Research Trends in Open, Distance, and Digital Education

13

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Contents

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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,*

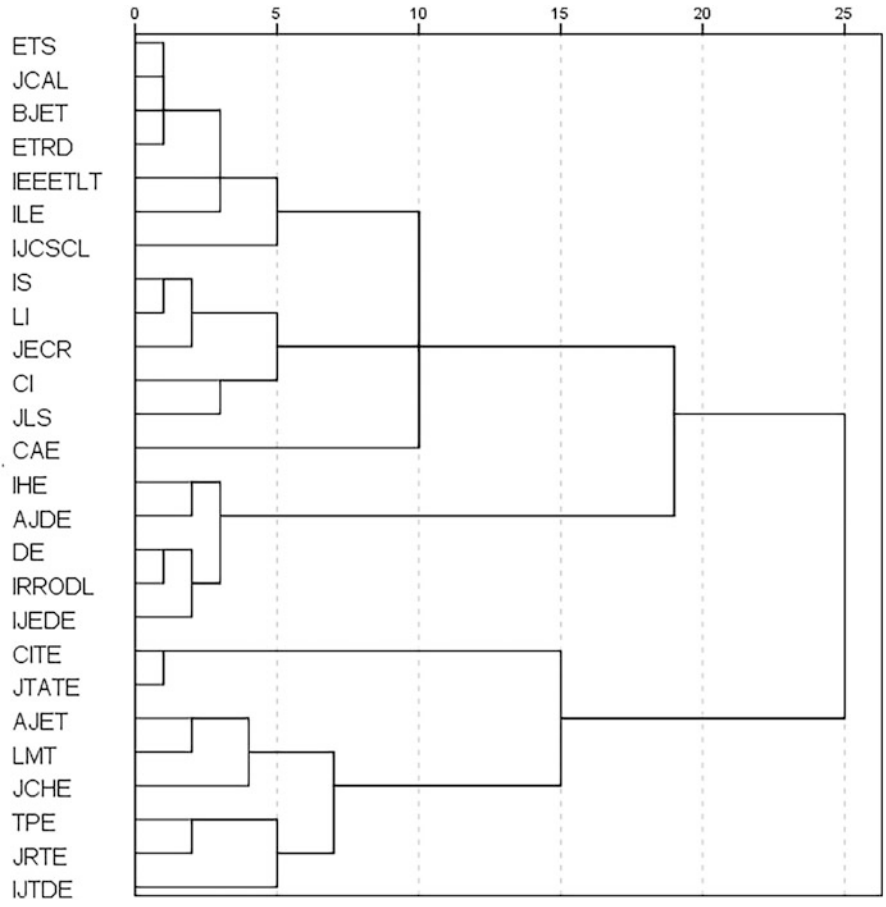

Fig. 1 Dendrogram of journal clusters, 2007–2016 (N = 10,827) (for abbreviations see Appendix A)

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.

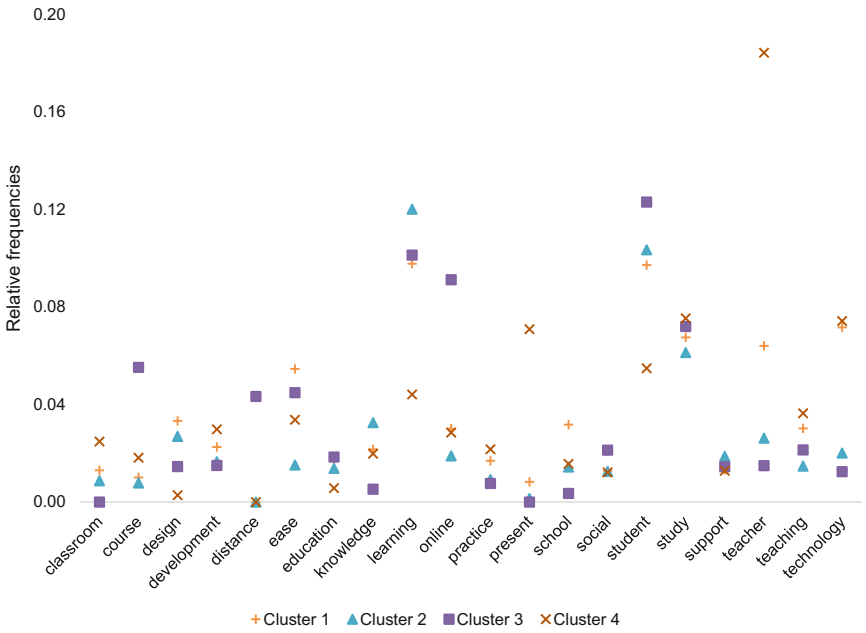

Fig. 2 The 20 most frequent concepts, unweighted over the 4 clusters

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.

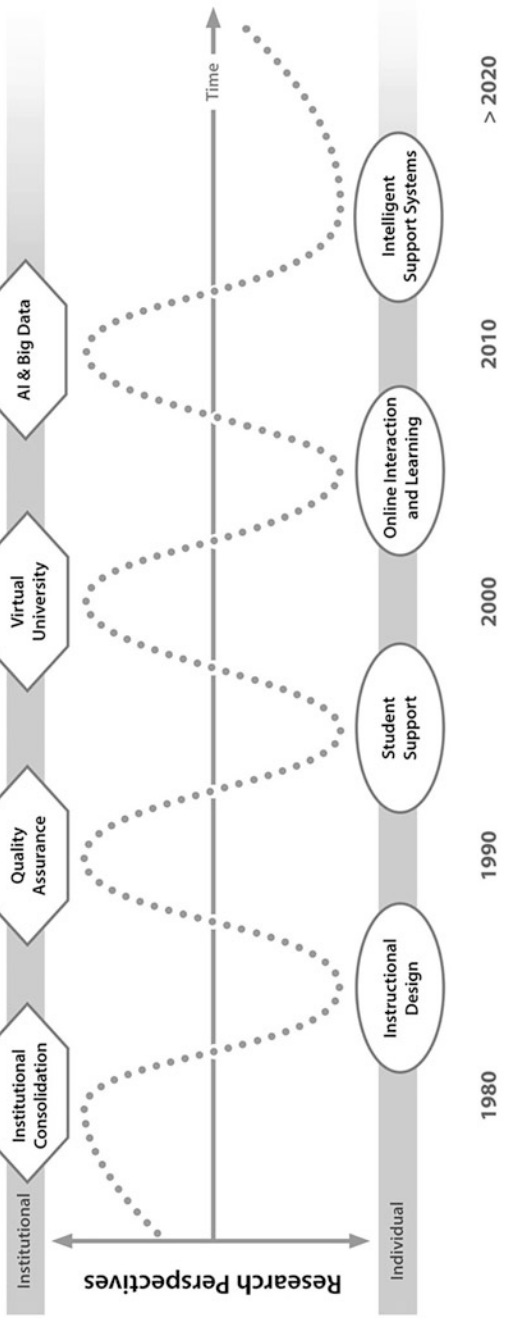

Fig. 5 Alternating research waves over time (based on Zawacki-Richter & Naidu, 2016)

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

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