the diverse learning designs in online courses are not different from "normal" offline courses – the latest research on the quality of MOOCs reveals that there are no specific learning designs for MOOCs (Bozkurt et al., 2018; Stracke et al., 2018b; Stracke & Trisolini, 2021; Zawacki-Richter et al., 2018). However, MOOCs do have specific aspects and opportunities (such as scalability, interactions, and reproducibility) that demand more emphasis on the learning designs and outcomes of MOOCs. Therefore, multidimensional perspectives are required for the design and quality of MOOCs to cover all these important aspects.

The international initiative MOOQ (which stands for the quality of MOOCs) has analyzed the current MOOC offerings and provisions from four perspectives: the learners, designers, facilitators, and providers of MOOCs. The first major research result of MOOQs (Stracke et al., 2018b; Stracke & Tan, 2018) is the different appreciation and valuing of interactions between learners ($n = 146$) and designers ($n = 52$). In the comparative online surveys for MOOC learners and designers, MOOC learners recognized all four interaction types: (a) learners to resources, (b) learners to learners, (c) learners to facilitators, and (d) groups to groups – these were all found to be relevant for the learning outcome (all four relations are significant with $p < 0.05$, and three of the four are even very highly significant with $p < 0.001$), while the MOOC designers considered all four interaction types as unimportant (all with non-significant relations).

Based on the overall research, including additional interviews, literature analyses, and workshops in collaboration with more than 10,000 MOOC learners, designers, facilitators, and providers, the research initiative MOOQ (www.mooc-quality.eu) has developed and continuously improved the QRF for MOOCs (Stracke et al., 2018a).

	Analysis			
A-1	Initiation			R
A-2	Stakeholder identification	X		R
A-3	Definition of objectives	R	X	R
A-4	Needs and demand analysis	R		X
A-5	Analysis of the external context			R
A-6	Analysis of the organizational context	X		R
A-7	Time, resources and budget planning	X		R

	Design			
D-1	Learning objectives	R	X	X
D-2	Organizational concept and roles	X	X	R
D-3	Didactical concept and methods	R	X	X
D-4	Concept for contents	R	X	X
D-5	Concept for learning activities	R	X	
D-6	Technical concept	X	X	R
D-7	Media design	R	X	X
D-8	Communication concept	R	X	
D-9	Interaction concept	R	X	
D-10	Feedback concept	R	X	
D-11	Concept for tests and assessment	R	X	X

Fig. 6 (continued)

	Implementation			
I-1	Content realization	R	X	X
I-2	Design realization	R		X
I-3	Media realization	R		X
I-4	Technical realization	X		R
I-5	Organization of use	X	X	R
I-6	Testing and activation	R		X

	Realization			
R-1	Administration	X	X	R
R-2	Learning activities and related support	X	R	X
R-3	Review of competence levels	R	X	X

	Evaluation			
E-1	Evaluation planning	X	X	R
E-2	Evaluation realization	X	X	R
E-3	Evaluation review	R	X	X
E-4	Improvements and optimization	X	X	R

Fig. 6 The quality reference framework (QRF) (Stracke et al., 2018a, pp. 10–11)

The QRF for MOOCs is following and adapting the quality norm for digital learning and online courses ISO/IEC 40180 (also called QRF) that was described in the previous section on relevant international standards and norms.

The QRF for MOOCs consists of three dimensions (phases, perspectives, and roles) and provides quality criteria and a quality checklist that is adaptable and has always been adjusted to the given situation, defined learning objectives, and selected target groups (Stracke et al., 2018b). Within the phase's dimension, the QRF distinguishes five processes (presented in Fig. 6): analysis, design, implementation, realization, and evaluation. The difference to the five consecutive ADDIE stages is that the QRF defines process categories without any sequence but with a strong recommendation for parallel and iterative cycles (Stracke, 2019). They have to be selected and defined in the design, quality, and evaluation of MOOCs as required. Consequently, they are optional and present the full range of alternatives that have to be adapted to the given situation, target group, and learning objectives (Stracke et al., 2018a).

Within the QRF, the QRF quality checklist asks guiding questions to beginners in the design of MOOCs, and the QRF key quality criteria present the complete list of quality criteria for MOOCs that designers and experts in online education can benefit from.

Finally, a recent systematic literature review on the quality of MOOCs (Stracke & Trisolini, 2021) focused on the analyzed quality criteria and identified 103 studies (following the PRISMA protocol). The comparison and discussion of the results from the 103 studies through iterative validation cycles led to the establishment of a quality framework for MOOCs. This quality framework covers four dimensions (pedagogical, organizational, technical, and social) that are relevant for the quality of MOOCs and thus for their design. It can be used to guide design and evaluation of the learning design of MOOCs and future research related to their quality.

Thus, we can conclude that the research on MOOCs has revealed and addressed quality, learning design, and outcomes as key topics and led to initial instruments, such as the QRF for MOOCs that are currently evaluated in use and validation studies.

Benefits, Arguments, and Scenarios for Using MOOCs

Finally, the key benefits of MOOCs and the main arguments and scenarios for their usage are summarized in this section.

The key benefits of MOOCs can be identified as:

1. Time-independent: Learners can use MOOCs at any time they prefer as long as synchronous parts are not emphasized.
2. Location-independent: Learners can use MOOCs at any location they prefer as long as internet connectivity and an appropriate device are available.
3. Scalable: Educators can address large populations of learners with no limits except technical infrastructure and bandwidth.
4. Equitable: One MOOC is always offering the same conditions and quality for all learners independent from individual form on the day.
5. Inclusive: Different pathways and media channels can be combined in one single MOOC to cover all needs and preferences of learners.
6. Observable: The activities of learners and educators can be easily observed in digital environments as long as legal data protection is fulfilled.
7. Repeatable: One MOOC can be provided many times to allow for many cohorts and sequences.
8. Improvable: A MOOC can be easily reviewed and evaluated for continuous improvement cycles.

In addition, prior discussions on the usefulness and quality of MOOCs can be considered obsolete and outdated given that traditional in-person courses can suffer the same problems in the learning design as MOOCs (if not more) (Stracke, Burgos, et al., 2022; Stracke, Sharma, et al., 2022).

Categories and Types of (Massive Open) Online Courses

Previously, we discussed findings from the research literature that identified quality criteria for the design and evaluation of MOOCs. In this section, we compare and integrate the results from the previous sections to contrast ideas of quality and standards and create a new framework to guide MOOC design.

First, Table 2 shows a comparison of the various categorizations and dimensions used in online courses in comparison to the international norm ISO/IEC 40180 coupled with the international standards IMS LD and IEEE LTSA and with the QRF for MOOCs to generate the typologies of online courses (TOC) framework, as shown below in Table 2. The first column “Categories” presents the clusters, while the other columns list the assigned components and terms discussed in the previous sections.

Table 3 presents the main outcome from the discussion of the literature and the comparison of the platforms and standards. It highlights the eight dimensions that are most important for the categorization of online courses and in particular for the design of MOOCs.

This potential TOC framework can serve as a basis for a future framework on the typologies of online courses that can be derived from the comparison of their different categories as shown in Table 3 above. For achieving that, it requires testing and evaluation in future applications, as well as research and validation studies to gain broad acceptance and richness of detail.

Conclusion

MOOCs, as a special type of online course, offer numerous benefits, and, thus, it is not surprising that their numbers and learners are constantly increasing. The main use of MOOCs is in higher and adult education for professional and personal development, often as free courses to promote the providing universities or to sell certificates after successful completion. However, MOOCs could also be used in school and vocational education and in lifelong learning to enrich educational opportunities and systems through alternatives with high and stable quality and with innovative learning designs.

The presented eight dimensions for a typologies of online courses (TOC) framework provide support for achieving these objectives. Derived from our analysis of current MOOC practices, offers and related standards and guidelines worldwide, these dimensions are marking the necessary perspectives the quality of MOOCs. They offer guidance for the MOOC development and evaluation. They can be applied in all processes and phases during the learning design and implementation

Table 2 Categories of online courses differentiated in norm and standards

Categories	ISO/IEC 40180 (QRF by SC36)	IMS LD	IEEE LTSA	Quality reference framework (QRF by MOOQ)
Objectives	Definition of objectives Learning objectives	Learning objective		Definition of objectives Learning objectives
Target group	Demand analysis Analysis of target groups	Person Prerequisite	Learner entity	Needs and demand analysis
Pedagogies	Didactical concept/ methods Roles and activities Organizational concept Communication concept Organization of use Activities	Method Play Act Role-part Role Activity Activity structure Learning activity Support activity	Delivery Coach	Organizational concept and roles Didactical concept and methods Concept for learning activities Communication concept Interaction concept Feedback concept Organization of use Learning activities and related support
Content	Concept for contents Media concept Content realization Media realization Testing of learning resources Adaptation of learning resources	Learning object Service	Learning resources	Concept for contents Media design Content realization Media realization
Design	Concept for media and interaction design Design realization			Design realization
Technologies	Technical concept Concept for maintenance Technical realization Maintenance Activation of learning resources Technical infrastructure	Environment		Technical concept Technical realization Testing and activation
Assessment	Concept for tests and evaluation Review of competencies levels	Outcome	Evaluation Learner records	Concept for tests and assessment Review of competence levels
Context	Initiation Stakeholder identification Analysis of external context			Initiation Stakeholder identification Analysis of the external context

(continued)

Table 2 (continued)

Categories	ISO/IEC 40180 (QRF by SC36)	IMS LD	IEEE LTSA	Quality reference framework (QRF by MOOQ)
	Analysis of staff resources Analysis of institutional and organizational context Time and budget planning Environment analysis Administration			Analysis of the organizational context Time, resources, and budget planning Administration
Evaluation	Planning Realization Analysis Optimization/improvement			Evaluation planning Evaluation realization Evaluation review Improvements and optimization

Table 3 Dimensions for a typologies of online courses (TOC) framework

Context	The given context is crucial for the design of an online course. Specific conditions and given limitations, such as available resources, have to be identified and considered. Therefore, the design should start with a needs analysis that also reflects requirements and demands of all involved stakeholders
Objectives	This dimension covers the organizational objectives related to the expected impact as well as learning objectives related to the planned learning outcomes
Pedagogy	The pedagogy dimension can be considered most important for overall success and requires close attention and many aspects to be addressed. In online courses, there are several unique opportunities that need to be exploited, such as digital competence building, and automatic self-assessment
Content	Content covers the resources and media that are combined and mixed in the online course
Interaction	Interactions in online courses are enriched by a fourth mode – —the interactions among different groups of learners, (next to the three traditional modes: (a) learners to resources, (b) learners to learners, (c) learners to facilitators as explained above). Online learners and online designers highly value this feature but with diverse expectations
Technologies	Technologies play a special role in online courses, as they have to work, and learners (and designers and facilitators) need the related digital competencies
Support	Support in online courses is crucial for introducing beginners to online learning, giving orientation, and providing feedback
Assessment	The assessment consists of measurement of the learning progress and outcomes achieved by the learners as well as the evaluation of the online course for future improvements

of MOOCs in collaboration among all stakeholders and can be used for the measurement and continuous improvement of the instructional quality of MOOCs as well as for their labeling and distinction by MOOC providers (for promotional purposes) and by MOOC learners (to select the best fitting MOOC).

In summary, we believe that the full potential of MOOCs for all educational systems worldwide has not yet been achieved. As part of the global community for open educational resources (OERs), and in combination with the UNESCO recommendation on OERs (UNESCO, 2019), MOOCs can play a significant role in achieving the United Nations' SDG4: inclusive and equitable quality education for all. This is true in particular in times of public lockdowns, such as in the ongoing COVID-19 pandemic. Further research on MOOCs is required, such as studies on licensing, sustainability and exploitation models, student dropout, teacher attrition, etc. Our long-term research objective is to identify all opportunities for their instructional quality and learning designs as well as for their uses for all learning objectives and target groups as well as in all educational fields.

References

Baldwin, S., Ching, Y.-H., & Hsu, Y.-C. (2018). Online course design in higher education: A review of national and statewide evaluation instruments. *TechTrends, 62*(1), 46–57. https://doi.org/10.1007/s11528-017-0215-z.

Baldwin, S. J., Ching, Y.-H., & Friesen, N. (2018). Online course design and development among college and university instructors: An analysis using grounded theory. *Online Learning, 22*(2), 157–171. https://doi.org/10.24059/olj.v22i2.1212.

Bolliger, D. U., & Martin, F. (2021). Critical design elements in online courses. *Distance Education, 42*(3), 352–372. https://doi.org/10.1080/01587919.2021.1956301.

Bozkurt, A., Kilgore, W., & Crosslin, M. (2018). Bot-teachers in hybrid massive open online courses (MOOCs): A post-humanist experience. *Australasian Journal of Educational Technology, 34*(3), 39–59. https://doi.org/10.14742/ajet.3273.

Bozkurt, A., & Stracke, C. M. (2022). The shift toward openness in education and the implications for learning ecosystems and ecologies. In M. Kerres, D. Otto, & O. Zawacki-Richter (Eds.), *Distributed learning ecosystems: Repositories, resources and practices*. Springer Nature. (accepted, in print).

Cheal, C. (2013). *Creating MOOCs for college credit: SJSU's partnership with edX and Udacity (Research Bulletin)*. Louisville, CO: EDUCAUSE Center for Analysis and Research (August 14, 2013). Retrieved from http://www.educause.edu/ecar

Class Central. (2021). *Subjects* (17 November 2021). https://www.classcentral.com/subjects

Coursera. (2021). *Impact report* (17 November 2021). https://blog.coursera.org/coursera-impact-report-2021

Daniel, J. (2012). Making sense of MOOCs: Musings in a maze of myth, paradox and possibility. *Journal of Interactive Media in Education, 2012*(3). https://doi.org/10.5334/2012-18.

Davidson, C. (2013). *What was the first MOOC?* https://www.hastac.org/blogs/cathy-davidson/2013/09/27/what-was-first-mooc

deWaard, I. (2011). Explore a new learning frontier: MOOCs. *Learning Solutions Magazine*. Retrieved from https://learningsolutionsmag.com/articles/721/explore-a-new-learning-frontier-moocs

edX. (2021). *Courses by subjects* (17 November 2021). https://www.edx.org/subjects

Fordham University. (2021). *Types of online learning*. https://www.fordham.edu/info/24884/online_learning/7897/types_of_online_learning

FutureLearn. (2021). *Subjects* (17 November 2021). https://www.futurelearn.com/subjects

Garrett, R., Legon, R., & Fredericksen, E. E. (2020). CHLOE 4: Navigating the mainstream: The changing landscape of online education, 2020 (Quality Matters & Eduventures Survey of Chief Online Officers). Quality Matters. https://bit.ly/3fIOHZW

IMS Global Learning Consortium, Inc. (2003). *Learning design information model*. Version 1.0 Final Specification. http://www.imsglobal.org/learningdesign/ldv1p0/imsld_infov1p0.html

Institute of Electrical and Electronics Engineers (IEEE). (2003). *IEEE Std 1484.1. IEEE standard for learning technologies – learning technology systems architecture (LTSA)*.

International Association for K–12 Online Learning. (2011, October). *National standards for quality online courses version 2*. Vienna, VA: Author.. Retrieved from http://www.inacol.org/wp-content/uploads/2015/02/national-standards-for-quality-online-courses-v2.pdf

ISO/IEC 40180:2017. (2017). *Information technology — Quality for learning, education, and training — Fundamentals and reference framework*. International Organization for Standardization (ISO). [International Norm]

Khan Academy. (2021). *Startpage* (17 November 2021). https://www.khanacademy.org

Koutropoulos, A., & Hogue, R. J. (2012). *How to succeed in a MOOC – massive online open course*. Retrieved from https://learningsolutionsmag.com/articles/1023/how-to-succeed-in-a-massive-online-open-course-mooc

Levy, D. (2011). Lessons learned from participating in a connectivist massive online open course (MOOC). In *Proceedings of the Chais Conference on instructional technologies research at Raanana, The Open University of Israel*. Retrieved from http://chais.openu.ac.il/research_center/chais2011/download/f-levyd-94_eng.pdf

Liyanagunawardena, T., Adams, A., & Williams, S. (2013). MOOCs: A systematic study of the published literature 2008–2012. *The International Review of Research in Open and Distributed Learning, 14*(3), 202–227. https://doi.org/10.19173/irrodl.v14i3.1455.

MOOC List. (2021). *Categories*. https://www.mooc-list.com/categories

Organisation for Economic Co-Operation and Development (OECD). (2021a). *The state of higher education. One year into the COVID pandemic*. https://doi.org/10.1787/83c41957-en

Organisation for Economic Co-Operation and Development (OECD). (2021b). *The state of school education. One year into the COVID pandemic*. https://doi.org/10.1787/201dde84-en

PAS 1032-2. (2004). *Learning, education and training focussing on e-learning – Part 2: Didactic objects model – Modelling and description of scenarios for learning, education and training*. Berlin, Germany: DIN.

Shah, D. (2020, December 14). *The second year of the MOOC: A review of MOOC stats and trends in 2020*. Class Central. https://www.classcentral.com/report/the-second-year-of-the-mooc

Siemens, G. (2013). Massive open online courses: Innovation in education? In R. McGreal et al. (Eds.), *Open educational resources: Innovation, research and practice* (pp. 5–15). Athabasca, Canada: Athabasca University Press.

Stracke, C. M. (2017a). Why we need high drop-out rates in MOOCs: New evaluation and personalization strategies for the quality of open education. In *Proceedings 17th IEEE International Conference on Advanced Learning Technologies (ICALT 2017)* (pp. 13–15). https://doi.org/10.1109/ICALT.2017.109.

Stracke, C. M. (2017b). The quality of MOOCs: How to improve the design of open education and online courses for learners? In P. Zaphiris & A. Ioannou (Eds.), *Learning and collaboration technologies. Novel learning ecosystems* (pp. 285–293). Cham, Switzerland: Springer. https://doi.org/10.1007/978-3-319-58509-3_23.

Stracke, C. M. (2019). Quality frameworks and learning design for open education. *The International Review of Research in Open and Distributed Learning, 20*(2), 180–203. https://doi.org/10.19173/irrodl.v20i2.4213.

Stracke, C. M., & Bozkurt, A. (2019). Evolution of MOOC designs, providers and learners and the related MOOC research and publications from 2008 to 2018. In *Proceedings of international open and distance learning conference 2019* (pp. 13–20). https://doi.org/10.5281/zenodo.3598418.

Stracke, C. M., Bozkurt, A., & Burgos, D. (2022). The typologies of (open) online courses and their dimensions, characteristics and relationships with distributed learning ecosystems, open educational resources and massive open online courses. In M. Kerres, D. Otto, & O. Zawacki-Richter (Eds.), *Distributed learning ecosystems: Repositories, resources and practices*. Springer Nature. (accepted, in print).

Stracke, C. M., Burgos, D., Santos-Hermosa, G., Bozkurt, A., Sharma, R. C., Swiatek, C., . . . Truong, V. (2022). Responding to the initial challenge of COVID-19 pandemic: Analysis of international responses and impact in school and higher education. *Sustainability, 14*(3), 1876. https://doi.org/10.3390/su14031876.

Stracke, C. M., Downes, S., Conole, G., Burgos, D., & Nascimbeni, F. (2019). Are MOOCs open educational resources? A literature review on history, definitions and typologies of OER and MOOCs. *Open Praxis, 11*(4), 331–341. https://doi.org/10.5944/openpraxis.11.4.1010.

Stracke, C. M., Sharma, R. C., Bozkurt, A., Burgos, D., Swiatek, C., Inamorato dos Santos, A., . . . Truong, V. (2022). Impact of COVID-19 on formal education: An international review on practices and potentials of Open Education at a distance. *The International Review of Research in Open and Distributed Learning*. (accepted, in print).

Stracke, C. M., Sharma, R. C., Swiatek, C., Burgos, D., Bozkurt, A., Karakaya, Ö., . . . Conole, G. (2021). How COVID-19 has an impact on formal education: A collective international evaluation of open education in distance learning. In *Proceedings of the 14th annual international conference of education, research and innovation (ICERI)* (pp. 4270–4275). https://doi.org/10.5281/zenodo.5764585.

Stracke, C. M., & Tan, E. (2018). The quality of open online learning and education: Towards a quality reference framework for MOOCs. In J. Kay & R. Luckin (Eds.), *Rethinking learning in the digital age. Making the learning sciences count: The international conference of the learning sciences (ICLS) 2018* (pp. 1029–1032). https://doi.org/10.5281/zenodo.3715341.

Stracke, C. M., Tan, E., Texeira, A., Pinto, M., Vassiliadis, B., Kameas, A., . . . Vidal, G. (2018a). *Quality reference framework (QRF) for the quality of massive open online courses (MOOCs)*. https://doi.org/10.5281/zenodo.3894573.

Stracke, C. M., Tan, E., Texeira, A. M., Pinto, M., Kameas, A., Vassiliadis, B., & Sgouropoulou, C. (2018b). Gap between MOOC designers' and MOOC learners' perspectives on interaction and experiences in MOOCs: Findings from the global MOOC quality survey. In M. Chang, N.-S. Chen, R. Huang, K. M. Kinshuk, S. Murthy, & D. G. Sampson (Eds.), *Proceedings 18th IEEE international conference on advanced learning technologies (ICALT)* (pp. 1–5). https://doi.org/10.1109/ICALT.2018.00007.

Stracke, C. M., & Trisolini, G. (2021). A systematic literature review on the quality of MOOCs. *Sustainability, 13*(11), 5817. https://doi.org/10.3390/su13115817.

Tlili, A., Nascimbeni, F., Burgos, D., Zhang, X., Huang, R., & Chang, T. W. (2020). The evolution of sustainability models for open educational resources: Insights from the literature and experts. *Interactive Learning Environments*, 1–16. https://doi.org/10.1080/10494820.2020.1839507.

Udemy. 2021. *Startpage* (17 November 2021). https://www.udemy.com

United Nations. (2015, October 21). *Transforming our world: The 2030 agenda for sustainable development*. http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E

United Nations. (2020, August). *Policy brief: Education during COVID-19 and beyond*. https://unsdg.un.org/resources/policy-brief-education-during-covid-19-and-beyond

United Nations Educational, Scientific and Cultural Organization (UNESCO). (2019). *UNESCO recommendation on Open Educational Resources*. 40 C/32 Annex. http://opening-up.education/wp-content/uploads/2019/12/RECOMMENDATION-CONCERNING-OPEN-EDUCATIONAL-RESOURCES.pdf

United Nations Educational, Scientific and Cultural Organization (UNESCO). (2020). *COVID-19: 10 recommendations to plan distance learning solutions*. https://en.unesco.org/news/covid-19-10-recommendations-plan-distance-learning-solutions

United Nations Educational, Scientific and Cultural Organization (UNESCO). (2021). *COVID-19 response*. https://en.unesco.org/covid19

United Nations Educational, Scientific and Cultural Organization (UNESCO), United Nations Children's Fund (UNICEF) & The World Bank. (2020). *What have we learnt? Overview of findings from a survey of ministries of education on national responses to COVID-19*. http://tcg.uis.unesco.org/wp-content/uploads/sites/4/2020/10/National-Education-Responses-to-COVID-

19-WEB-final_EN.pdf and https://data.unicef.org/resources/national-education-responses-to-covid19

United Nations Educational, Scientific and Cultural Organization (UNESCO), United Nations Children's Fund (UNICEF), The World Bank, & the Organisation for Economic Co-operation and Development (OECD). (2021). *What have we learnt? Overview of findings from a survey of ministries of education on national responses to COVID-19*. http://covid19.uis.unesco.org/wp-content/uploads/sites/11/2021/07/National-Education-Responses-to-COVID-19-Report2_v3.pdf

Veletsianos, G., & Shepherdson, P. (2016). A systematic analysis and synthesis of the empirical MOOC literature published in 2013–2015. *The International Review of Research in Open and Distance Learning, 17*(2), 198–221. https://doi.org/10.19173/irrodl.v17i2.2448.

World Health Organization (WHO). (2020). *Coronavirus disease 2019 (COVID-19). Situation Report – 51* (11 March 2020). https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200311-sitrep-51-covid-19.pdf?sfvrsn=1ba62e57_10

Zawacki-Richter, O., Bozkurt, A., Alturki, U., & Aldraiweesh, A. (2018). What research says about MOOCs – An explorative content analysis. *The International Review of Research in Open and Distributed Learning, 19*(1), 242–259. https://doi.org/10.19173/irrodl.v19i1.3356.

Index

O. Zawacki-Richter, I. Jung (eds.), *Handbook of Open, Distance and Digital Education*,
https://doi.org/10.1007/978-981-19-2080-6