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Editorial — Volume 26, Issue 2

Adnan Qayyum, PhD
Associate Editor

This is our second issue of IRRODL after celebrating our silver (25th) anniversary. It is notable how the field of open and distributed learning (ODL) has evolved. ODL was once a peripheral branch of education. Now open, distance, online, and distributed learning is increasingly a part of mainstream education.

IRRODL has benefited from, and been means to, this mainstreaming. As the profile of IRRODL has grown, so have the number of submissions. We are happy to have such strong interest from researchers and practitioners. We do want to clarify that IRRODL is a journal for open and distributed learning. We are highly interested in furthering research and discussion on open education, distributed learning, online, and distance education across the globe. But we are not an educational technology journal. Though ed tech and ODL overlap, they are not the same. There are many excellent highly respected journals for these research fields.

Mainstreaming of ODL has likely accelerated after the pandemic lockdowns made many educational institutions begin or increase their distance and online offerings. In this issue, there are papers related to the pandemic. The research paper by **Batista-Toledo** and **Gavilan** investigated the experiences during Covid of students and teachers in a blended format, what the authors call phygital (physical plus digital) university ecosystem. Interestingly, they identify students' mental health as an important challenge during the pandemic along with more familiar ODL issues such as digital tool proficiency and organizational barriers.

Faza and **Lestari** conducted a systematic review of self-regulated learning strategies, particularly after the shift to online learning due to Covid. The found that technologies (AI, LMS, MOOCs) can support self-regulated learning via personalized feedback and autonomous learning opportunities. **Sulkipani et al.** did a bibliometric analysis of online learning in civic education (OLCE). Though online learning has been used for Civic Education for decades, the authors did note that publications about OLCE increased immensely since 2021.

Readiness for e-learning is the focus of research by **Ramos**, **Lee**, and **Mabuan**. They study pre-service teachers in a HyFlex (hybrid, flexible) learning environment. They found that these pre-service teachers e-learning readiness and learning engagement is significantly related to their perceived learning performance. **Chang** and **Sun** studied in-service teachers preparing and designing MOOC lessons. They found teachers relied heavily on their early experience for their course design. **Anghel**, **Littenberg-Tobias**, and **von Davier** also studied MOOCs in a scoping review. They found that most existing studies measured teacher's attitudes and engagement with MOOCs with limited data analysis methods.

We know that ODL has ongoing challenges. Among them are concerns about dropout rates. **Ranasinghe et al**. identify reasons that contribute to dropout in ODL. The authors found that employed students were more likely to dropout. By identifying internal and external reasons for dropout (e.g., student characteristics and family commitments, respectively), this research can help inform solutions for student retention.

Open Education Resources and learning design are important solutions-based topics of ODL research. **Spencer et al.** compared how OER and commercial textbooks can help student's achieve learning outcomes. They found that commercial textbooks are fine for helping students achieve learning outcomes. But well-designed OER can help students reduce cognitive load and improve learning efficiency while also achieving learning outcomes. **Al Abri** and **Elhaj** explored practical guidelines for designing high-quality online courses. Their comprehensive literature identified important course components for supporting student engagement and learning. **Kalima et al.** used activity theory to study whether learning could be deepened for ODL students via tutoring in satellite learning centres called "field facilitation." They found that for field facilitation to be effective, it needs to be part of the curriculum rather than being an extra activity.

Kalimah reviews the book *AI for Teachers*. She believes the book is an accessible guide with foundational knowledge about AI without being too technical. As an open access book by and for teachers, it may be an important resource for educators. **Manik** reviews the very practical *Methods for Facilitating Adult Learning* by Coryell et al. She finds the book to be a valuable resource for educators looking for foundational theories and contemporary trends in ODL environments including art-based learning, e-portfolios MOOCs, and gamification.

Anderson reviews Cormier's book *Learning in a Time of Abundance*. Cormier investigates how education has been altered from its origins during a time of information scarcity. Cormier thoughtfully asks what learning means and how it operates now in a time of information abundance. Anderson finds that Cormier is not just incisive but quirky and engaging in his investigation.

In their Notes From the Field, **Heller** and **Leeder** remind us of the importance access and openness in ODL. They contend that research incorporating the experiences of distributed and under-represented populations are more likely to have greater local application.

In their research notes, **Levitan et al**. discuss how Covid affected educational access for Indigenous communities in Peru. They discuss how important it is to contextualize e-learning and educational resources to improve educational access for low-income students in remote regions. **Torres-Vergara et al.** conducted a bibliometric analysis of IRRODL over the past 25 years. They provide an overview of the journals development by using bibliometric indicators. They identify that the journal continues to attract diverse authors from institutions and countries across the world. Long may it continue.

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A Blended Learning Future: COVID-19 Lessons for "Phygital" Higher Education

Santiago Batista-Toledo[1] and Diana Gavilan[2]
[1]Department of Marketing, Faculty of Economics and Business Sciences, Complutense University of Madrid, Madrid, Spain;[2]Department of Marketing, Faculty of Information Sciences, Complutense University of Madrid, Madrid, Spain

Abstract

The pandemic transformed higher education, making it clear that the future of education lies in the use of technology. Recognizing this development, this study examined the blended learning experiences of students and teachers during the COVID-19 pandemic in order to propose targeted strategies for the evolving "phygital" (physical + digital) university ecosystem. Drawing on existing literature, it explores three critical dimensions of the educational experience: technology, the teaching-learning process, and social interaction. Following a transcendental phenomenological approach, the study used a convenience sample of 10 students and 10 teachers, selected based on the saturation criterion. Using Leximancer software for text analysis, in-depth interviews with a representative sample of students and teachers were conducted. The findings exposed significant challenges faced during the pandemic, including a lack of digital tool proficiency among users, inadequate engagement with online content, organisational hurdles, increased workload, diminished personal interactions, and emerging mental health concerns among students. These insights underscore the urgency of crafting tailored strategies to enhance the phygital learning environment, focusing on improving infrastructure and providing comprehensive training to both students and educators.

Keywords: blended learning, higher education, Leximancer, phygital, learning experience

Introduction

The COVID-19 pandemic has reshaped the university ecosystem, with online tutoring, digitized administrative procedures, and blended teaching becoming commonplace. This new "phygital" (physical + digital) context integrates physical and digital dimensions across all university operations, making technology a cornerstone of daily activities. By going beyond teaching modalities, the phygital model enhances learning experiences, administrative efficiency, and inclusiveness, addressing the needs of a digitally connected generation.

Reports have indicated a significant shift toward blended work and educational technologies, with virtual and augmented reality in education projected to grow substantially by 2030 (Statista, 2023). Universities are redesigning their programs to incorporate technology, driven by changing student preferences for flexible learning models, such as blended learning (BL), and a rise in absenteeism (Kohnke & Moorhouse, 2021).

During the pandemic period, universities adopted the BL modality fostering better communication and improving academic performance (Robson et al., 2022; Zeng, 2023). However, this modality also revealed challenges such as inequalities in access to education and excessive teacher workloads (Carius, 2020; Müller et al., 2021). Existing studies often analyze BL from either the student or teacher perspective, but few adopt a holistic approach to draw comprehensive conclusions.

This paper identifies specific measures that can be applied to the new university ecosystem, based on the experiences of students and teachers during the pandemic. To this end, in-depth interviews were conducted with students and university teachers after the pandemic. The data collected was examined using Leximancer, a machine-learning text-analysis tool. The study addressed two research questions:

1. How did students and teachers experience blended learning during the COVID-19 pandemic in terms of technology, learning processes, and social interactions?

2. What lessons from these experiences can guide higher education institutions in shaping the new phygital context in the post-pandemic era?

The results provide insights into the strengths and weaknesses of BL, highlighting opportunities for fostering a user-centered phygital environment. By addressing challenges in integrating digital and physical dimensions, this study offers adaptable solutions for higher education institutions worldwide, enhancing resilience, inclusivity, and competitiveness.

This paper is organised into four sections. First, the following section reviews the theoretical underpinnings of the phygital concept and its applications, focusing on its relevance to higher education. Next, the methodology and analysis are described, followed by the results obtained. Finally, the results are discussed, and the future lines of research, limitations of the work, and conclusions are presented.

Literature Review

Phygital Environment

The concept of phygital is relatively new, and although it has been used mainly in the context of retail, it extends to the domains of tourism, gaming, and education (Almeida & Silva, 2020). It is underpinned by theoretical frameworks that explain the integration of physical and digital environments (Jenkins, 2006).

From a marketing perspective, a phygital environment provides a seamless physical and digital experience through emerging technologies such as virtual reality, artificial intelligence, smart devices, and so forth (Hollebeek et al., 2019). The phygital concept is based on global connectivity and the pervasive influence of the Internet in our daily physical life (Uspenski, 2013), reaching a point where technology blurs the boundary between the real and the simulated (Gaggioli, 2017). All of this aims to increase the value proposition offered, adapted to specific contexts such as tourism or education (Purcarea, 2019).

From the perspective of educational psychology, Vygotsky's sociocultural theory of learning (1978) highlighted the interplay between individual development and social interaction, emphasizing the role of tools and mediated interactions as essential components of cognitive and social development. This makes technology integral to meaningful learning processes. Additionally, Milgram and Kishino's (1994) reality-virtuality continuum illustrated how technology blurs boundaries between physical and digital environments.

The phygital model also aligns with principles of open and distance learning (ODL) by addressing challenges such as engagement, interactivity, and community building in hybrid environments. By integrating physical and digital elements, it reduces transactional distance and fosters meaningful connections, which are critical in ODL settings.

In education, the concept of phygital extends beyond blended learning by encompassing governance, social interactions, and institutional processes, creating a seamless hybrid ecosystem (Christensen et al., 2015). A phygital academic environment refers to the use of technology in the daily life of students and teachers on campus, in administrative and teaching processes, and in any other activity carried out at the university. The phygital phenomenon does not replace BL or e-learning but rather expands on it by eliminating the boundaries between the virtual and the face-to-face.

For instance, a university equipped with interactive screens in administration offices or virtual reality tools is able to provide students and teachers with an optimised environment in terms of resources and time (Torres, 2022). These innovations also contribute to improving cognitive, affective, and psychomotor learning outcomes (Spitale et al., 2019).

Blended Learning: Online and Face-to-Face Teaching and Learning

In a phygital environment, teaching is also transformed, and it is here that BL emerges as one of the main teaching modalities. BL is a teaching modality that began in the mid-twentieth century and has evolved with advancements in technology (Singh et al., 2021). Initially, it was conceived as the balanced combination of face-to-face learning experiences in the classroom with online learning experiences outside the classroom, with neither predominating (Garrison & Kanuka, 2004). However, the technological revolution has caused the concept of BL to evolve, giving rise to new definitions such as those given by Goncharov et al. (2020) or Siripongdee et al. (2020). For these authors, BL refers to the combination of face-to-face learning with the use of any technology inside or outside the classroom for the assimilation of knowledge, skills, and abilities.

The evolution of BL into phygital ecosystems provides a robust framework for advancing ODL. By blending synchronous and asynchronous elements with digital tools, this model enhances flexibility and inclusivity, two core tenets of ODL.

This new conceptualisation, which eliminates the need for balance between the two learning experiences, results in a flexible framework that embraces all forms of academic instruction by integrating physical and digital resources and spaces.

The breadth of the concept of BL and its popularisation in recent decades, together with the availability of advanced educational technologies (Hadiyanto et al., 2021), has led to the emergence of a wide variety of BL models (Goncharov et al., 2020) such as station, lab or individual rotation, flipped, flexible, self-mix, and enriched virtual (Batista-Toledo & Gavilan, 2022).

This variety of BL models puts the learners at the centre, giving them considerable flexibility to customise their learning experiences to their particular schedules and needs (Rahman et al., 2020). It allows them to progress at their own pace, increasing their motivation and engagement levels (Singh et al., 2021). In short, BL is based on both the teacher's perspective and the understanding of the student's experience, integrating both approaches to enhance the educational process.

Student Experience in Education

In education, although there is much controversy about the focus on students as customers (Guilbault, 2018), experience management is fundamental to gaining a competitive advantage and securing the future of an institution (Waśkowski, 2017).

Schwager and Meyer (2007) understood customer experience as the subjective perceptions that customers have during any interaction, whether direct or indirect, with a company. In contrast to physical goods, which are usually evaluated based on their attributes, services involve a combination of processes, people, and facilities (Ding & Keh, 2017). This increased complexity means that there is no broad consensus on the aspects that make up the customer experience (Bueno et al., 2019).

One of the approaches taken and accepted as valid is that of Grace and O'Cass (2004) who proposed the concepts of core service, employee service, and servicescape as the aspects that contribute to the experience. Core service refers to what the company offers, the essential benefit that customers purchase. Employee service refers to the interactions that occur in the delivery of the service. Servicescape is the physical environment where the service takes place and includes design, layout of physical elements, electronic equipment, accessibility, and so forth.

Based on the above, and following what is proposed by Grace and O'Cass (2004), we identify technology, the teaching-learning process, and social interaction as essential dimensions of experience, which the phygital environment integrates into a cohesive institutional framework:

- **technology**: Classrooms and the university campus form the environment of the service offered by universities in cases where face-to-face training is provided. However, in the case of a phygital university, technology is integrated with the existing physical facilities, modifying the entire environment and expanding the off-campus experience, making technology the defining environmental component of the experience.

- **teaching-learning process**: Students seek training provided by universities through their academic programmes, and the achievement of training is obtained through the teaching process by professors and the learning process by students.

- **social interaction**: For the existence of the teaching-learning process, interaction between student and teacher is necessary. This interaction is not only limited to these actors but given the characteristics of education, there are other interactions between students and university staff (not related to the teaching process) and among students themselves. Moreover, in a phygital context, these interactions take place both face-to-face and online, both being fundamental in the construction of the experience.

These dimensions are in line with the research by Izquierdo-Yusta et al. (2021) on the experience in e-service environments where phygital universities would be framed. The authors showed that the quality of virtual systems and the personal relationships that take place in them have the greatest influence on the final experience. Likewise, the teaching-learning process and the social interactions in that process are seen as fundamental and inherent to academic life (Munna & Kalam, 2021). Building on these theoretical insights, this study employed a qualitative methodology to examine how these dimensions—technology, teaching-learning processes, and social interactions—manifested in the experiences of students and teachers during the pandemic.

Methodology

This study adopted a transcendental phenomenological approach, collecting and analyzing the individual perspectives of students and teachers in the BL context. Through this approach, it aimed to identify the most significant common elements of the experience in this context (Creswell & Poth, 2018). Specifically, semi-structured in-depth interviews and a focus group were conducted through the Google Meet app. Qualitative techniques are a useful method for obtaining information and understanding participants' perceptions (Bell, 2015). They are widely used in the social sciences, particularly in the educational field (Merriam & Grenier, 2019).

Data Collection

The selected sample was obtained from the Complutense University of Madrid since there was a common pattern throughout the university to implement BL, which consisted of students alternating one week of face-to-face and online classes. This sample provides diverse perspectives on the experience within the same BL mode.

Interviews were conducted with students and teachers in the four main branches of knowledge: sciences, social and legal sciences, health sciences, and arts and humanities. The sampling process began with random cluster sampling for the choice of faculties. Then, within the faculties, participants were obtained by convenience sampling, a technique suitable for studies that require individuals with accessibility, availability, and willingness to participate (Etikan et al., 2016). The sample size was 20, defined by the criterion of saturation or tendency to repeat responses (Gavilan & Martinez-Navarro, 2022), which was evident in the sample used.

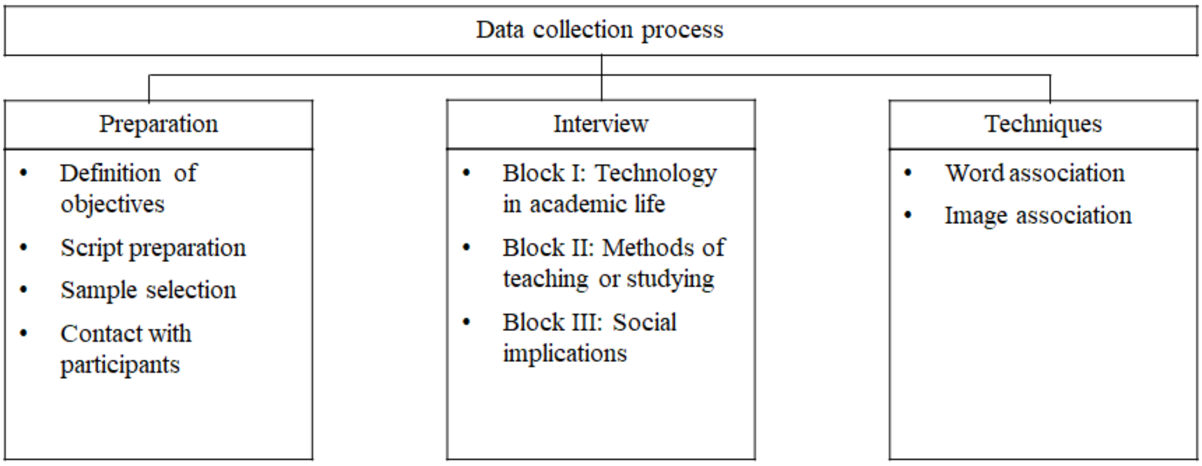
The interviews, lasting approximately one hour, were conducted between April and August 2022, and recorded to facilitate their subsequent transcription. Participants were informed about the objectives of the research and the use of the data. They were asked permission for their participation and the recording, which was collected at the beginning of each interview.

The data collection procedure is shown in Figure 1. A semi-structured personal interview was conducted, following a script designed and validated according to the procedure established by Carrera Farran et al. (2011), to collect data from three blocks: technology in academic life, teaching-learning methods, and social implications of BL.

The interviews were complemented with two types of projective techniques that were ideal for obtaining data about aspects that may have been difficult for participants to express directly, such as underlying attitudes or feelings (Malhotra, 2006). These included projective techniques of word and image association (images of a traditional classroom and an online class), both of which were used transversally in all blocks.

Figure 1

Data Collection Process



Data Analysis

The analysis of the interviews was performed using Leximancer software (Version 4.51) to map the BL experiences of students and teachers during the pandemic, aiming to identify key lessons for enhancing the phygital ecosystem.

Leximancer is a text-analysis tool that uses machine-learning techniques and enables the visualisation of concepts and their interrelationships (Rooney, 2005). It extracts co-occurrence information in stages—semantic and relational—using a proprietary algorithm (Smith & Humphreys, 2006). The use of machine-learning algorithms in Leximancer helps reduce researcher bias and provides greater objectivity in the analysis, as highlighted by McKenna and Waddell (2007). Furthermore, the software ensures stability and reproducibility in the results, reinforcing the validity of qualitative analyses (Thompson et al., 2014).

Leximancer automatically identifies words (seeds), which are subsequently grouped into concepts based on their frequency and weight (Leximancer Pty Ltd., 2021). It then identifies clusters (themes) based on the co-occurrence of the identified concepts. Leximancer also shows the words that appear most frequently associated with each concept, as well as the likelihood that they have a positive or negative connotation. By combining the depth of qualitative analysis with quantitative data, Leximancer is a practical and powerful tool for understanding complex data and supporting more comprehensive research (Berná Sicilia et al., 2013).

In this study, we manually selected the words (seeds) for analysis to enhance the richness of the results and generated concept maps for the dimensions of technology, teaching-learning, and social interaction. These identified themes provide a detailed understanding of the challenges and opportunities involved in achieving a seamless integration between physical and digital elements in a phygital ecosystem.

To generate each map, student and teacher comments referring only to the topic to be analysed were included. Finally, the maps show the labels of the participant (student or teacher) and the field of knowledge. The proximity between the label and the cluster signifies a relationship between them. The size of the spheres represents the relative importance of each theme within the dataset, with larger spheres indicating the themes mentioned by a greater number of respondents. Moreover, the importance of the themes follows the colours of the rainbow, with the most important themes being shown in red, followed by orange, yellow, green, blue, and purple (Leximancer Pty Ltd., 2021). The maps display 33% of the most relevant concepts, and the themes are scaled to 40% of their original size to enhance clarity and interpretation.

Results

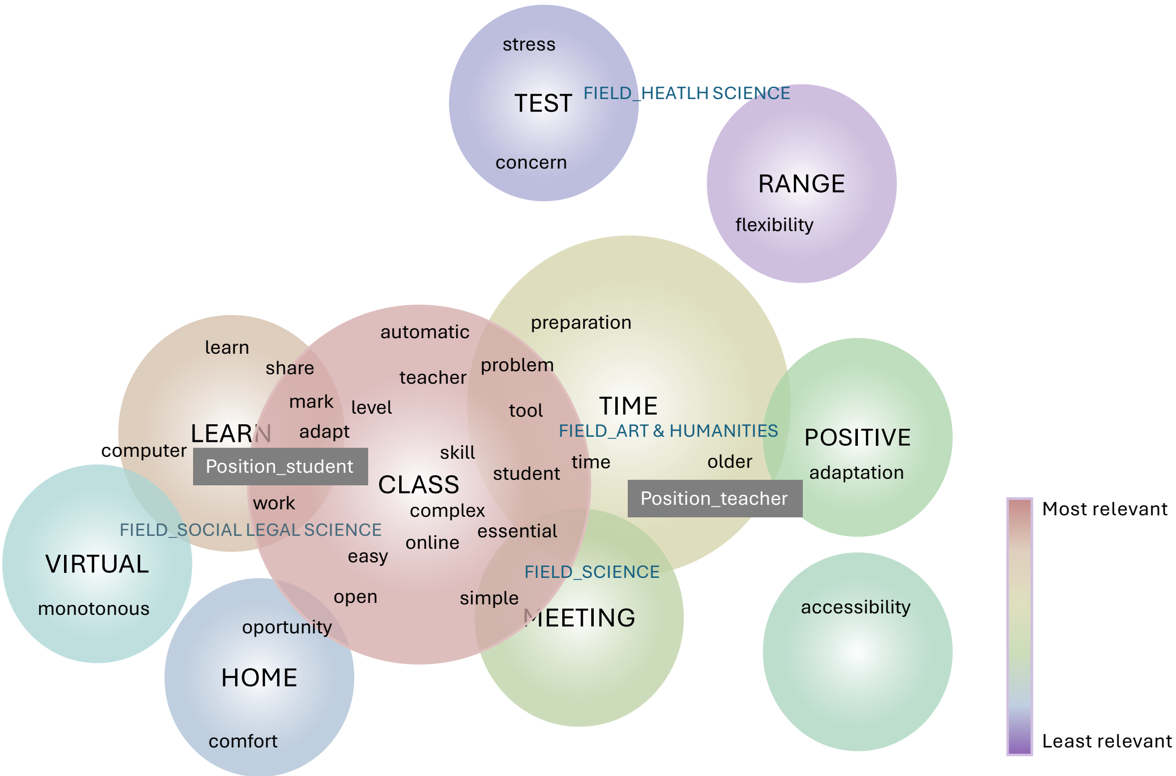
Technology

Technology provides support to BL. The introduction of technology in teaching through online classes and its combination with face-to-face classes is what makes this teaching modality unique and differentiated.

Figure 2 represents the conceptual map of the technology dimension. Ten different themes were obtained, namely class, learning, time, virtual, positive, home, meeting, range, exam, and diversity, in order of importance.

Figure 2

Conceptual Map of Themes in the Technology Dimension



The main theme was *class*, which is more associated with students. Reference was made to the preparation and use of technology in classes. Some related words were *complex* and *recording*, with a 100% probability of being associated, followed by *preparation* (50%), *tools* (50%), or *time* (20%):

- "I think that preparation in online tools is indispensable for teaching classes because the teacher cannot lose an hour of class due to technical problems." (teacher)
- "At the beginning, it was noticeable that no one had any knowledge of how to do an online class. We have had teachers who have been interested in learning." (student)

In this regard, learning and time emerged as relevant issues. Teachers need to learn how to use technology to teach, and students need to spend time using technology to learn. This had an impact on the time spent due to a lack of technological knowledge and skills (Bezliudna et al., 2021):

- "The important thing is to want to learn while doing it. In my case, I learned a lot with the computer to work with different files." (student)
- "I had never done a Meet meeting in my life, and I had never used Teams, but you put yourself in and spend a little time on it, and that's it." (teacher)
- "I signed up for all the courses they gave. They should be done by both teachers and students." (teacher)

The simultaneous existence of two groups of students in the class—some online and some face-to-face—posed a challenge to teachers and students. For instance, teachers had to attend to both groups of students while increasing and dispersing their attention. For students at home, classes became monotonous and boring because they were constantly watching a screen and often felt overlooked. This situation showed the poor integration of technology into existing infrastructures (Mdhlalose & Mlambo, 2023):

- "Having some students face-to-face and others at home is a problem for the teacher. Managing them has been difficult for me." (teacher)
- "Putting the camera on made the difference between a boring class and an entertaining one." (student)

The remaining themes covered issues related to the impact of technology on meetings, on differences in students' digital skills, or on feelings about taking online exams:

- "One positive thing I have found is that meetings are more effective online." (teacher)
- "There were students who knew how to handle the tools without problems and others who had never done so, and this modality has forced everyone to have to know how to handle them." (student)
- "If you are taking an exam via computer and if your Internet goes down, what do you do? You feel unprotected." (student)

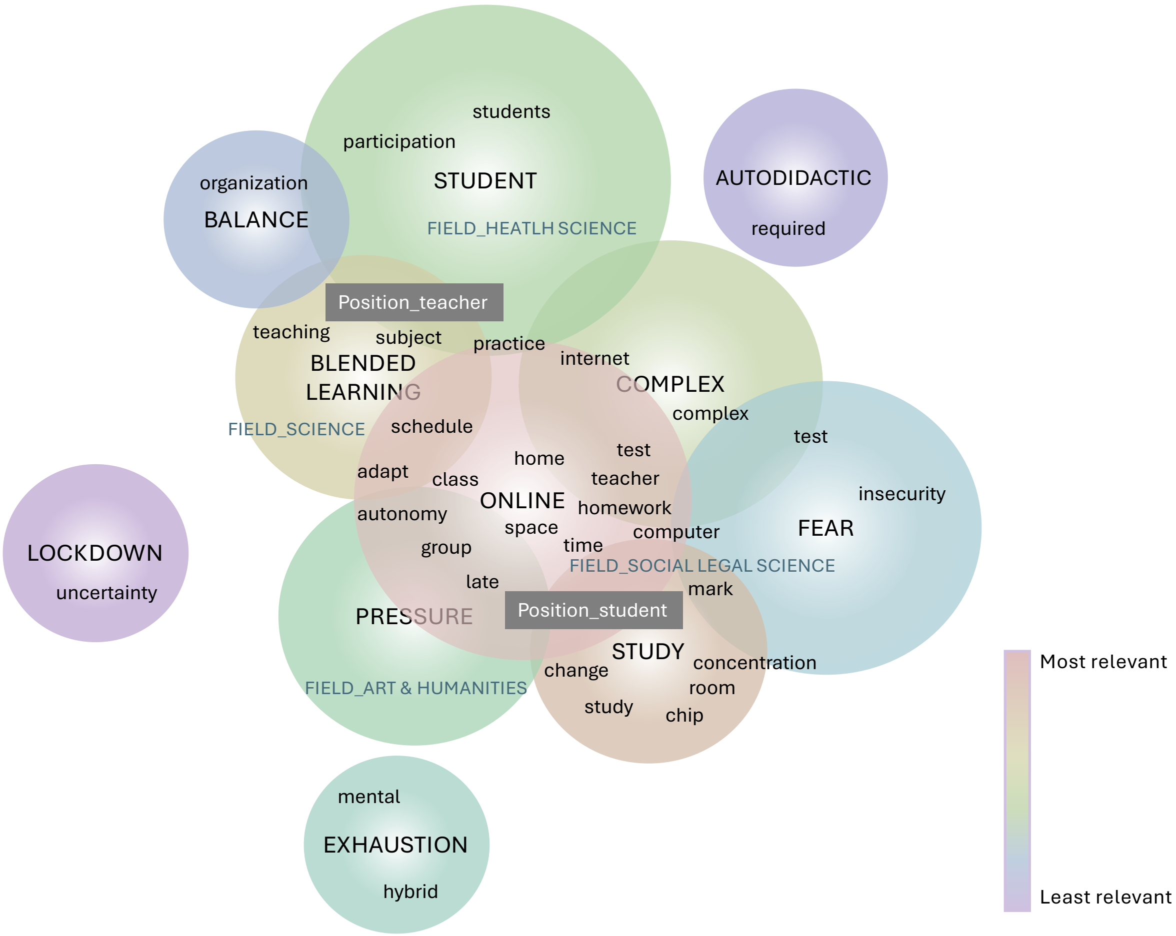
The Teaching-Learning Process

The implementation of BL affects all actors involved. For teachers, it represents a change in the way of teaching, and consequently, for students, it means a new way of learning. Both must go through a process of adaptation and adjustment, which, in the context of this study, was characterised by a lack of time for assimilation.

Figure 3 shows the conceptual map of the teaching-learning dimension. The themes that emerged included online, study, BL, complex, students, pressure, fear, exhaustion, lockdown, autodidactic, and balance.

Figure 3

Conceptual Map of Themes in the Teaching-Learning Process Dimension



Teachers' problems in adapting their teaching methods to virtual environments and combining both modalities at the same time (Rahman et al., 2015) made it difficult to attract the attention and interest of students (Buck & Tyrrell, 2022):

- "When I rebroadcast the class, it was hard because I had to go 15 minutes earlier to class to go online and set everything up. There were Internet glitches that meant that those at home couldn't see, but the teaching itself went along quite well." (teacher)

- "The weeks that were face-to-face, I took the opportunity for debates, presentations, or projecting advertisements, where they participated more. Classes that were more theoretical [were saved] for the online weeks because sometimes, the tool would crash because it did not support a certain advertisement, or it would hang and then they did not participate as much." (teacher)

Learning was also a challenge for the students as evidenced by words such as *disconnection* (100%), *distraction* (100%), *performance* (50%), and *habits* (50%) that were mainly related to studying. The change in teaching modality affected their study behaviour (Schwerter et al., 2022). Students found it difficult to establish study habits, requiring more rest, which affected their performance (Potra et al., 2021):

- "I studied more the week I went to class because it was very difficult for me to spend 4 hours with the computer in front of me, taking notes and then get down to studying. Many times, I had to disconnect and distract myself with anything to concentrate again." (student)

- "I managed my time better when it was online because you finish the class, and you can move on to something else. However, when you had to go face-to-face, I would arrive tired from interacting all day, and the tiredness is not physical, but mental." (student)

- "I have stopped studying, and my performance has dropped quite a bit. I didn't get bad marks but not the ones I should." (student)

Student problems occupy the remaining themes; they focus on how teaching methodologies influenced their knowledge acquisition and performance. Students faced difficulties interacting with the teacher and their classmates when resolving doubts or studying in a group. This, together with the lack of appropriate methodologies (Rahman et al., 2015), meant that students were autodidactic. These findings highlight the need for tailored strategies to address challenges such as autodidactic learning and improve collaborative tools, ensuring that hybrid models promote interaction and inclusivity:

- "The teachers would give you the slides, and that was it. You had to prepare it on your own with all that that entailed. That affected my performance." (student)

- "I had less pressure when I had to do assignments and not exams." (teacher)

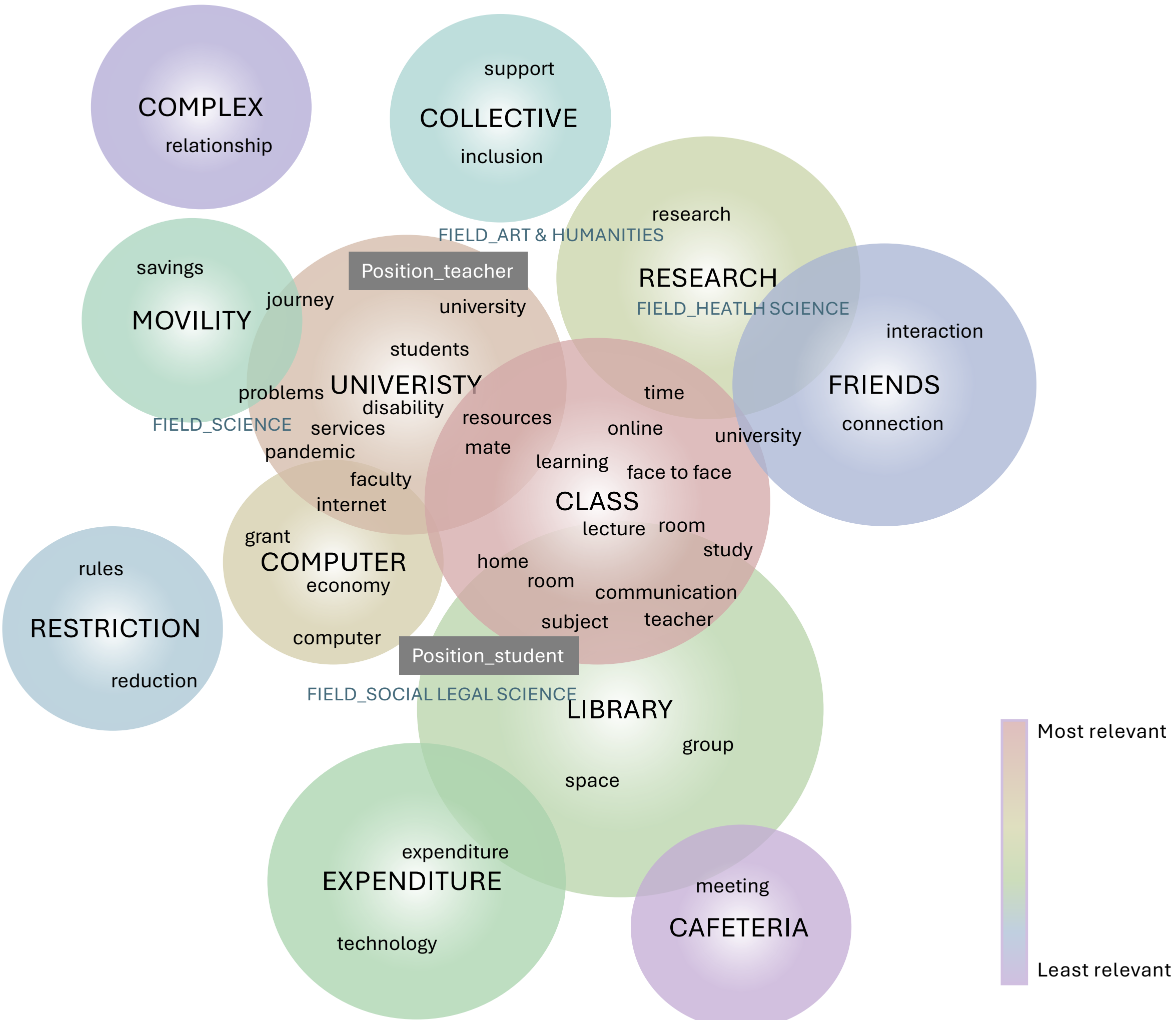
Social Interaction

In the context of the pandemic, social interaction was limited to the possibilities offered by technology. The reduction of face-to-face meetings between students impoverished the social part of both the recreational and academic experience at the university; however, technology enabled new channels for online relationships. Additionally, the dependence on certain resources (e.g., equipment, connections, space, etc.) to have access to this new educational and social ecosystem posed a challenge, where the risk was that the implementation of BL would increase already-existing social gaps.

Figure 4 shows the conceptual map of the social interaction dimension, and as in the previous maps, classes appear as the most important topic, followed by the university, the computer, research, spending, the library, the collective, mobility, friends, restrictions, the cafeteria, and the complex.

Figure 4

Conceptual Map of Themes in the Social Interaction Dimension



Online classes affected students with disabilities or few resources, highlighting the role of the public university as a corrector of these inequalities (Carius, 2020):

- "It depends on the disability and the circumstances of the student if it can generate inequality. There are people who do not have a space at home to sit quietly to receive a class because they live with five people." (teacher)

- "I think it is very discriminatory for students who have resource problems to have that adequate space, that privacy, or computer equipment. The student in the public university makes use of the resources that the university makes available." (teacher)

- "To go to university, you have to have enough money or be on scholarship. The university is not to blame, but the least it can do is try to help those who need it." (student)

The campus is the meeting point for the development of university life. Activities such as going to the library to study with classmates, participating in activities, or dedicating time to research were modified during the pandemic:

- "We did not have the opportunity to sign up for many activities because the groups were small due to COVID limitations; there were people from other years, etc." (student)

- "Time for research was still scarce because we had to train ourselves in knowing the tools, managing classes ..." (teacher)

- "Things like going to libraries or studying in groups was lost." (student)

The reduction of face-to-face classes at universities affected social relationships among students and with teachers (Egan & Tiernan, 2023). For instance, students particularly emphasised less contact with friends both in the classroom and in the cafeteria:

- "I feel like I lost half of my college life by not seeing my classmates." (student)

- "Making friends was complicated. You could no longer stay after class and go to the cafeteria, for example." (student)

The limitation of social life could have affected students' emotional well-being as well (Bezliudna et al., 2021):

- "The numbers of students who have needed psychological help from the university in the last year have multiplied from the services they provided before the pandemic." (teacher)

Discussion

This study aimed to extract valuable lessons from the phenomenological analysis of university teachers' and students' experiences with BL during the pandemic. This analysis offers insights for enhancing BL's implementation in the evolving post-pandemic landscape.

The study identified key challenges in BL implementation, which must necessarily be addressed within the emergent hybrid (phygital) scenario, where the physical and digital realms converge in higher education. Table 1 illustrates these challenges. Conceptual maps generated by Leximancer provide a systematic analysis of the qualitative data, highlighting key themes and their interconnections. These themes—such as improving technology access, fostering innovative teaching environments, and enhancing communication through integrated physical and digital elements—directly align with the study's purpose of identifying strategies to facilitate the transition to a cohesive phygital ecosystem.

Table 1

Comparison Between BL Needs During the Pandemic and in a "Phygital" Ecosystem

Dimension	Blended learning needs	
	COVID-19 pandemic	Phygital ecosystem
Technology	Online tools training Adequate facilities	Adequate facilities
Teaching-learning	New ways of teaching New assessment frameworks New ways of learning	Training in new teaching methodologies Flexible training plans
Social	Reducing inequality Reducing social interactions	Phygital educational spaces New ways of communication

A paramount challenge is the seamless and coherent integration of technology, ensuring that it serves the educational process's academic and administrative needs rather than imposing constraints. Rasheed et al. (2020) reinforced this, emphasising the crucial role of technological adaptation and the provision of appropriate instruction technology. Moreover, fostering digital competencies is vital for the proficient use of technological tools, enabling a fluid transition between physical and digital spaces (Chowdhury & Singha, 2023). The pandemic's onset saw a rapid advancement in technological efficiency as the necessity to navigate various software and platforms spurred the acquisition of new skills and competencies (Hadiyanto et al., 2021). Nonetheless, technological proficiency does not inherently ensure its effective pedagogical application, adding complexity for both educators and students (Rasheed et al., 2020).

Addressing the interplay between teaching and learning is another critical challenge in transitioning to a phygital environment. Training educators in new online teaching methodologies will empower them to effectively deploy technological tools and engage students with compelling content (Gurrea et al., 2023). The issue of increased lecturer workload, previously highlighted by research (Maarop & Embi, 2016), underscores the necessity for strategies such as staff training, support, and networking to assist educators in overcoming these challenges. To mitigate exhaustion and workload challenges, universities should implement flexible training plans and provide institutional support, such as mentoring programs and time management workshops for staff.

From a student's perspective, acknowledging diverse learning styles and preferences, particularly in balancing face-to-face and online elements, is imperative (Donlon et al., 2022). Challenges such as the need for greater autonomy and difficulties in maintaining engagement highlight the importance of incorporating collaborative tools and designing hybrid environments that foster interaction and accessibility. These measures not only enhance students' satisfaction and performance (Shukla et al., 2023) but also ensure they feel supported in adapting to new methodologies. Thus, creating flexible and inclusive programmes within a phygital ecosystem can enrich learning experiences and enable universities to attract a more diverse student body (Singh, 2003).

The social dimension emerges as the third challenge in the phygital transition, where several researchers have recognised the importance of the affective component, thus considering it a socioaffective dimension. Developing an affective learning climate is crucial to mitigating learner isolation, which is a consequence of increased transactional distance in online environments (Boelens et al., 2017). This socioaffective dimension necessitates the development of spaces equipped with technological and interactive tools for the entire university community's use (Carius, 2020). Beyond online interactions, physical engagement is vital for fostering relationships and a sense of community belonging (Balula-Dias & Alves-Diniz, 2014). Innovating communication tools that bridge the gap between physical and digital interactions, for instance, a university app that connects individuals engaging in similar campus activities, can significantly enhance the social environment.

This study underscores the holistic nature of the academic experience in the new phygital context beyond the sole focus on teaching in extant literature. Emphasising technology as a foundational pillar can substantially improve the academic experience across all university facilities.

The findings of this study have important implications for open and distance learning (ODL). By combining physical and digital elements, the phygital approach addresses key ODL challenges, such as improving engagement and fostering interaction. The socioaffective dimension further reduces transactional distance by enabling real-time collaboration and community building through hybrid tools. This approach enhances ODL practices, making them more inclusive, engaging, and adaptable to the needs of a diverse and connected student population.

From a theoretical perspective, the phygital model enhances the understanding of ODL by integrating Vygotsky's sociocultural theory of learning (1978) and the reality-virtuality continuum (Milgram & Kishino, 1994). These frameworks explain how hybrid ecosystems reduce isolation and transactional distance by blending physical and digital elements, fostering meaningful interaction and engagement.

Methodologically, the use of Leximancer demonstrates a robust approach to analyzing qualitative data. This highlights its potential for future ODL research to systematically analyze qualitative data and extract meaningful insights from reported learner experiences.

From a practical standpoint, the phygital model provides actionable strategies for higher education institutions transitioning to hybrid ecosystems. Institutions can prioritize: (a) enhancing technological infrastructure to seamlessly connect physical and digital spaces; (b) providing training for educators in hybrid methodologies to ensure effective use of digital tools; and (c) developing hybrid learning spaces that foster meaningful social interactions, addressing common issues of isolation in ODL contexts.

These contributions offer a pathway for advancing ODL practices, making them more inclusive, engaging, and adaptable to the needs of a diverse and connected student population in a rapidly evolving educational landscape.

Future research should aim to quantify the impact of identified measures on the academic experiences of students and teachers, validating this study's findings and exploring potentially more influential factors. Analysing the factors deemed most critical by students and teachers in a phygital environment will also guide universities in prioritising under budget constraints.

This study's limitation lies in its context being unique to the pandemic era, representing a specific experience that may not fully align with previous studies. However, as we navigate post-COVID realities, the insights offered are invaluable for understanding this period and leveraging learnt lessons.

In conclusion, as universities continue to integrate technology into their daily operations post-pandemic, they evolve into a hybrid phygital ecosystem. This transition emphasises the necessity of understanding pandemic-era BL experiences to guide this new blended phase. The findings provide a comprehensive view of current BL implementation across three dimensions: technology, teaching-learning interplay, and socioaffective aspects, introducing the phygital ecosystem concept to higher education institutions. Applying quantitative methodology to qualitative data analysis, this research offers robust insights to enhance the future of universities in the phygital landscape.

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Self-Regulated Learning in the Digital Age: A Systematic Review of Strategies, Technologies, Benefits, and Challenges

Ahmad Faza[1,*] and Ilyana Agri Lestari[2]
[1]Department of Information Systems, Universitas Multimedia Nusantara, Indonesia; [2]Department of Social Welfare, University of Indonesia, Indonesia; [*]Corresponding author

Abstract

When students enter higher education, self-regulated learning (SRL) involving goal setting, planning, monitoring, and reflection is crucial for academic success. This study systematically reviews SRL strategies, supporting technologies, and their impacts, especially with the shift to online learning due to the COVID-19 pandemic. Following Kitchenham's guidelines, 121 articles from ScienceDirect and Scopus were reviewed. Key SRL strategies include goal setting, cognitive and metacognitive processes, time management, self-reflection, help-seeking, and monitoring. Technologies such as learning management systems (LMS), massive open online courses (MOOCs), artificial intelligence (AI), collaborative platforms, and learning analytics support SRL by providing personalized feedback and facilitating autonomous learning. Benefits include improved performance, motivation, and engagement, while challenges involve limited access to digital resources, technical issues, resistance to change, and inadequate instructor training. Addressing these barriers is essential for optimizing SRL implementation, guiding future research and educational practice.

Keywords: self-regulated learning strategies, self-directed learning strategies, educational technologies, systematic literature review

Introduction

When students enter higher education, accountability in thoughts and actions is crucial for realizing potential and achieving academic success (Latipah et al., 2021). Planning learning activities, collaborating, working in teams, and conveying ideas through physical and digital media enhance academic achievement (Tadesse et al., 2022). These skills are integral components of self-regulated learning (SRL), where students independently set goals, reflect on their progress, and evaluate their learning. SRL is not only critical for academic success but also fosters lifelong learning (Tekkol & Demirel, 2018) and prepares students for future challenges, such as competitiveness in the job market (Latipah et al., 2021; Muwonge et al., 2020; Nguyen & Zarra-Nezhad, 2023).

Technological advancements have significantly transformed the landscape of education. Traditional learning is now often digital, accelerated by the COVID-19 pandemic, which required social distancing and remote learning (Anthonysamy et al., 2021; Nguyen & Zarra-Nezhad, 2023). Online learning reduces social interactions, especially in instruction and feedback, necessitating strong SRL skills to maintain motivation and prevent dropout (Domínguez et al., 2021).

While previous research has identified various SRL strategies, supporting technologies, benefits, and implementation challenges (Araka et al., 2020; Heikkinen et al., 2023; Su et al., 2023), these aspects have typically been examined separately, often lacking a unified framework. Moreover, existing literature reviews tend to focus on specific components of SRL or on particular educational settings, such as traditional classrooms or fully online environments, without providing a comprehensive overview that addresses the integration of SRL strategies, technologies, and challenges in hybrid and evolving digital learning contexts. This study distinguishes itself from prior reviews by offering a holistic synthesis that not only covers all four aspects of SRL but also highlights their interdependencies within diverse digital learning environments.

By addressing these gaps, this study aims to advance the understanding of SRL by systematically reviewing and synthesizing existing research on SRL strategies, supporting technologies, benefits, and challenges in digital education. This integrated approach provides a more comprehensive framework for educators and policymakers to implement effective SRL practices tailored to the nuances of digital learning. The research questions are as follows:

1. What are the strategies in self-regulated learning?
2. What information technology tools have been used to support self-regulated learning (SRL) strategies in educational settings?
3. What are the benefits of IT-supported SRL strategies?
4. What are the barriers to implementing IT-supported SRL strategies in educational institutions?

The findings will help students effectively use SRL strategies and technologies, understanding their benefits and challenges.

Self-Regulated Learning

Self-regulated learning (SRL) is an active, constructive process where learners set goals and regulate their cognition, motivation, and behavior to achieve these goals (Turan et al., 2022). It involves setting goals, devising strategies, and monitoring effectiveness (Kesuma et al., 2020), with dimensions such as goal setting, help-seeking, self-learning, managing the environment, and effort regulation (Amiruddin et al., 2023). Learners autonomously set their own goals, manage time, select strategies, and evaluate progress (Karrenbauer et al., 2023; Saiyad et al., 2020). Comprehensive models by Winne and Hadwin (1998) include stages such as task definition, planning, enactment, and evaluation (Liang et al., 2023; Pintrich, 2000). SRL includes monitoring processes such as goal orientation, environment structuring, time management, task strategies, help-seeking, and self-evaluation (Hidayatullah & Csíkos, 2023), crucial for online learning success (Yeh et al., 2019). Supported by cognitive and metacognitive processes (Brusilovsky et al., 2015; Cook et al., 2015; Kay et al., 2022; Kay & Lum, 2005; Panadero, 2017; Tise et al., 2023; Upton & Kay, 2009; Zimmerman, 2008), effective SRL requires accurate metacognition (Cervin-Ellqvist et al., 2021; Wild & Neef, 2023). Promoting learner autonomy involves empowering students to set goals, make decisions, and monitor progress (Kay et al., 2022; Schunk & Ertmer, 2000; Zimmerman & Moylan, 2009). The cyclical interaction of cognitive and metacognitive activities fosters lifelong learning and professional skills development (Biggs, 1999; Kay et al., 2022; Wong et al., 2019).

Previous Studies

Several previous studies have identified various strategies, supporting technologies, benefits, and challenges related to the implementation of SRL, using systematic literature reviews, scoping reviews, and meta-analyses. Key strategies identified include cognitive and metacognitive strategies, affective strategies, motivational regulation strategies, behavioral and contextual regulation strategies, time management, effort regulation, and planning and goal setting (Ballouk et al., 2022; Doo et al., 2023; Edisherashvili et al., 2022; Heikkinen et al., 2023; Lee et al., 2019; Su et al., 2023; Xu et al., 2023). Additionally, tools such as the Learning Tracker prototype, learning analytics, the Online Self-Regulated Learning Questionnaire, and the Motivated Strategies for Learning Questionnaire have been highlighted as supporting the implementation of SRL (Araka et al., 2020; Heikkinen et al., 2023; Lee et al., 2019). The benefits of SRL implementation noted in previous research include enhanced academic success, better engagement with course materials, improved study habits, and sustained motivation and autonomy (Ballouk et al., 2022; Cheng et al., 2023; Doo et al., 2023; Heikkinen et al., 2023; Su et al., 2023; Xu et al., 2023). Despite these benefits, challenges remain, particularly in measuring students' ability to apply SRL in e-learning environments (Araka et al., 2020). Table 1 provides a summary of these previous research articles, showing their methods, magnitude, and main focus.

Table 1

Summary of Previous Reviews and Analyses on Self-Regulated Learning

Review	Method	Studies reviewed, *n*	Focus
Su et al. (2023)	Systematic review	20	SRL strategies and SRL benefits
Lee et al. (2019)	Systematic review	21	SRL strategies and SRL supporting technologies
Heikkinen et al. (2023)	Systematic review	56	SRL supporting tools and SRL benefits
Edisherashvili et al. (2022)	Systematic review	38	SRL strategies
Xu et al. (2023)	Scoping review	163	SRL strategies and SRL benefits
Doo et al. (2023)	Meta-analysis	14	SRL strategies and SRL benefits
Cheng et al. (2023)	Meta-analysis	27	SRL benefits
Araka et al. (2020)	Systematic review	30	SRL supporting technologies and SRL challenges
Ballouk et al. (2022)	Scoping review	44	SRL strategies and SRL benefits

From Table 1, it can be concluded that studies have identified four aspects related to the implementation of SRL: (a) strategies, (b) supporting technologies, (c) benefits, and (d) challenges. However, these four aspects have been individually examined in separate studies. This research has synthesized all four aspects into a single study.

Method

Research Design

This systematic literature review followed Kitchenham's guidelines, comprising three stages: (a) planning, (b) conducting the review, and (c) reporting (Kitchenham, 2004; Kitchenham, et al., 2009; Kitchenham et al., 2015). In the planning stage, a comprehensive research protocol was developed, which defined the research questions, search strategy, and inclusion, exclusion, and quality criteria, as illustrated in Figure 1.

Data Analysis

The inclusion and exclusion criteria were meticulously applied to ensure that only high-quality and relevant articles were selected for the review. This rigorous selection process was designed to maintain the integrity and relevance of the review. For the literature search, ScienceDirect and Scopus databases were selected due to their extensive coverage of peer-reviewed journals across various disciplines relevant to the study and their strong reputation for high-impact publications. The keywords used for the literature search, along with their alternatives, are also presented in Figure 1. These keywords were chosen to ensure a well-defined approach to capturing relevant studies. Due to the Boolean operator limit in ScienceDirect (maximum of eight), two separate search strings were used to ensure that the search was both exhaustive and precise, maximizing the retrieval of relevant articles while minimizing irrelevant results.

Figure 1

Research Protocol

Research Question	• What are the strategies in self-regulated learning (SRL)? • What information technology tools have been used to support SRL strategies in educational settings? • What are the benefits of IT-supported SRL strategies? • What are the barriers to implementing IT-supported SRL strategies in educational institutions?		
Search Strategy	Digital Libraries	ScienceDirect	https://www.sciencedirect.com/
		Scopus	https://www.scopus.com/
	Search Terms	Keywords	Alternatives
		SRL	SRL, Self-directed learning, SDL
		Strategies	Methods, Techniques
		Technologies	IT, information technology
		Benefits	Advantages
		Challenges	Barriers
	Search Strings	ScienceDirect	((Self-regualted learning) OR SRL) AND (Strategies OR Methods OR Techniques) AND (IT OR (Information Technologies)) AND (Benefits) AND (Challenges)
		Scopus	((Self-regualted AND learning) OR SRL OR (Self-directed AND learning) OR SDL) AND (Strategies OR Methods OR Techniques) AND (Technologies OR IT OR (Information AND Technologies)) AND (Benefits OR Advantages) AND (Challenges OR Barriers)
Inclusion Criteria	• Full-text publications • Published between 2019 and 2024 • Written in English • Available for access • Identify SRL strategies • Include SRL support technologies • Discuss the benefits and challenges of SRL implementation		
Exclusion Criteria	• • Grey literature (theses, unpublished, and incomplete works), books, editorials • • Educational technology studies not focused on SRL implementation • SRL research from perspectives other than students		
Quality Criteria	• Theoretical basis • Data gathering, analysis, and presentation • Reference use • Research objectives • Credibility and stated conclusions • Contribution to knowledge or understanding		

Selecting Articles for Inclusion

After the research protocol was developed, the next step was to initiate the search and collection of journal articles. Table 2 summarizes the stages of the search and collection process, along with the number of articles at each stage. To further enrich the review, a snowballing technique was applied to the selected articles after a thorough examination of their abstracts and findings. A total of 121 articles were included after all stages were completed.

Validity and Reliability

To minimize bias and maintain rigor, each article was evaluated against the inclusion and exclusion criteria by two independent reviewers. This approach helped ensure that the selection process was both valid and reliable, reducing the likelihood of subjective bias in the study selection. Any discrepancies between reviewers were discussed and resolved through consensus, further enhancing the reliability of the selection process.

Table 2

Number of Articles Included After Each Stage of the Search and Collection Process

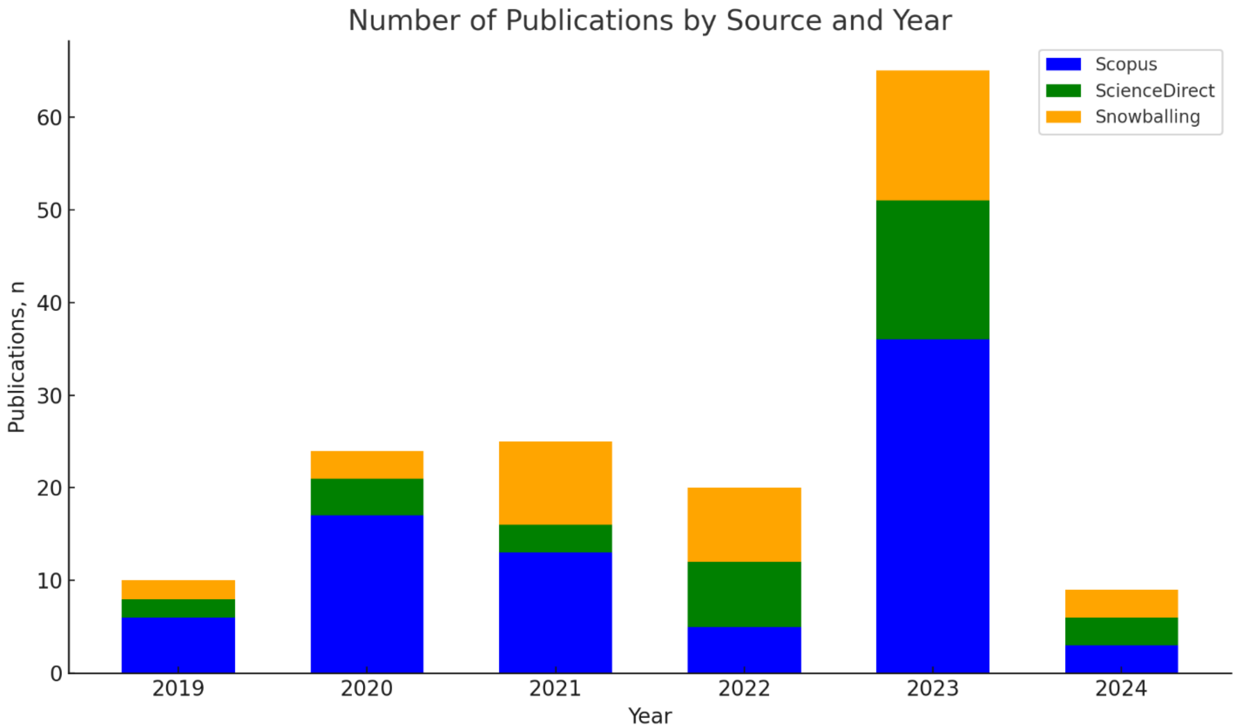
	Stage			
Source	Preliminary search	Post inclusion	Post exclusion	Post screening of abstract and findings
ScienceDirect	1,946	500	120	34
Scopus	101	70	50	39
Snowballing				48
Total	2,047	570	170	121

Findings and Discussion

Figure 2 provides a summary of the articles used for analysis, categorized by year of publication and database. The data reveal that 2023 had the highest number of publications, totaling 36 research articles, with 15 articles from ScienceDirect, 14 from Scopus, and 7 obtained through the snowballing process. Conversely, 2024 had the lowest number of publications, with a total of 6 articles, equally distributed between ScienceDirect and Scopus, each contributing 3 articles. However, as the year 2024 is still in progress, this is expected to change.

Figure 2

Number of Publications per Year by Database



The following section discusses the identified strategies, technological support, benefits, and challenges of self-regulated learning (SRL).

Self-Regulated Learning Strategies

In SRL, goal setting is crucial for organizing thoughts, emotions, and actions to achieve objectives, including goal clarity, planning, and behavior adaptation based on feedback (Mapuya, 2022; Omar et al., 2023; Zimmerman & Schunk, 2011). Pintrich (1999) identified three goal orientations: mastery, performance, and comparison, where mastery goals enhance SRL strategies and learning, while performance and comparison goals may have negative effects (Jivet et al., 2020). Effective goal setting involves specific, measurable objectives, timelines, continuous assessment, and adjustments (Chen, 2023; Funa et al., 2023; Kay et al., 2022; Kesuma et al., 2020).

Cognitive and metacognitive processes are central to SRL, enabling learners to monitor, control, and adapt their cognitive activities (Cervin-Ellqvist et al., 2021; Fleur et al., 2023; Kesuma et al., 2020). Metacognition involves higher-order processes such as self-checking and evaluating cognitive activities (Cervin-Ellqvist et al., 2021; Mapuya, 2022; Yeh et al., 2019). Cognitive strategies such as rehearsal, elaboration, organization, and critical thinking aid in planning, monitoring, and adjusting learning processes (Kay et al., 2022; Tise et al., 2023).

Time management in SRL involves allocating study time, monitoring progress, and maintaining motivation, especially in online environments (Jivet et al., 2020; Osakwe et al., 2023; Wong et al., 2021). Effective time management includes setting goals, efficient time allocation, monitoring progress, and adjusting schedules (Apridayani et al., 2023; Bećirović et al., 2022; Huber & Helm, 2020; Oinas et al., 2022; Yeh et al., 2019). Time management interventions reduce anxiety and improve academic balance (Apridayani et al., 2023; Huber & Helm, 2020; Oinas et al., 2022; Osakwe et al., 2023).

Self-reflection and evaluation are vital for reviewing performance, assessing progress, identifying strengths and weaknesses, and adjusting strategies (Kesuma et al., 2020; Khalid et al., 2024; Tise et al., 2023; Xu et al., 2022). Reflective writing and technological tools support these processes, allowing students to track learning progression and make adjustments (Kay et al., 2022).

Help-seeking in SRL involves seeking assistance or resources when facing learning challenges, fostering self-awareness and adaptive strategies (Chen, 2023; Hidayatullah & Csíkos, 2023). Effective help-seeking requires knowing when to seek help, whom to ask, and how to evaluate the received assistance (Xu et al., 2022). Self-regulated instruction includes seeking assistance from peers, parents, or instructors (Ismail et al., 2023). AI technologies and open learner models (OLMs) support help-seeking by providing personalized assistance and performance metrics (Bodily & Verbert, 2017).

Monitoring in SRL involves continuously tracking progress, evaluating strategies, and making necessary adjustments to achieve learning goals. Portfolio assessments further support independent monitoring and improvement of academic performance, promoting learner autonomy (Ismail et al., 2023). Technological tools like OLMs facilitate monitoring by displaying mastery levels and performance metrics (Kay et al., 2022).

Task management in SRL involves organizing and planning activities to achieve learning goals, using both cognitive and metacognitive strategies (Funa et al., 2023). Effective task strategies predict personal course goals and learning gains, with perceived autonomy enhancing task management and problem-solving abilities (Hidayatullah & Csíkos, 2023). Table 3 presents various SRL strategies identified in the literature, along with supporting source references.

Table 3

Self-Regulated Learning Strategies and Source References

Strategy	References
Goal setting	Alotumi, 2021; Al-Shaye, 2021; Chen, 2023; Darvishi et al., 2024; Funa et al., 2023; Habók et al., 2024; Huang et al., 2021; Ingkavara et al., 2022; Jeon & Lee, 2023; Jivet et al., 2020; Kay et al., 2022; Kesuma et al., 2020; Lukes et al., 2020; Mapuya, 2022; Nufus et al., 2024; Omar et al., 2023; Osakwe et al., 2023; Reyes-Millán et al., 2023; Su et al., 2023; Tao et al., 2023; Tran & Phan Tran, 2021; Zarestky et al., 2022

Cognitive and metacognitive	Anthonysamy et al., 2021; Cervin-Ellqvist et al., 2021; Fleur et al., 2023; Hidayatullah & Csíkos, 2023; Karrenbauer et al., 2023; Kay et al., 2022; Kesuma et al., 2020; Khalid et al., 2024; Nguyen & Zarra-Nezhad, 2023; Latipah et al., 2021; Liang et al., 2023; Lukes et al., 2020; Mapuya, 2022; Muwonge et al., 2020; Oinas et al., 2022; Omar et al., 2023; Tise et al., 2023; Wild & Neef, 2023; Yeh et al., 2019
Time management	Apridayani et al., 2023; Bećirović et al., 2022; Darvishi et al., 2024; Fleur et al., 2023; Hidayatullah & Csíkos, 2023; Jivet et al., 2020; Khalid et al., 2024; Kong & Lin, 2023; Mapuya, 2022; Oinas et al., 2022; Omar et al., 2023; Osakwe et al., 2023; Patiño-Toro et al., 2023; Reyes-Millán et al., 2023; Su et al., 2023; Wong et al., 2021; Yavuzalp & Bahcivan, 2021
Self-reflection and evaluation	Imhof et al., 2024; Ingkavara et al., 2022; Ismail et al., 2023; Kay et al., 2022; Kesuma et al., 2020; Khalid et al., 2024; Tise et al., 2023; Wong et al., 2021; Xu et al., 2022; Yeh et al., 2019; Zhou et al., 2021
Help-seeking	Alhalafawy & Zaki, 2022; Bacher-Hicks et al., 2021; Briones et al., 2023; Chen, 2023; Darvishi et al., 2024; Hidayatullah & Csíkos, 2023; Ismail et al., 2023; Kay et al., 2022; Tadesse et al., 2022; Xu et al., 2022
Monitoring	Huang et al., 2021; Imhof et al., 2024; Ingkavara et al., 2022; Ismail et al., 2023; Karrenbauer et al., 2023; Kay et al., 2022; Martin et al., 2022; Su et al., 2023
Task management	Funa et al., 2023; Hidayatullah & Csíkos, 2023; Liang et al., 2023; Matsuyama et al., 2019; Wild & Neef, 2023; Yeh et al., 2019; Zhou et al., 2021

Self-Regulated Learning Supporting Technologies

Learning management systems (LMS) are essential for accessing course materials, interacting with peers and instructors, and managing learning activities (Abduvakhidov et al., 2021; Reyes-Millán et al., 2023). These systems play a significant role in facilitating self-regulated learning (SRL) by organizing educational resources, tracking learner progress, and implementing strategies that promote self-regulation (Kong & Lin, 2023). Additionally, a LMS can be customized to provide personalized learning experiences that align with individual learner preferences, further enhancing the effectiveness of SRL (Han et al., 2021; Khalid et al., 2024).

Similarly, massive open online courses (MOOCs) contribute to SRL by allowing learners to manage their learning processes independently, set goals, and monitor progress (Wong et al., 2021). However, while

MOOCs offer flexibility and broad access to educational resources, they are often challenged by high dropout rates, which can be mitigated through better engagement strategies (Mehrabi et al., 2020; White et al., 2020). Learning analytics dashboards (LADs) within MOOCs offer valuable feedback on study habits and progress, enhancing SRL by helping learners adjust their strategies as needed (Fleur et al., 2023).

Artificial intelligence (AI) further enhances SRL by providing personalized learning paths and real-time support (Ingkavara et al., 2022; Markauskaite et al., 2022). AI tools such as ChatGPT provide tailored assistance, feedback, and scaffolding that enhance learner engagement and self-efficacy (Dai et al., 2023; Darvishi et al., 2024; Jeon & Lee, 2023; Milano et al., 2023). These tools are particularly effective in supporting goal setting, time management, and help-seeking behaviors through dynamic feedback and assessments (Darvishi et al., 2024; Deeva et al., 2021).

In addition to individual learning tools, collaborative platforms are essential for supporting SRL by fostering interaction and collaboration among students and instructors (Núñez et al., 2019, 2023). These platforms facilitate group discussions, resource sharing, and collaborative projects, promoting active engagement and peer support, which are critical components of effective SRL (Fructuoso et al., 2023; Liang et al., 2023). Tools such as Blackboard, Skype, or discussion boards promote active engagement and peer support (Briones et al., 2023; Mapuya, 2022).

Mobile learning (m-learning) enhances SRL by providing accessible and interactive learning resources through mobile applications (Khalid et al., 2024). The use of mobile devices has been shown to improve both self-regulation and learning outcomes (Nikolopoulou, 2023). Additionally, mobile applications support engagement, flexibility, and collaboration in both classroom and no-classroom settings (Elkot & Ali, 2020; Reyes-Millán et al., 2023). Therefore, it is critical for online course designers to ensure mobile accessibility to effectively support SRL (Briones et al., 2023).

Learning analytics (LA) involves the collection and analysis of learner data to optimize educational outcomes (Baek & Doleck, 2023; Fleur et al., 2023; Tao et al., 2023; Zheng et al., 2021). LA tools provide visual data representations, enabling students to assess their performance and engage in self-reflection (Jivet et al., 2020). By offering insights into progress and areas for improvement, these tools effectively support self-regulated learning (Ingkavara et al., 2022). LA dashboards help learners set goals, self-monitor, and self-evaluate, which enhances motivation and participation (Fleur et al., 2023; Jivet et al., 2020). Effective LA interventions largely depend on the design of dashboards that facilitate meaningful data interpretation. Additionally, while LA can support help-seeking behaviors by providing progress insights, dashboard design must account for how learners interact with these tools to optimize SRL support (Jivet et al., 2020).

Task strategies, such as digital note-taking, also play an essential role in enhancing learning gains and SRL (Mapuya, 2022; Su et al., 2023). Apps that track goals or facilitate digital journaling help in self-reflection and evaluation, supporting continuous learning (Anthonysamy et al., 2021; Zarestky et al., 2022). Teacher observation and personalized feedback further support these processes (Ismail et al., 2023).

Technology-based educational tools promote self-regulatory behaviors through features such as virtual tutors, instant feedback, and adaptive technology (Khalid et al., 2024). Interactive tools such as OLMs provide personalized learning experiences and encourage learner autonomy (Kay et al., 2022). Reading quizzes, screencast feedback, digital platform-based gamification (DPBG) and similar tools support SRL by enhancing cognitive and metacognitive processes (Alhalafawy & Zaki, 2022; Inan-Karagul & Seker, 2021; Karrenbauer et al., 2023; Lukes et al., 2020). Platforms such as Microsoft Forms, Mentimeter, and Poll Everywhere also aid formative assessment and engagement (Fructuoso et al., 2023). Moreover, intelligent learning systems facilitate personalized learning by incorporating learner preferences and individual data (Han et al., 2021; Ingkavara et al., 2022; Rodríguez et al., 2022; Troussas et al., 2020; Xie et al., 2019).

Digital resources and repositories are valuable for SRL, providing vast and accessible materials that support personalized learning and autonomy (Tise et al., 2023). These resources play a key role in flipped classroom instruction by making learning materials readily available to students (Raviv et al., 2023). By expanding access to materials and tools, digital resources further support SRL and personalized learning (Tise et al., 2023). Additionally, they facilitate cultural exchanges and promote digital literacy among mentors, enriching the learning experience (Abdullah et al., 2022; Carvalho & Santos, 2022; Chauncey & McKenna, 2023; Kay et al., 2022; Riatun & Alvin, 2023).

Finally, video conferencing tools enable synchronous communication and collaborative learning, enhancing SRL (Khalid et al., 2024). Tools such as Google Meet and Zoom facilitate interactions between teachers and students, promoting engagement and participation in virtual settings (Al-Shaye, 2021; Briones et al., 2023; Mapuya, 2022). These tools also support active engagement and collaboration among virtual students (Briones et al., 2023). Table 4 presents the various technologies supporting SRL identified in the literature, along with supporting source references.

Table 4

Self-Regulated Learning Support Technologies and Source References

Support technology	References
Learning management system	Abduvakhidov et al., 2021; Fructuoso et al., 2023; Han et al., 2021; Ingkavara et al., 2022; Karrenbauer et al., 2023; Khalid et al., 2024; Kong & Lin, 2023; Omar et al., 2023; Reyes-Millán et al., 2023; Rodríguez et al., 2022; Tise et al., 2023; Troussas et al., 2020; Zarestky et al., 2022
MOOC	Fleur et al., 2023; Günther, 2021; Lambert, 2020; Lee et al., 2019; Lu, 2021; Mehrabi et al., 2020; Patiño-Toro et al., 2023; Paudyal et al., 2019; Khan et al., 2020; Rodríguez et al., 2022; White et al., 2020; Wong et al., 2019; Wong et al., 2021
AI and chatbot	Alqahtani et al., 2023; Chauncey & McKenna, 2023; Dai et al., 2023; Darvishi et al., 2024; Deeva et al., 2021; HolonIQ, 2022; Ingkavara et al., 2022; Jeon & Lee, 2023; Markauskaite et al., 2022; Milano et al., 2023; Yan et al., 2023

Collaborative platforms	Briones et al., 2023; Fructuoso et al., 2023; Khalid et al., 2024; Liang et al., 2023; Mapuya, 2022; Núñez et al., 2019, 2023
Mobile educational application	Anthonysamy et al., 2021; Briones et al., 2023; Elkot & Ali, 2020; Khalid et al., 2024; Nikolopoulou, 2023; Omar et al., 2023; Reyes-Millán et al., 2023
Learning analytics and dashboards	Baek & Doleck, 2023; Fleur et al., 2023; Günther, 2021; Ingkavara et al., 2022; Jivet et al., 2020; Tao et al., 2023; Zheng et al., 2021
Digital note-taking	Anthonysamy et al., 2021; Ismail et al., 2023; Mapuya, 2022; Su et al., 2023; Zarestky et al., 2022
Learning interactivity tools	Alhalafawy & Zaki, 2022; Fructuoso et al., 2023; Han et al., 2021; Inan-Karagul & Seker, 2021; Ingkavara et al., 2022; Karrenbauer et al., 2023; Kay et al., 2022; Khalid et al., 2024; Kong & Lin, 2023; Lukes et al., 2020; Rodríguez et al., 2022
Digital resources and repositories	Abdullah et al., 2022; Bravo-Agapito et al., 2021; Carvalho & Santos, 2022; Chauncey & McKenna, 2023; Kay et al., 2022; Kim et al., 2022; Núñez et al., 2023; Raviv et al., 2023; Tise et al., 2023
Video conferencing tools	Al-Shaye, 2021; Briones et al., 2023; Khalid et al., 2024; Mapuya, 2022

Self-Regulated Learning Benefits

SRL is essential for academic success and is closely linked to higher achievements (Heirweg et al., 2020; Oinas et al., 2022; van Alten et al., 2020). SRL involves independent planning, managing, and assessing learning to achieve goals, significantly boosting performance, especially in online learning (Hidayatullah & Csíkos, 2023; Yeh et al., 2019). While explicit reading strategies combined with SRL have been shown to enhance performance, the absence of SRL strategies leads to significant challenges for students, including reduced engagement and higher dropout rates (Irvine et al., 2021; ter Beek et al., 2019). High SRL skills predict better academic performance and online learning success (Hidayatullah & Csíkos, 2023; Lee et al., 2021). Personal involvement and motivation are key for success (Apridayani et al., 2023). SRL is crucial not only for understanding and improving performance but also for predicting engagement and performance in online courses and impacting long-term retention and skills (Guo et al., 2022; Imhof et al., 2024; Martin et al., 2022).

Engagement in learning involves interacting with content to achieve goals. Learners tend to prefer active environments and collaboration (Bećirović et al., 2022; Lin & Dai, 2022; Matsuyama et al., 2019). Although self-reflection and feedback tools have been shown to enhance engagement and motivation, their impact can be limited if not properly aligned with the learning objectives and student needs (Fructuoso et al., 2023; Su et al., 2023). SRL is vital for engagement and course completion, particularly in online learning environments (Amiruddin et al., 2023; Kesuma et al., 2020; Wong et al., 2021). SRL strategies help maintain motivation by fostering supportive learning behaviors, especially in online contexts (Alotumi, 2021; Li et al., 2023; Omar et al., 2023). Student-centered approaches in learning systems support SRL, fostering skills for language learning and 21st-century skills (Omar et al., 2023). Moreover, engaging learning environments play a key role in boosting motivation and self-regulation (Khalid et al., 2024), and transitioning to a learner-centered model significantly increases both engagement and SRL (Matsuyama et al., 2019).

Autonomous learners are accountable for their learning decisions and responsible for their education (Ismail et al., 2023). Autonomy enhances self-organization and involves deciding one's learning plan and choosing mentors (Matsuyama et al., 2019; Zhou et al., 2021). Authentic assessments promote autonomy by making learners responsible for their education (Ismail et al., 2023). Self-regulated learning (SRL) enhances interest and engagement through autonomy, fostering academic ownership via technology (Khalid et al., 2024; Nikolopoulou, 2023). SRL involves goal setting, strategy planning, and progress monitoring (Ingkavara et al., 2022; Karrenbauer et al., 2023). Online learning environments support needs like competence and relatedness, enhancing motivation and autonomy (Xu et al., 2022). Gamification and digital applications engage students through autonomous learning (Alhalafawy & Zaki, 2022; Bećirović et al., 2022). Mentor support and reflection on learning experiences further enhance autonomy (Carvalho & Santos, 2022; Matsuyama et al., 2019). Overall, SRL empowers learners to control their learning, increasing motivation, engagement, and independence (Omar et al., 2023; Su et al., 2023).

Motivation is key in the learner-centered approach. SRL learners with metacognitive abilities are highly motivated and perform better academically (Kesuma et al., 2020; Muwonge et al., 2020). Motivation and self-efficacy are closely linked to engagement and SRL behaviors; however, fostering these traits requires a nuanced understanding of each student's individual goals and contexts (Wong et al., 2021). Individual goals and motivation impact SRL strategies, with perceived autonomy linked to online SRL and greater motivation (Hidayatullah & Csíkos, 2023; Kong & Lin, 2023). SRL combines academic learning with self-control, leading to improved motivation (Nufus et al., 2024). Mobile applications supporting SRL strategies have also been shown to increase motivation (Elkot & Ali, 2020). Overall, motivation plays a crucial role in fostering both engagement and SRL behaviors.

Self-efficacy, defined as learners' beliefs in their ability to succeed, is crucial for academic success in SRL. High self-efficacy leads to persistence, effective learning behaviors, and personal goal achievement in online environments, enhancing confidence and resilience (Wong et al., 2021). Strategies promoting self-efficacy enhance belief in abilities, impacting academic success (Khalid et al., 2024). Emphasizing self-observation and self-judgment fosters academic self-efficacy, improving achievement (Kesuma et al., 2020). However, overemphasis on self-judgment without adequate feedback can lead to negative self-assessment and reduced motivation, highlighting the need for balanced instructional strategies. High self-efficacy learners display persistence, task interest, and effective emotion management, contributing to frequent SRL strategy use (Lee et al., 2021; Martin et al., 2022). Building confidence in executing strategies and achieving outcomes enhances motivation and persistence (Tise et al., 2023). Positive reinforcement and task value reinforce this confidence, enhancing resilience and performance (Wong et al., 2021).

Personalized learning experiences, achieved through individual goal setting and tailored strategies, facilitate the shift toward a learner-centered model (Matsuyama et al., 2019; Zhou et al., 2020).

Nonetheless, personalization must be carefully calibrated to avoid information overload or misalignment with broader curricular objectives. Portfolio assessments reflect progress and areas for improvement, while authentic assessments develop skills through real-world situations (Ismail et al., 2023). Personalized SRL systems enhance learning through goal setting and tailored paths (Ingkavara et al., 2022). Personalized advice on SRL strategies fosters learning (Lim et al., 2023). Personalized feedback helps learners understand strengths and areas for improvement, promoting SRL (Ingkavara et al., 2022; Khalid et al., 2024; Osakwe et al., 2023). Digital teaching strategies ensure personalized learning through structured experiences and reflective practices (Al-Shaye, 2021), while online courses allow self-paced study, enhancing SRL and overall competence (Raviv et al., 2023).

Feedback ranges from basic formats, including grades, to more comprehensive methods such as comments and rubrics (Lukes et al., 2020). A learner-centered approach requires personalized feedback to meet diverse needs (Matsuyama et al., 2019). Instructors must provide timely support and feedback, especially to students struggling with reflection, to promote in-depth reflection and effective goal-setting (Li et al., 2023). Individualized, narrative feedback from mentors significantly promotes professional identity formation (PIF; Matsuyama et al., 2019). Personalized training encourages strategy adoption (Inan-Karagul & Seker, 2021), and students use feedback to manage time and resources efficiently (Su et al., 2023). Table 5 presents the various benefits of implementing SRL identified in the literature, along with supporting source references.

Table 5

Self-Regulated Learning Benefits and Source References

Benefit	References
Support academic achievements	Al-Shaye, 2021; Apridayani et al., 2023; Bećirović et al., 2022; Chen & Li, 2021; Elkot & Ali, 2020; Fructuoso et al., 2023; Guo et al., 2022; Heirweg et al., 2020; Hidayatullah & Csíkos, 2023; Imhof et al., 2024; Irvine et al., 2021; Karrenbauer et al., 2023; Lee et al., 2021; Liang et al., 2023; Lukes et al., 2020; Martin et al., 2022; Núñez et al., 2023; Oinas et al., 2022; Reparaz et al., 2020; Su et al., 2023; Tao et al., 2023; ter Beek et al., 2019; van Alten et al., 2020; Wang et al., 2019; Yeh et al., 2019
Increase engagement	Alotumi, 2021; Al-Shaye, 2021; Amiruddin et al., 2023; Bećirović et al., 2022; Briones et al., 2023; Elkot & Ali, 2020; Fructuoso et al., 2023; Guo et al., 2022; Imhof et al., 2024; Inan-Karagul & Seker, 2021; Ismail et al., 2023; Kesuma et al., 2020; Khalid et al., 2024; Li et al., 2023; Lin & Dai, 2022; Matsuyama et al., 2019; Nikolopoulou, 2023; Omar et al., 2023; Su et al., 2023; Tadesse et al., 2022; Wong et al., 2021; Yeh et al., 2019

Promote autonomy	Alhalafawy & Zaki, 2022; Bećirović et al., 2022; Carvalho & Santos, 2022; Inan-Karagul & Seker, 2021; Ingkavara et al., 2022; Ismail & Abdul Hamid, 2024; Karrenbauer et al., 2023; Khalid et al., 2024; Lin & Dai, 2022; Matsuyama et al., 2019; Nikolopoulou, 2023; Omar et al., 2023; Su et al., 2023; Tise et al., 2023; Xu et al., 2022; Zhou et al., 2021
Foster motivation	Bećirović et al., 2022; Elkot & Ali, 2020; Hidayatullah & Csíkos, 2023; Ismail et al., 2023; Kesuma et al., 2020; Kong & Lin, 2023; Matsuyama et al., 2019; Muwonge et al., 2020; Nufus et al., 2024; Omar et al., 2023; Su et al., 2023; Wong et al., 2021; Yeh et al., 2019
Increase self-efficacy	Al-Shaye, 2021; Elkot & Ali, 2020; Ingkavara et al., 2022; Ismail et al., 2023; Kesuma et al., 2020; Khalid et al., 2024; Nguyen & Zarra-Nezhad, 2023; Lee et al., 2021; Martin et al., 2022; Raviv et al., 2023; Tise et al., 2023; Wong et al., 2021; Yavuzalp & Bahcivan, 2021
Personalized learning experienced	Al-Shaye, 2021; Chen, 2023; Ingkavara et al., 2022; Ismail et al., 2023; Karrenbauer et al., 2023; Khalid et al., 2024; Lim et al., 2023; Matsuyama et al., 2019; Osakwe et al., 2023; Raviv et al., 2023; Tadesse et al., 2022; Zhou et al., 2021
Personalized feedback	Inan-Karagul & Seker, 2021; Li et al., 2023; Lukes et al., 2020; Matsuyama et al., 2019; Su et al., 2023

Self-Regulated Learning Challenges

Appropriate infrastructure, digital resources, support, and cooperation are crucial for sustaining blended learning, particularly SRL (Nikolopoulou, 2023). Access to technology is vital for SRL, but limited access can hinder it and impact learning outcomes (Gutiérrez-Pelaez & Ellis, 2020; Ingkavara et al., 2022; Khalid et al., 2024; Núñez et al., 2023; Sevnarayan, 2022). This issue is significant for students facing barriers to digital resources and online tools, affecting their success in online courses. For instance, students in rural areas or underfunded schools often face difficulties accessing reliable Internet and digital devices, which restricts their ability to engage with online learning platforms and use digital tools essential for SRL (Reyes-Millán et al., 2023; Zarestky et al., 2022). Ensuring equitable access to technology requires not only the provision of devices but also digital literacy training to enhance online learning readiness (Carvalho & Santos, 2022; Kay et al., 2022).

Technical challenges, such as connectivity issues, can impede student participation. For example, students participating in synchronous online classes may experience frequent disruptions due to unstable Internet connections, making it difficult for them to stay engaged and keep up with the course content (Inan-Karagul & Seker, 2021; Tadesse et al., 2022). Similarly, asynchronous learners with poor Internet connections may struggle to download necessary materials or submit assignments on time, leading to gaps in learning

(Briones et al., 2023). Effective SRL and e-learning depend on access to information, communication, and technology (ICT) equipment and reliable Internet connections (Abbasi et al., 2020; Almaiah et al., 2020; Choong, 2020; Looi, 2023; Wang et al., 2020). Addressing these challenges requires inclusive strategies to ensure equitable access and strengthen digital infrastructure (Dai et al., 2023; Nikolopoulou, 2023).

Clear instructional design is essential for SRL, promoting goal setting, strategy planning, and adaptive learning (Ingkavara et al., 2022). In practical terms, this means educators need to provide clear guidelines and scaffolding to help students set realistic goals and develop personalized learning plans. Without proper guidance, students may struggle with self-control in online environments (Ingkavara et al., 2022). Clear instructions and scaffolding tools support SRL by providing guidance on self-regulatory processes (Matcha, Ahmad Uzir, et al., 2019; Matcha, Gašević, et al., 2019; Osakwe et al., 2023). Quality instructional materials ensure learners understand tasks and expectations, which is crucial for facilitating self-regulation (Chen, 2023). Teacher guidance and personalized feedback significantly enhance learning outcomes by fostering self-reflection and self-assessment, essential components of metacognitive strategies (Nikolopoulou, 2023; Tzimas & Demetriadis, 2024; Yavuzalp & Bahcivan, 2021). Timely and specific feedback can help students adjust their learning strategies and improve their self-regulation skills, yet in many cases, such feedback is delayed or generic, reducing its effectiveness (Yavuzalp & Bahcivan, 2021).

Resistance to change can impede new SRL methods, necessitating supportive strategies (Khalid et al., 2024). This resistance is common during the transition to online models (Almaiah et al., 2020; Gutiérrez-Pelaez & Ellis, 2020; Looi, 2023; Núñez et al., 2019). Teacher education often prioritizes content knowledge over SRL principles, leading to resistance. For instance, teachers may resist integrating SRL strategies such as self-reflection, goal setting, and help-seeking into their curricula due to a lack of familiarity or confidence in these methods (Faza et al., 2024; Omar et al., 2023; Robbins et al., 2020). Educators need competencies to support self-directed learners, but the lack of SRL emphasis in teacher preparation programs may limit the integration of mobile educational apps, hindering academic success (Omar et al., 2023). In practice, this means that even when mobile apps are available, they are underused or not used to their full potential because educators lack the necessary skills to integrate them effectively into their teaching practices.

The pandemic highlighted significant gaps in instructor training for online teaching impacting SRL outcomes, student success, and attitudes toward online education (Bećirović et al., 2022; Karrenbauer et al., 2023; Khalid et al., 2024; Patiño-Toro et al., 2023; Reyes-Millán et al., 2023). Many instructors were unprepared to facilitate online learning effectively, lacking training in essential SRL strategies such as time management, self-reflection, and monitoring, which are critical for supporting student learning in virtual environments (Chen, 2023). Instructors who are not well-versed in these strategies may find it challenging to foster a self-regulated learning environment conducive to online learning success.

Limited access to learning materials poses significant obstacles to SRL, especially for students lacking resources like international study opportunities or internships (Gutiérrez-Pelaez & Ellis, 2020; Núñez et al., 2023). These challenges can affect students' ability to engage in SRL and manage their learning. For instance, students from low-income backgrounds may have limited access to textbooks or online subscriptions, making it difficult for them to engage fully in their studies and apply SRL strategies effectively (Funa et al., 2023; Funa & Talaue, 2021). To overcome these barriers, employing strategies such as help-seeking and proactive resource management can enhance students' capacity to navigate limited resources and still achieve their learning goals (Almaiah et al., 2020; Looi, 2023; Zhou et al., 2020). Access to digital resources enhances instructional benefits and accessibility, improving SRL outcomes (Khalid et al., 2024).

Students often face time management difficulties in distance education, impacting their ability to use online resources effectively (Anthonysamy et al., 2021; Turan et al., 2022). For example, juggling multiple deadlines without the structure of a physical classroom environment can lead to procrastination or incomplete tasks, affecting learning outcomes (Osakwe et al., 2023; Reyes-Millán et al., 2023). Despite these constraints, SRL strategies such as self-monitoring and adaptive planning can help students manage time and workload effectively (Omar et al., 2023). The setup of online learning influences task completion, underscoring the importance of SRL (Adnan & Anwar, 2020; Funa et al., 2023).

Students' lack of prior knowledge of motivational regulation strategies highlights the need for university training to enhance SRL self-efficacy (Alotumi, 2021; Howlett et al., 2021; Kryshko et al., 2020; Wang et al., 2021; Zhang et al., 2020). In practice, training on SRL strategies can help students use self-regulated motivation (SRM) effectively, particularly in EFL contexts (Alotumi, 2021; Teng et al., 2020).

Digital competencies are essential for leveraging technological tools in SRL, enabling students to navigate online resources, collaborate effectively, and use learning management systems proficiently (Chen, 2023; Ingkavara et al., 2022; Karrenbauer et al., 2023; Tise et al., 2023). Online learning readiness depends on digital competencies, which are assessed using tools such as the Online Learning Readiness Questionnaire (OLRQ; Reyes-Millán et al., 2023). Students unfamiliar with digital tools may struggle to access online resources or participate in collaborative online projects, hindering their ability to fully engage in SRL (Chen, 2023). Developing digital competencies also involves understanding and applying metacognitive strategies, such as monitoring one's own learning progress and seeking feedback, which are vital for successful SRL in digital environments. Table 6 presents various challenges in implementing SRL identified in the literature, along with supporting source references.

Table 6

Self-Regulated Learning Challenges and Source References

Challenge	References
Limited access to technology	Abbasi et al., 2020; Almaiah et al., 2020; Briones et al., 2023; Carvalho & Santos, 2022; Choong, 2020; Dai et al., 2023; Elkot & Ali, 2020; Gutiérrez-Pelaez & Ellis, 2020; Inan-Karagul & Seker, 2021; Ingkavara et al., 2022; Kay et al., 2022; Khalid et al., 2024; Looi, 2023; Nikolopoulou, 2023; Núñez et al., 2023; Omar et al., 2023; Reyes-Millán et al., 2023; Sevnarayan, 2022; Tadesse et al., 2022; Wang et al., 2020; Zarestky et al., 2022
Instruction clarity	Bećirović et al., 2022; Chen, 2023; Ingkavara et al., 2022; Mapuya, 2022; Matcha et al., 2019; Nikolopoulou, 2023; Omar et al.,

	2023; Osakwe et al., 2023; Tzimas & Demetriadis, 2024; Yavuzalp & Bahcivan, 2021
Resistance to change	Almaiah et al., 2020; Chen, 2023; Gutiérrez-Pelaez & Ellis, 2020; Khalid et al., 2024; Looi, 2023; Matsuyama et al., 2019; Núñez et al., 2023; Omar et al., 2023; Robbins et al., 2020; Turan et al., 2022
Instructor lack of training	Bećirović et al., 2022; Chen, 2023; Karrenbauer et al., 2023; Khalid et al., 2024; Omar et al., 2023; Park & Kim, 2023; Patiño-Toro et al., 2023; Reyes-Millán et al., 2023
Limited access to learning material	Almaiah et al., 2020; Funa et al., 2023; Funa & Talaue, 2021; Gutiérrez-Pelaez & Ellis, 2020; Khalid et al., 2024; Looi, 2023; Núñez et al., 2023; Zhou et al., 2020
Time and workload constraints	Adnan & Anwar, 2020; Anthonysamy et al., 2021; Chauncey & McKenna, 2023; Funa et al., 2023; Omar et al., 2023; Osakwe et al., 2023; Reyes-Millán et al., 2023; Turan et al., 2022
Student lack of knowledge	Alotumi, 2021; Howlett et al., 2021; Kryshko et al., 2020; Teng et al., 2020; Wang et al., 2021; Zhang et al., 2020
Digital competencies	Chen, 2023; Ingkavara et al., 2022; Karrenbauer et al., 2023; Reyes-Millán et al., 2023; Tise et al., 2023

Conclusion

This study highlights the pivotal role of self-regulated learning (SRL) in fostering academic success. By incorporating SRL strategies such as goal setting, cognitive and metacognitive processes, time management, self-reflection, and help-seeking, students can effectively manage their learning processes. Integrating these strategies with technological tools such as learning management systems (LMS), massive open online courses (MOOCs), and artificial intelligence (AI) significantly enhances students' ability to set and achieve goals, monitor progress, and stay engaged, particularly in online and blended learning environments. Technological advancements have revolutionized education, making robust SRL skills essential for maintaining motivation and preventing dropout in digital learning contexts. AI and collaborative platforms offer personalized learning paths and support, while mobile learning and learning analytics provide accessible, interactive resources and enable continuous self-monitoring and strategy adjustment. However, implementing IT-supported SRL strategies faces challenges, including limited access to technology, the need for digital literacy, effective time management, resistance to change, and inadequate instructor training. Overcoming these barriers is crucial for creating inclusive and effective educational environments. Ensuring equitable access to technology, offering digital literacy training, and enhancing digital infrastructure are necessary steps.

This study also advances the SRL theoretical framework by integrating strategies with modern technology, emphasizing accountability, planning, collaboration, and communication. It provides a comprehensive understanding of improving SRL through digital means, illustrating its importance for lifelong learning and job market readiness. The research highlights the shift in educational paradigms due to technological advancements and the COVID-19 pandemic, emphasizing the need for robust SRL skills in online learning.

For educators, this research offers insights into implementing SRL strategies using IT tools, helping design practices that foster accountability, planning, collaboration, and communication. Policymakers can promote digital literacy and SRL training in educational programs, addressing barriers such as technology availability and digital capability to create inclusive environments. The research underscores supporting students in developing strong SRL skills to maintain motivation and prevent dropout, especially in online learning contexts.

Limitation

Despite the insightful findings of this study, several limitations must be acknowledged, primarily stemming from the restricted scope of the journal databases used. First, the study's reliance on only two journal databases may have limited the comprehensiveness of the literature review. This constraint could result in potential biases, as important studies and diverse perspectives from other relevant databases may have been overlooked. Consequently, the findings and recommendations might not fully capture the breadth of existing research on SRL and its integration with technological tools.

Furthermore, the rapidly evolving nature of technology means that some studies included in the database might already be outdated, failing to account for the latest advancements in AI, mobile learning, and learning analytics. This temporal limitation could impact the relevance and applicability of the findings to current educational contexts. As technology continues to advance at a rapid pace, ongoing research is necessary to keep pace with these changes and to validate the continued relevance of the findings presented in this study.

Future Research

Future research should explore the perspectives and experiences of various educational stakeholders, such as faculty members and administrators, to understand better the implementation and efficacy of SRL strategies. Examining these insights can refine SRL interventions and ensure their practical applicability in diverse educational settings. Empirical testing of SRL strategies and supporting technologies is essential to substantiate their benefits and identify obstacles. Studies should evaluate the effectiveness of SRL strategies integrated with tools such as LMSs, MOOCs, and AI in different learning environments. This research will help understand the impact of these strategies on student performance, engagement, retention, and academic achievement. Additionally, future research should investigate challenges related to digital literacy, equitable access to technology, and instructor training in implementing IT-supported SRL strategies. By examining these factors, researchers can help develop targeted interventions and professional development programs to enhance digital literacy among students and educators. Identifying best practices for overcoming resistance to change and fostering continuous improvement in educational institutions is crucial for adopting SRL strategies.

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Online Learning in Civic Education Research Trend: A Bibliometric Analysis

Sulkipani Sulkipani[1], Kokom Komalasari[1*], Sapriya Sapriya[1], Susan Fitriasari[1], and Jusuf Blegur[2]
[1] Universitas Pendidikan Indonesia; [2] Universitas Kristen Artha Wacana, Indonesia; [*]Corresponding Author

Abstract

Online learning in civic education (OLCE) has been going on since the 2000s. It has become an increasingly interesting topic in light of recent technological advances and emergencies, and it contributes to improving the quality of learning processes and outcomes. This study aimed to track the publication trends of OLCE in the Scopus database (2005–2024). The method used was bibliometric, with VOSviewer software analysis. The investigation found 123 documents, half of which were articles, and the rest distributed among conference papers, book chapters, conference reviews, books, and notes. These publications were written by 320 authors from 39 different countries and used nearly 800 keywords. The number of OLCE publications increased significantly in 2021 and reached its highest peak in 2024. VOSviewer analysis showed that civic education was connected to the keywords “online learning” and “e-learning” in the case of large nodes and close distances. However, other strategic keywords, such as “MOOC,” “digital citizenship,” “artificial intelligence,” and “social media” were detected in small nodes and far distances. The keyword “global citizenship education” was not directly connected; even “ChatGPT,” the most influential OpenAI today, was not seen at all. This could mean that the development of several strategic keywords would make for a potential research study in future. This research provides new insights for researchers and institutions involved in OLCE publication mapping for future development.

Keywords: online learning, civic education, OLCE, citizenship education, bibliometric analysis

Online Learning in Civic Education Research Trend: A Bibliometric Analysis

Online learning is an increasingly popular learning delivery method. Its implementation may be not only due to technological advances but can also be triggered by emergency situations, such as the COVID-19 pandemic (Chai & Ye, 2024; Ganguli et al., 2024; Khan & Khan, 2024), which force restrictions on direct physical interaction. In fact, experts have predicted that online learning will continue to be the primary learning approach after the pandemic for reasons of flexibility and efficiency (Guo et al., 2024; Lv, 2024; Zhao et al., 2023), as is the case in the field of civic education. Studies have shown that online learning in civic education (OLCE) increases citizen engagement in political dialogue and public issues (King et al., 2021; Perla et al., 2022).

In observing various publication reports, numerous studies have also revealed weaknesses in online learning, such as lack of interaction quality, dependence on digital use, and eye health disorders (Baber, 2022; Bou Ghannam et al., 2024; Mohammed et al., 2024). As a field with qualitative material substance, OLCE certainly presents a challenge for teachers to focus the attention and participation of students with network-based instruments. Therefore, teachers need to innovate in designing OLCE to minimize these weaknesses, integrating games and various exciting learning models for example (Chin & Chen, 2023).

Among the studies on OLCE, Tadlaoui-Brahmi et al. (2022) linked the term *digital citizenship* to technology-based learning tasks and student engagement. Other studies, such as Gleason and von Gillern (2018), discussed how digital media applications can support citizenship education in middle and high schools to increase student activity and engagement in learning. Choi (2016), Choi et al. (2018), and Bal and Akcil (2024) explained the conception of democratic digital citizenship and how teachers educate their students to become responsible digital citizens, the level of efficiency of the digital citizenship curriculum, self-evaluation, and student opinions about the digital citizenship courses implemented.

Mapping of OLCE research is essential in efforts to develop OLCE in the future. In the Scopus database, only one study was found that mapped citizenship education research in general from 1975 to 2020 (Bozkurt et al., 2021). However, its focus did not include online learning, thus failing to address the need to understand publication trends specifically in this area. Our study aimed to track bibliographic metadata in OLCE to find research trends (documents, sources, authors, and other points). In addition to filling the research gap, this study provides new insights for researchers and institutions regarding OLCE.

Conceptual Framework of the Study

Online Learning

The migration from face-to-face to online learning during the COVID-19 pandemic posed significant challenges (Alshaboul et al., 2024; Caliph & Lee, 2024; Tesfay Gebremariam, 2024), including limited face-to-face interactions, which can reduce student engagement in learning (Baber, 2022; Shankar & Robinson, 2024). Reliance on adequate technology networks and infrastructure was a constraint in many regions, especially in less developed areas (Mohammed et al., 2024; Yu, 2024). In addition, the adoption of more sophisticated technologies, such as blockchain, hyper spectroscopy, AI predictive models, and fuzzy systems (Bou Ghannam et al., 2024; Yan et al., 2024), although promising increased security and efficiency, also brings challenges in terms of scalability and complexity of implementation (Zhao et al., 2023), which has an impact on the risk of anxiety in learning activities (Bono et al., 2024; Peng et al., 2024), as well as increasing dropout rates (Aldowah et al., 2020).

On the other hand, various studies have revealed that there are innovations in online learning to help overcome these challenges. For example, using digital mind maps has been proven to increase student engagement and understanding, although its effectiveness still requires further research (Alsuraihi, 2022). Other approaches, such as auction-based client selection in federated learning, have shown an increase in efficiency and reduced training time while maintaining user privacy (Guo et al., 2024). In addition, using mobile devices makes access to education broader and more flexible (Al-Adwan et al., 2018). The online technology instruments used not only increase student engagement but also make the teaching and learning process more interactive, engaging, efficient, and successful in learning (Chonraksuk & Boonlue, 2024; Kristiana et al., 2023; Xue et al., 2024). Furthermore, students' inclination towards Information and Communication Technology (ICT) and web-centric devices creates excellent opportunities for online learning (Czerkawski, 2016; Tseng et al., 2023). Learning in the online context can improve students' learning culture, communication skills, satisfaction, and learning responsibility (Demirelli & Karaçay, 2024). These innovations reflect ongoing efforts to optimize online learning to be more effective and inclusive.

The future of online learning demands further research and development. Various studies recommend several inputs, such as increasing awareness of digital use, especially in reducing the negative impacts of prolonged use of digital devices, including eye health problems (Bou Ghannam et al., 2024). In addition, improving the quality of interaction and services in online learning platforms to reduce technical problems is essential to improving students' academic performance (Mohammed et al., 2024; Peng et al., 2024). With a more creative and innovative approach, online learning has great potential to continue to grow and provide more comprehensive benefits to the field of education in the future (Shankar & Robinson, 2024).

Civic Education

The International Civic and Citizenship Education (ICCS) reports in 2016 and 2022 identified sustainability, social systems, diversity, civic identity, civic engagement, and global citizenship as strategic global issues that must be systematically integrated into school curricula and civic education programs to foster a peaceful, balanced, and effectively functioning global society (Carstens & Schulz, 2018; Schulz et al., 2023). As an essential component of the global education curriculum, civic education is becoming increasingly important in order to broaden students' horizons not only in the national context but also in the global context (Bosio, 2024; Ghebru & Lloyd, 2020; Ghosn-Chelala, 2020; Meng, 2024; Schulz et al., 2023; Silva & Lourenço, 2023).

The delivery of civic education has evolved into a networked system called online learning in civic education (OLCE). OLCE has proliferated to the extent that it has attracted the attention of the academic world, driven by technological developments, the need for flexible learning, and emergencies such as COVID-19 (Chai &

Ye, 2024; Ganguli et al., 2024; Khan & Khan, 2024). However, even before the COVID-19 pandemic, the UK had developed, piloted, and evaluated a freely accessible Web-based civic learning activity that aimed to teach students about current academic debates on civics (Smith et al., 2008).

Various researchers have agreed on the definition of OLCE as learning that uses digital technology to teach civics concepts, moral values, and the sociopolitical skills essential to become active, critical, and responsible citizens (Winarno et al., 2023). This pattern of education is essential because it allows the wide dissemination of information and more equitable access, especially in the era of globalization, where understanding educational and global issues is increasingly important (Akkari & Maleq, 2020; Bosio, 2024; Harshman, 2018; Meng, 2024; Saada, 2023). Online civic education has guaranteed greater flexibility for students to study according to their schedules, thus increasing participation and engagement in the educational process (Cole et al., 2014; Demirelli & Karaçay, 2024; King et al., 2021).

Tools used in OLCE vary widely, including digital platforms, media, and algorithm analysis tools designed to support more adaptive and interactive learning (Choi et al., 2018; Hunt, 2023; Trisiana & Utami, 2022). Using AI and neural network-based platforms enables efficient student data management and supports personalization of the learning process (Cui, 2024b). In addition, digital media is used to increase student engagement in more critical and reflective discussions of politics and global issues and support adaptive and interactive learning (Bosio, 2024). Another practice, the use of massive open online courses (MOOCs) in civic education, can be used to bring together people who hold different political views through online forums and be an effective tool to increase citizen participation in political discussions (Sharov et al., 2023; Yeomans et al., 2018). Furthermore, the use of Internet media in civic parliaments can also encourage active citizen participation in social and political discussions despite challenges in technology access and participant engagement (Naval & Arbués, 2015). In addition, using neural network algorithms and artificial intelligence (AI) has become essential in personalizing learning. It improves the efficiency of civic education (Lv, 2024).

Various studies have revealed the advantages of OLCE, including flexibility in implementation, which allows students to access learning materials anytime and from anywhere (Al-Adwan et al., 2018; Cole et al., 2014; Demirelli & Karaçay, 2024; Shankar & Robinson, 2024), thus increasing their engagement in the learning process (Jing, 2024; Komalasari et al., 2024; Lv, 2024; Mahadir et al., 2021). A project-based learning model, using digital technology to strengthen the character of the foundational philosophical theory of Indonesia, Pancasila, by integrating life values in a digital context, suggested that civic learning can be used to build students' character effectively through an approach appropriate to the digital era (Komalasari et al., 2024). In line with that, OLCE in blended learning dramatically improves the learning process and supports democratic and sustainable civic education (Ovcharuk et al., 2020; Putri et al., 2020).

Recent research has also uncovered disadvantages of OLCE, such as risks to data privacy and overreliance on technology, which, if not properly managed, can hinder the learning process (Mohammed et al., 2024). In addition, the potential for greater political polarization, the challenges of maintaining consistent student engagement in online learning environments, and the risk of spreading misinformation through digital media are severe concerns in OLCE (Cui, 2024a; Meng, 2024). Digital technology must be recognized as having great potential, although it needs to be managed well; otherwise, it is feared it will strengthen social inequality and mobilize sectarianism (Jackson, 2019).

Developing policies that support data protection, ethical use of technology, expansion of technology training, and more interactive and student-centered pedagogical approaches are the challenges for researchers and institutions to maximize the benefits of online civic education and overcome its drawbacks (Guo et al., 2024). These efforts are important to ensure that OLCE can continue to contribute to the strengthening of democracy and the formation of a more just and inclusive society in future (Bosio, 2024; Cui, 2024b).

Method

This research used the VOSviewer-assisted bibliometric analysis method. This type of analysis is conducted to understand the evolution, trends, status of scientific publications, and current research in a field (Avecilla et al., 2024; Ayaviri-Nina et al., 2023; Orbe et al., 2024; Rodriguez-Ulcuango et al., 2023), as well as to examine large data sets across sciences, disciplines, and topics (Donthu et al., 2021). The research analyzed in this study was scientific publications on online learning in civic education on the Scopus database, published 2005–2024 (Per August). The selection of the Scopus database took into account that Scopus is capable of analyzing scientific research in a quality and comprehensive manner, covering more international journals and resources, and having an automatic internal descriptive metrication and visualization system (Aksnes & Sivertsen, 2019; Blegur et al., 2024; Livia et al., 2021).

Data Collection

Data collection was conducted on August 12, 2024, using the main keywords "online learning" and "civic education" and several synonyms on the Scopus database with search queries, namely: TITLE-ABS-KEY ("online learning" OR "online teaching" OR "e-learning" OR "elearning" OR "virtual learning" OR "virtual teaching" OR "online pedagogy" OR "online course" OR "internet learning" OR "digital learning" OR "digital teaching" OR "digital pedagogy" OR "digital course" OR "distance learning" OR "distance course" OR "internet course" OR "internet-based learning" OR "web-based learning" OR "online-based learning" OR "digital-based learning" OR "distance-based learning") AND TITLE-ABS-KEY ("civic education" OR "civic learning" OR "citizenship education" OR "citizenship learning" OR "civic course" OR "citizenship course"). As a result, 123 documents were found, and all identified publications were determined to be without exception.

Data Analysis

Bibliometric analysis is a rigorous data analysis procedure for exploring and analyzing large amounts of scientific data through various open-source software packages (Bozkurt et al., 2021; Donthu et al., 2021) to observe and interpret the current state of research, including the evolution of progress and trends of scientific publications on a topic (Avecilla et al., 2024; Orbe et al., 2024; Rashid et al., 2024). Using VOSviewer software, we were able to produce bibliographic maps of most of the data related to the distribution of publications per year, document type, subject area type, source type, author, author country, and most cited publications (Ge et al., 2023), which were visualized in the form of data network and cluster displays (Zhao et al., 2023). For general bibliographic data metrication of publications (year of publication, number of documents, citations, etc.), we used the Publish or Perish software (Version 8.15.4710.9036; https://harzing.com/resources/publish-or-perish/). See Table 1.

Table 1

General Bibliographic Data From Selected Publications, 2005 until August 12, 2024

Data category	***n***
Citation years	19
Papers	123
Citations	497
Cites/year	26.26
Cites/paper	4.04
Cites/author	180.26
Papers/author	68.06
Authors/Paper	2.47
h-index	11
g-index	20
hI,norm	6
hI,annual	0.32
hA-index	5

Findings

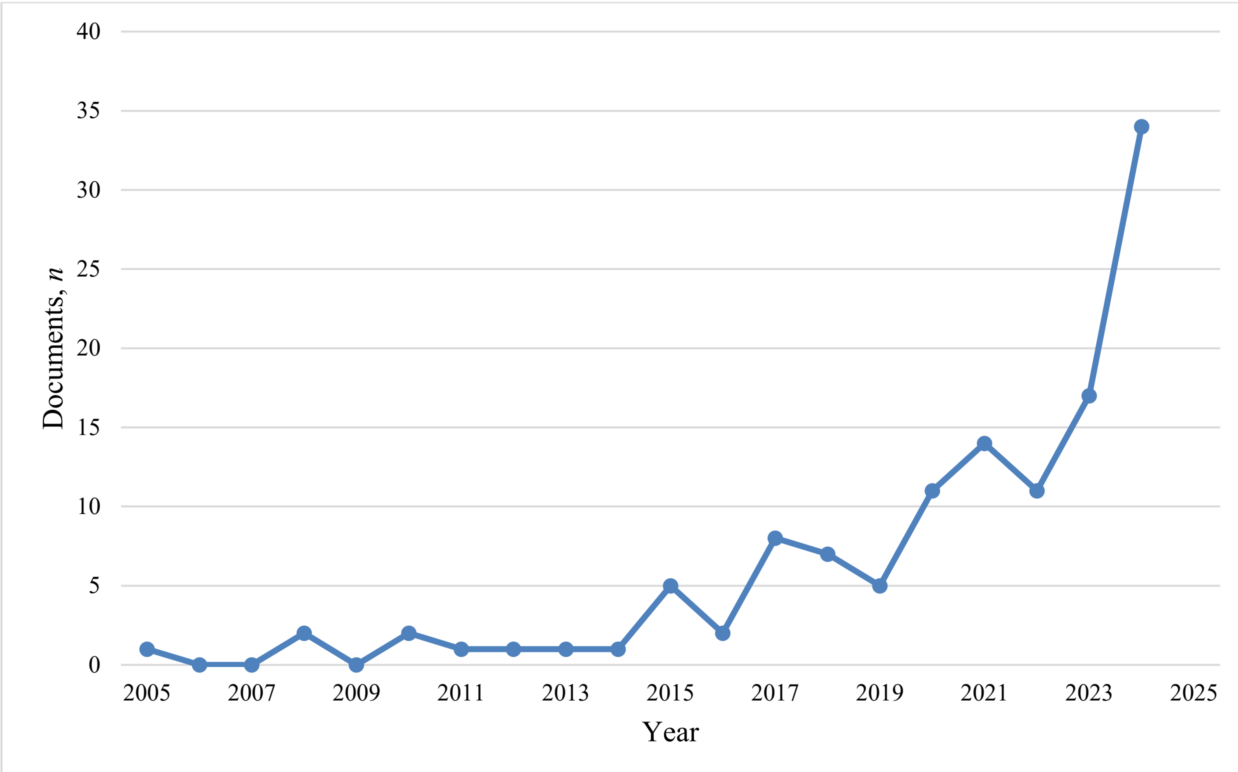
This section presents the results obtained from the analysis and synthesis of information carried out using the VOSviewer software.

Documents by Year

A search of publications in the Scopus database from 2005 until August 12, 2024, found 123 documents, including articles, books, and so forth, shown distributed by year in Figure 1. The distribution has fluctuated and tended to increase gradually since 2014. The highest number of publications occurred in 2024. From 2005 to 2014, the number of publications per year was relatively low, and in fact, in 2006, 2007, and 2009, there were no publications on OLCE. From 2019 to 2024, two peak points are essential to note: 2021 and 2024.

Figure 1

Number of Documents Analyzed in the OLCE Study by Year



Documents by Type and Subject Area

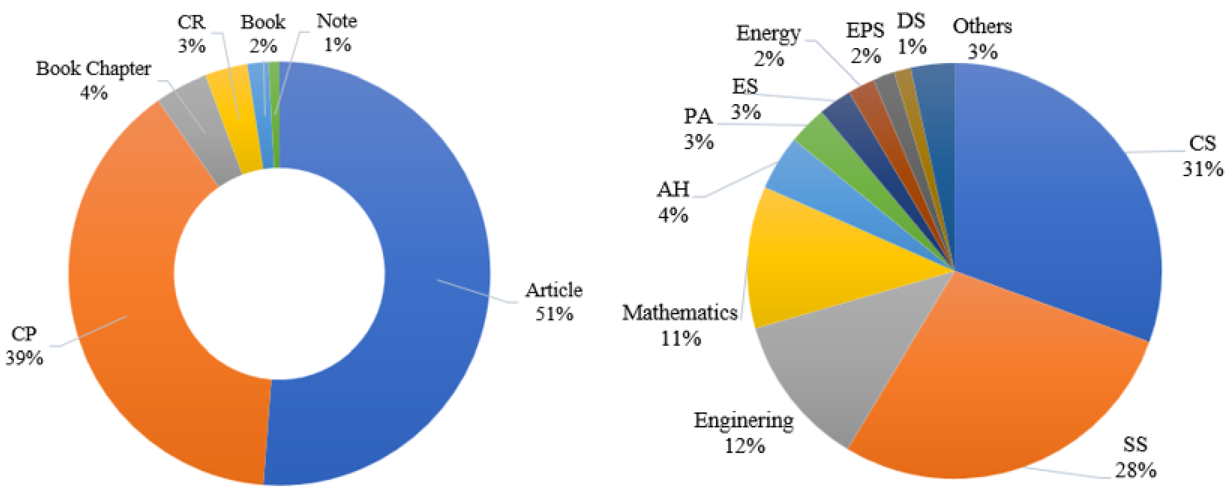
Publications over the past 19 years have included various document types and subject areas. Document types, as shown in Figure 2, were distributed in six forms, with the most significant being articles, followed by conference papers, then book chapters, followed by conference reviews, books, and notes.

Simultaneously, Figure 2 shows the subject areas, which were spread across a range of disciplines. The highest proportion was in computer science, representing close to one third of subject areas, followed by social science, engineering, and mathematics. Together, these four subject areas represented about 80% of all subject areas in the study.

Figure 2

Documents in the OLCE Study Classified by Type and Subject Area

Documents by Type *Documents by Subject Area*



Note. N = 123; CP = conference paper; CR = conference review; CS = computer science; SC = social science; AH = art and humanities; PA = pysics and astronomy; ES = environmental science; EPS = earth and planetary science; DS = decision sciences.

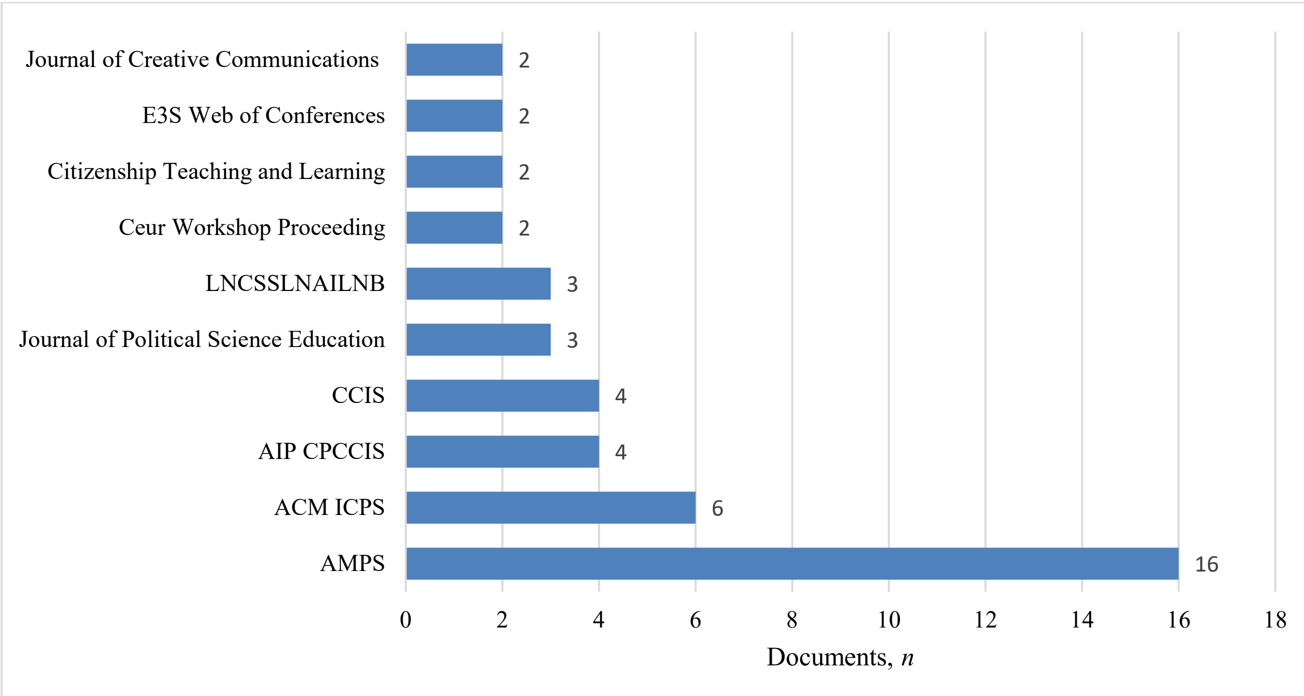
Documents by Source

Between 2005 and 2024 (Per August), numerous sources published on OLCE. Fifty-three sources were found, including both articles with regular submission processes and conference proceedings. Figure 3 shows the top 10 sources based on number of documents. The journal *Applied Mathematics and Nonlinear Sciences* published 16 documents, the most of any of the identified sources. It was followed by *ACM International Conference Proceeding Series*, *AIP Conference Proceedings*, and *Communications in Computer and Information Science*.

Applied Mathematics and Nonlinear Sciences is a journal affiliated with the publisher Walter de Gruyter based in Berlin, Germany, with a research scope in mathematics and related applications in physics, engineering, chemistry, economics, and social sciences. Given the number of OLCE articles published, the journal has significantly impacted the field. As a cautionary note, although *Applied Mathematics and Nonlinear Sciences* was the most productive journal, the most cited source was found in the journal *Computers and Education*, published by Elsevier: Choi et al. (2017), which presents a digital citizenship scale, has received 124 citations.

Figure 3

Top Ten Sources of Documents Analyzed in the OLCE Study



Note. AMPS = applied mathematics and nonliniear sciences; ACM ICPS = association for computing-machinery international conference proceeding series; AIP CPCCIS = american institute of physics-conference proceedings, and communications in computer and information science; CCIS = communication in computer and information science; LNCSSLNAILNB = lecture notes in computer science including subseries lecture notes in artificial intelligence and lecture notes in bioinformatics.

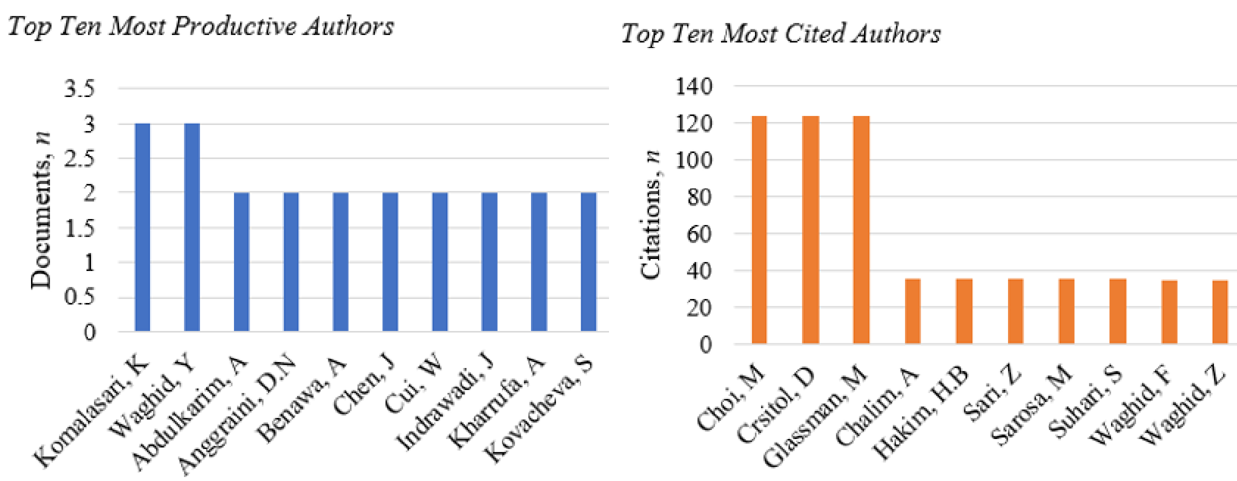
Next, the *ACM International Conference Proceedings Series* published by the United States-based Association for Computing Machinery (ACM) is the largest source of publications in the conference proceedings category (and the second largest overall), with a focus on publishing conference content, technical symposia, and workshops through electronic channels, specifically the ACM Digital Library, thereby increasing ACM's visibility in the international computing community. Of the six publications from this source, Richardson et al. (2017) has received the highest number of citations (n = 10). That research concerns the use of technology to support outdoor civic learning. Considering this data, it can be stated that ACM-published proceedings also significantly impact the field. As an important note, the conference proceedings source with the highest number of citations is the *Journal of Physics: Conference Series* (n = 35), specifically a paper by Sarosa et al. (2019) that explores teaching citizenship to children using augmented reality.

Distribution of Most Productive and Cited Authors in Publications

We identified the 10 most productive and cited authors. Figure 4 shows the 10 authors with the most publications and the 10 with the most citations. Komalasari and Waghid are the authors with the most publications (n = 3 each), followed by Abdulkarim, Anggraini, Benawa, Chen, Cui, Indrawadi, Kharrufa, and Kovacheva with n = 2 each. The number of publications is relatively stable, with an average publication of 2 documents. At the same time, the diagram also shows the authors with the most citations. The number of citations from the 10 authors shows a dramatic difference between the first three authors, namely Choi, Cristol, and Glassman, who received 124 citations. The other seven authors with the most citations are Chalim, Hakim, Sari, Sarosa, and Suhari, with 35 citations each, followed by F. Waghid and Z. Waghid, with the same number of citations (n = 34).

Figure 4

Top Ten Most Productive and Cited Authors in the OLCE Study

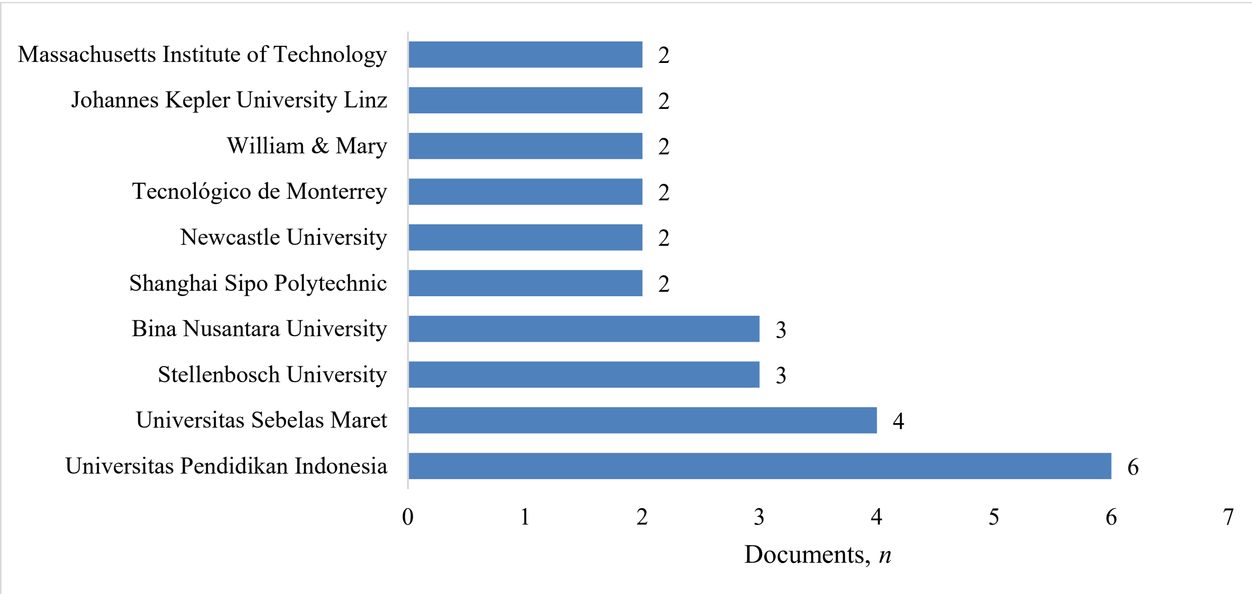


Documents by Affiliation

There are 10 author affiliations credited with the most publications, with a relatively stable trend. The ten affiliations with the most publications are shown in Figure 5, with Universitas Pendidikan Indonesia as the affiliation with the most publications (n = 6), followed by Universitas Sebelas Maret, and Stellenbosch University. The average number of publications of the 10 affiliations is 2.7, meaning that in the last 19 years, all affiliations have been relatively stable. It is important to note that Universitas Pendidikan Indonesia has a complete Civic Education Study Program at the undergraduate, master, and doctoral levels. Thus, OLCE would tend to be a central topic of study for researchers from that university, considering the massive use of digital-based devices and activities.

Figure 5

Number of Published Documents by Affiliation



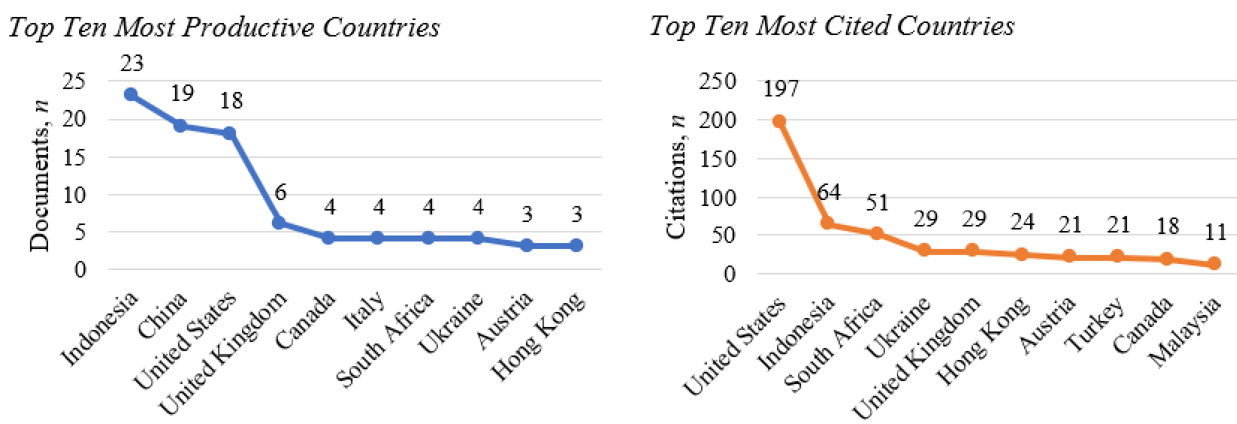
Documents by Country

The 10 countries with the most publications and citations concerning OLCE are also of interest in this study. These are shown in Figure 6, where there is a modest distribution in the category of countries with the highest number of publications. Indonesia has the highest number of publications (n = 23), followed by China and the United States. Seven countries averaged four publications each. This means that publications on OLCE are relatively stable in this category.

There is, however, a reasonably varied distribution of numbers in the countries with the most citations. The United States is in the first position (n = 197), followed by Indonesia and South Africa. Next are Ukraine, the United Kingdom, Hong Kong, Austria, and Turkey. Countries worldwide and almost all continents are represented, as shown in Figure 7.

Figure 6

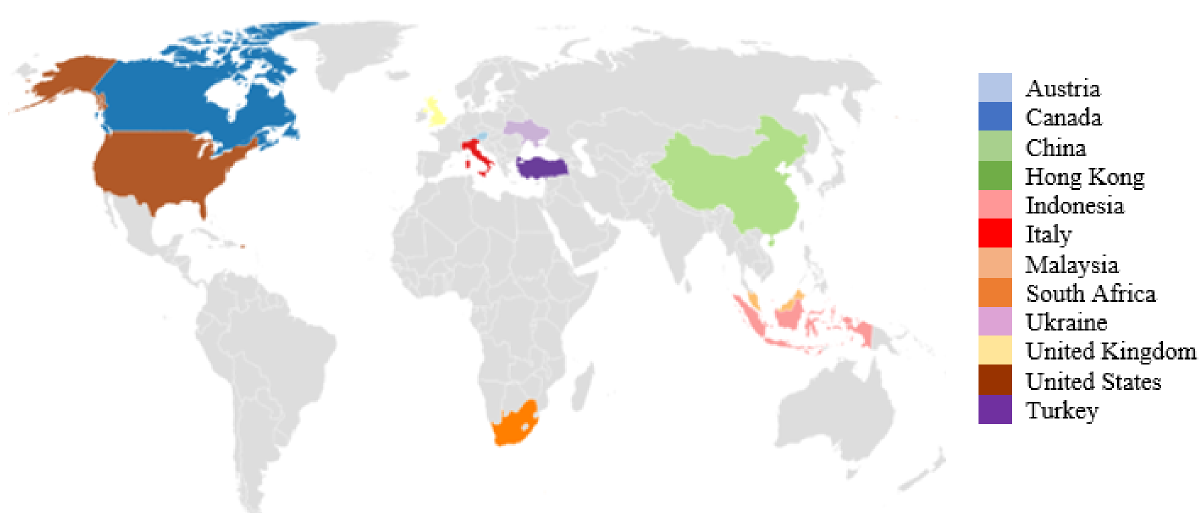
Top Ten Most Productive and Cited Countries in the OLCE Documents



In terms of continental representation, Asia and Europe dominated the publications on OLCE: Indonesia, China, Malaysia, Hong Kong, the United Kingdom, Italy, Ukraine, and Austria all had equal numbers (*n* = 4; countries in Asia and Europe dominate publications in the OLCE field with four publications each). They were followed by the America (*n* = 2) (two countries in america with 2 publications each), namely the United States and Canada, and South Africa from Africa. These findings illustrate that the topic of OLCE has become a study almost all over the world as an implication of technological advances and the emergency conditions during the COVID-19 pandemic.

Figure 7

Number of OLCE Documents and Citations by Country



Note. The map highlights the most productive and most cited countries in OLCE documents. The legend indicates the color representation for each country. Gray areas represent countries that are not part of the dataset.

Documents by Citation Number

Our analysis identified 10 publications with the highest number of citations. Table 2 shows these 10 publications, with a notably varied distribution of numbers. Choi et al. (2017) is in the first position with 124 citations, followed by Sarosa et al. (2019) and Waghid et al. (2018).

Table 2

OLCE Documents Ranked by Number of Citations

Rank	Authors	**Documents Title**	CT	FWCI	VC	CB
1	Choi et al. (2017)	"What it Means to Be a Citizen in the Internet Age: Development of a Reliable and Valid Digital Citizenship Scale"	124	4.83	169	97th
2	Sarosa et al. (2019)	"Developing Augmented Reality-Based Application for Character Education Using Unity with Vuforia SDK"	35	10.88	74	99th
3	Waghid et al. (2018)	"Rupturing African Philosophy on Teaching and Learning: Ubuntu Justice and Education"	34	3.28	18	94th
4	Brinker et al. (2015)	"Inspiring and Informing Citizens Online: A Media Richness Analysis of Varied Civic Education Modalities"	28	0.43	28	51th
5	Ovcharuk et al. (2020)	"The Use of Digital Learning Tools in the Teachers' Professional Activities to Ensure Sustainable Development and Democratization of Education in European Countries"	23	10.07	74	99th
6	Hyett et al. (2019)	"Trialing Virtual Intercultural Learning with Australian and Hong Kong Allied Health Students to Improve Cultural Competency"	21	1.76	54	84th
7	Reich et al. (2016)	"The Civic Mission of MOOCs: Measuring Engagement Across Political Differences in Forums"	21	4.20	38	96th
8	Akbulut et al.	"More Than a Virus: How COVID- 19	19	2.31	25	90th

	(2020)	Infected Education in Turkey?”				
9	Sonn et al. (2021)	“Achievements and Challenges for Higher Education During the COVID-19 Pandemic: A Rapid Review of Media in Africa”	15	1.18	33	76th
10	Huish (2021)	“Global Citizenship Amid COVID-19: Why Climate Change and a Pandemic Spell the End of International Experiential Learning”	12	1.20	57	76th

Note. CT = citation total; FWCI = field-weighted citation impact; VC = views count; CB = citation benchmarking.

Co-Occurrence (Keywords) Trends

Our analysis found keywords using the category of frequent occurrence. It was carried out through co-occurrence analysis on all units of analysis, with the full counting method and the criterion of at least three keywords appearing together from five default models. The analysis results show 56 keywords that meet the threshold out of 794 keywords. Table 3 shows examples of the keywords, categorized in five clusters. Figure 8 is a visualization of the relationships between the keywords. It shows 470 links and 997 total link strength. Link strength indicates the strength of the relationship between keywords based on the frequency of their co-occurrence in the analyzed documents, where the higher the link strength value, the stronger the conceptual relationship between the keywords in bibliometric analysis.

Table 3

Clusters of Keywords by Co-Occurrence in the OLCE Documents

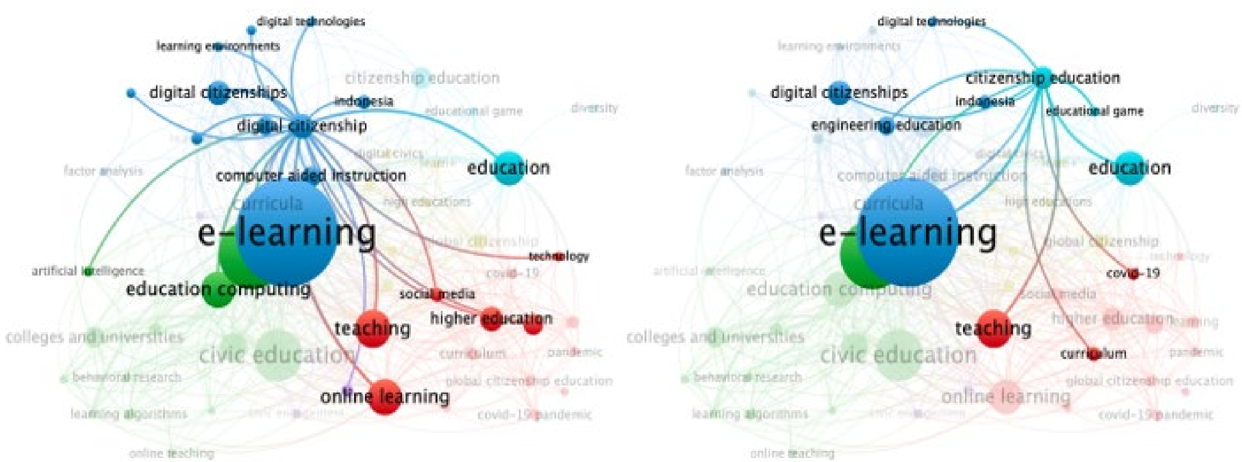
Cluster	Color	Sample keywords	Items, ***n***
1	Red	Artificial intelligence, behavioral research, big data, civic education, colleges and universities, education computing, ideological and political education, learning behavior, learning systems, online teaching	21
2	Green	Citizenship, COVID-19, curriculum, data analysis, global citizenship education, higher education, learning, online learning, social media, technology	15
3	Blue	Computer-aided instruction, digital citizenship, digital citizenship education, digital citizenships, digital technologies, engineering education, factor analysis, learning environments, sustainable development, teachers	10
4	Yellow	Citizenship education, civic learning, digital civics, diversity, education, education game, learn+	7
5	Magenta	Civic engagement, MOOC, surveys	3

Note. Red represents a cluster of keywords that are strongly interconnected, indicating a major thematic area with high co-occurrence frequency; Green represents a distinct but related thematic group, often signifying a secondary or emerging research focus; Blue indicates another key cluster, often reflecting a complementary or alternative research direction within the broader topic; Yellow represents a smaller or more specialized thematic grouping, often connected to interdisciplinary or niche topics; Magenta denotes a minor yet relevant cluster, typically associated with specific case studies, recent trends, or exploratory research directions.

The dominant main themes, significant supporting themes, and several specific sub-themes shown in Table 3 form a map of research trends in OLCE. This reflects the complexity and depth of this field of study and shows that the topic is broad and rich with multiple perspectives and approaches. Unfortunately, from the networking that has been established, OLCE has yet to be optimized for assessment purposes, be it self-assessment or peer assessment. This could be a topic for future research.

Figure 8

Visualization Co-occurrence (Keywords) Analysis



Note. The color grouping in this visualization aims to make it easier to read, indicating that the redder the color, the more terms are discussed in the document, while the bluer the color, the fewer terms are discussed in the document.

Our analysis identified these 10 keywords which occurred most often among the research documents: e-learning, students, civic education, teaching, educational computing, online learning, education, learning system, curriculum, and higher education. . Furthermore, the overlay visualization showed that in the range of 2018 to 2024, there are keywords in yellow nodes, namely colleges and universities, learning algorithms, behavioral research, learning behavior, ideological and political education, big data, k-means clustering, learn+, and higher education. Researchers widely used some of these keywords in OLCE studies in 2024.

Title and Abstract Trends

We enriched the visualization analysis on the title and abstract term trends, using the field to extract the term in the title and reducing the field with the full counting method. The minimum number of occurrences of a keyword was set at five from the default model of 10, thus forming 231 that meet the threshold of 3,294 terms. In the chosen number of terms display, the default option was to select 60% of the most relevant terms; the number of terms selected then was 139. This resulted in five clusters, 2,932 links, and 13,860 total link strength (See Table 4)

Table 4

Clusters of Keywords by Title and Abstract in the OLCE Documents

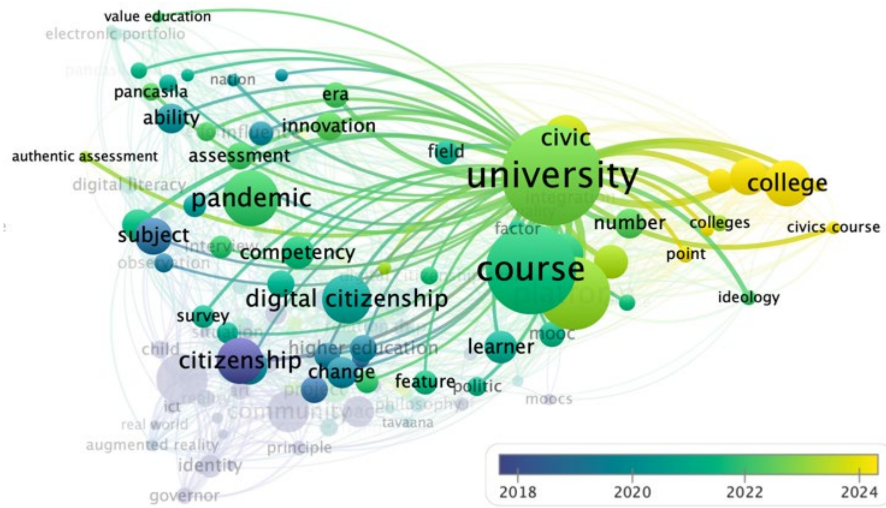
Cluster	Color	Sample terms	Items, ***n***
1	Red	Augmented reality, character education, citizenship, community, digital competency, digital environment, digital resource, digital technology	40
2	Green	Civic knowledge, civic learning, global citizenship, global citizenship education, higher education, higher education students, massive open online course, MOOCs, online teaching	37
3	Blue	Assessment, authentic assessment, citizenship learning, digital learning environment, digital literacy, electronic portfolio, Pancasila education, pandemic, self assessment, value education	30
4	Yellow	Behavior, big data technology, civics course, college student, ideology, integration, online course, political education, resource	21
5	Magenta	Course, creation, digital citizenship education, digital citizenship skills, focus, individual, learner, MOOC, quality, undergraduate students	11

Note. Red represents a cluster of keywords that are strongly interconnected, indicating a major thematic area with high co-occurrence frequency; Green represents a distinct but related thematic group, often signifying a secondary or emerging research focus; Blue indicates another key cluster, often reflecting a complementary or alternative research direction within the broader topic; Yellow represents a smaller or more specialized thematic grouping, often connected to interdisciplinary or niche topics; Magenta denotes a minor yet relevant cluster, typically associated with specific case studies, recent trends, or exploratory research directions.

Table 4 also shows the clusters of terms and thus, the OLCE research trends. Once again, we highlight the term “assessment” in OLCE learning since assessment is both essential and complex. If teachers maximize technology to assess student learning outcomes and experiences, they can record and manage student learning data more safely and accurately. If we look at Table 4 and the visualization in Figure 9, assessment has appeared in the OLCE research trends. Unfortunately, terms related to assessment, such as “authentic assessment,” “assessment,” and “electronic portfolio” have formed a network with the term “university,” but when tracked using the term “digital citizenship,” there is no evidence of networking. This finding may indicate an opportunity for future exploration so that digital platforms are more directly and consistently linked to assessment-related activities.

Figure 9

Visualization Title and Abstract Analysis



Note. VOSviewer (https://www.vosviewer.com/).

In the title and abstract analysis, the 10 terms with the highest occurrence were: university, course, platform, pandemic, game, digital citizenship, college, civic, citizenship, and community.

Discussion

The limited number of bibliometric studies in citizenship education indicates the need for research mapping in this field, especially regarding OLCE. In the Scopus database, we found only one study which mapped research on citizenship education in general from 1975 to 2020 using bibliometric analysis (Bozkurt et al., 2021). However, that study did not address the aspect of online learning in citizenship education. This means that our study can fill the gap in previous research and provide a new perspective, emphasizing that investigating OLCE remains a future research need. It is not only the limited number of studies on OLCE, but also the need for more clinical investigations that we highlight. It is vital for strategic recommendations that apply to teachers who integrate technology in supporting decisions related to developing student learning outcomes in civic education.

The field of computer science is known to have the highest number of research publications (Sanz-Prieto et al., 2024; Vanitha & Alathur, 2023; Zhang, 2024), which reflects the importance of computers in supporting activities across life fields (Arsić & Milovanović, 2016), making computer science an appropriate area for further publication, including in the field of OLCE. The analysis also shows that research on OLCE can be studied from various perspectives, not limited to social science (El Massoudi, 2024; Mullen, 2021; Sriwisathiyakun & Dhamanitayakul, 2024), but also of particular interest in the fields of engineering (Sun, 2024), mathematics (Jing, 2024; Li, 2024), arts and humanities (Kovacheva & Dimitrova, 2017; Montessori et al., 2024), physics and astronomy, environmental science (Occhioni et al., 2023), earth and planetary sciences (Occhioni et al., 2023; Sharov et al., 2023), business, management, and accounting (Cho et al., 2024; Liu & Ni, 2024), and medicine (Perla et al., 2022; Sonn et al., 2021).

It is worth noting that "Rupturing African philosophy on teaching and learning: Ubuntu justice and education" (Waghid et al., 2018) had the highest total link strength. In substance, this book explores African educational philosophy and the application of Ubuntu justice through a MOOC on teaching for change. The author argued that critical, reflective, and compassionate pedagogical interactions can promote just and democratic human relations and foster decolonization in African higher education settings. Concepts of justice, equality, and democracy are core substances of citizenship education (Blevins, 2022; Bringle & Clayton, 2023; Jaffee, 2022; Kennedy, 2019; Kim & Kwon, 2023; Quinn & Bauml, 2018).

In addition, Choi et al. (2017) was the article with the highest number of citations (n = 124). This publication focuses on developing a comprehensive Digital Citizenship Scale (DCS) to measure youth's abilities, perceptions, and participation levels in Internet-based communities. This study is certainly of public interest, given the importance of digital citizenship in the context of 21st-century citizenship education (Althibyani & Al-Zahrani, 2023). This publication's metrics showed a FWCI of 4.83 and a CB score of 97th, indicating that the article is highly influential in the OLCE research field, with a citation performance above average or more cited than expected. Sarosa et al. (2019) is also noteworthy, with only 35 citations but surpassing Choi et al. (2017) in both the FWBI (10.88) and CB score (99th) categories. It, too, has a massive influence on OLCE research.

Analysis of the co-occurrence of keywords confirms that there is a strong research trend on the topic of OLCE, as shown by the network of civic education keywords connected to strategic and diverse keywords such as online learning (red), virtual reality (yellow), e-learning (blue), digital citizenship (magenta), and MOOC (magenta), and in the green cluster, also connected to online teaching. Further research is needed, considering that in almost two decades (2005–2024), only 123 publications were found. The links between civic education and several strategic keywords are still quite far apart, with minor nodes, and include terms such as digital citizenship, artificial intelligence, MOOC, and social media. Some of these keywords are strategic in the current OLCE constellation (Mahadir et al., 2021; Waghid, 2021; Yeomans et al., 2018); the keyword "global citizenship education" as a movement to actualize civic education in an international context (Kenyon & Christoff, 2020; Silva & Lourenço, 2023) has not been directly connected to civic education research.

The term "ChatGPT," despite it being the most influential OpenAI for citizens' lives globally today (Chauncey & McKenna, 2023; Pursnani et al., 2023), has yet to appear in the network, indicating that there is still very little or no research about it and civic education. In addition, colleges and universities, learning algorithms, behavioral research, and several other terms appear in the overlay visualization, indicating that the latest research in 2024 on the topic of OLCE continues to be conducted from various perspectives, concentrated however at the higher education level (Cui, 2024b; Liu, 2024).

Conclusion and Implications

Co-occurrence analysis using all units of analysis found that the term "online learning" appeared 16 times. The word "e-learning" as a synonym for online learning appeared the most (*n* = 60), and the keyword "civic education" appeared 25 times. These three keywords have relatively large nodes with close distances, clearly visualized in the VOSviewer network. This proves that in the last 19 years, research on OLCE has been the concern of researchers, for example, Choi et al. (2017), Sarosa et al. (2019), Brinker et al. (2015), and Ovcharuk et al. (2020). However, further research is needed on several strategic keywords in the context of OLCE with relatively small nodes, such as massive open online courses (MOOCs), while other keywords are at a greater distance, such as digital citizenship, artificial intelligence, and social media. Even in the visualization, the keyword "global citizenship education" has not been directly connected to civic education, and the term "ChatGPT" has not appeared at all. This means that these terms have the potential to be applied in further research.

In addition to mapping publications on OLCE over the past 19 years, this study also makes essential contributions for researchers and institutions wishing to explore, innovate, and develop further understanding on the topic of OLCE. This study has some limitations arising from the nature of the bibliometric approach. For example, the research findings are based on only 123 publications from the Scopus database; publications from other databases were not included. In addition, the keywords in civic education were limited to civic education and citizenship education, so publications using social science keywords were not analyzed. We recommend that future research add other databases and social science keywords to obtain more comprehensive analysis results.

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Exploring the Relationship Among Preservice Teachers' E-Learning Readiness, Learning Engagement, and Learning Performance in HyFlex Learning Environments

Alvin M. Ramos, Hyunkyung Lee*, and Romualdo A. Mabuan
*Institute of Education, Far Eastern University, Manila, Philippines; *Corresponding author*

Abstract

This study investigated the relationship among e-learning readiness, learning engagement, and learning performance of preservice teachers in HyFlex learning environments. To identify the causal relationship, data collected from 776 preservice teachers at four universities in the Philippines were analyzed using structural equation modeling (SEM). The results indicated that e-learning readiness and learning engagement are significantly related to students' perceived learning performance. In addition, e-learning readiness mediates the relationship between learning engagement and learning performance. Given that the educational landscape has been transcending conventional delivery methods and now includes the HyFlex modality, education designers and learning facilitators must create dynamic and holistic learning delivery to enhance students' e-learning readiness and learning engagement. Moreover, a student's learning engagement may not be sufficient to predict the learning outcomes solely without the help of e-learning readiness in HyFlex learning environments. Findings shed light on which e-learning readiness construct is paramount for effective HyFlex learning environment design in education.

Keywords: HyFlex learning environment, learning engagement, e-learning readiness, learning performance, preservice teachers

Introduction

The ever-evolving 21st century presents significant challenges to traditional education models. Economic instability (Calder, 2019; Kroher et al., 2022; McClellan & Argue, 2022), global pandemics (Gilead & Dishon, 2021; OHHLEP, 2023), and escalating conflicts (Bendavid et al., 2021) disrupt learning continuity and necessitate adaptable teaching methods. In this context, preservice teachers must have multimodal competencies to address these challenges effectively. Preparing preservice teachers for the complexities of modern education ensures they can implement innovative and flexible teaching strategies, meeting the diverse needs of learners in an evolving educational landscape.

HyFlex learning offers a promising solution by enabling flexible and inclusive education across various delivery modes, thus improving access for students in remote areas (Beatty, 2014; Wong et al., 2023). HyFlex learning is an innovative educational approach that seamlessly integrates face-to-face, online synchronous, and asynchronous learning into a unified framework (Beatty, 2019). This model empowers students with the flexibility to choose their mode of participation based on their individual needs and preferences.

In response to the challenges posed by the COVID-19 pandemic and the limitations of traditional face-to-face and fully online modalities, numerous universities shifted to the HyFlex learning environment. While blended learning provides a combination of in-person and online learning, it lacks the flexibility that HyFlex offers. In the HyFlex learning environment, students have the agency to choose their mode of participation based on their individual needs, whether in-person, synchronous, or asynchronous, making it a more adaptable and inclusive approach. HyFlex empowers students with greater autonomy over their educational choices and fosters dynamic engagement, which contributes to improved learning performance (Mahande et al., 2024; Miller et al., 2021; Nelson et al., 2022; O'Ceallaigh et al., 2023).

Student engagement in HyFlex learning environments is crucial for active learning and achievement. Central to the HyFlex framework is the principle of fostering meaningful participation and engagement across all modalities, ensuring equitable opportunities to meet learning objectives (Beatty, 2019; Maloney & Kim, 2020). The HyFlex model merges in-person and online modalities, ensuring academic rigor and inclusivity for diverse student populations (Amiruddin et al., 2024; Mahande et al., 2024). However, there is a pressing need for a deeper understanding of how engagement affects students, considering the complexity of their learning experiences, the limitations of their educational settings, diverse learning styles, and different levels of tech skills.

On the other hand, e-learning readiness is a cognitive construct that prepares a student for online and HyFlex learning environments (Beatty, 2014; Çebi, 2022). This readiness aids students' online engagement, which influences their progress (Loock et al., 2022) and outcomes (Dikbas Torun, 2020), as reflected in grades, test scores, and cohort performances. HyFlex creates a fluid learning continuum transcending class disruptions from unforeseen natural and anthropological events by providing teachers and students with alternative learning routes (Beatty, 2014). In this way, HyFlex learning design ensures continuity of education during challenging times (Moorhouse & Tiet, 2021).

Exploring the impact of e-learning readiness and learning engagement is essential due to observed discrepancies in student performance between online and traditional face-to-face settings (Dendir, 2018). While students in online environments may achieve higher grades and test scores, they often exhibit less dynamic learning progress compared to their counterparts in face-to-face classes. This highlights the importance of e-learning readiness, influenced by factors such as individual aptitude, socioeconomic status, and gender, in enhancing online and hybrid learning experiences (Sinecen, 2018). Moreover, universities offering HyFlex models have seen declining graduation and completion rates over the past four years in Southeast Asian countries, including the Philippines, Vietnam, Cambodia, and Thailand, with 35.4% of university students dropping out annually (Yeung, 2022). Critical reasons for student attrition in these settings include lack of personal interest, technological challenges, and isolation (Parreño, 2023; Takács et al., 2023; Willging & Johnson, 2019).

Recent research underscores the importance of active student engagement and classroom collaboration in boosting motivation (Korpershoek et al., 2020) and academic competence (Demir & Karabeyoglu, 2016). Despite this, there is a significant gap in understanding these dynamics within HyFlex learning environments, where the role of online engagement in enhancing learning outcomes still needs to be explored (Beatty, 2014; Wong et al., 2023). Furthermore, the potential of e-learning readiness to predict academic success has yet to be extensively studied (Sukor et al., 2021). This highlights the need for more focused research in these areas, considering their implications for student performance.

This research unveils the mediating role of e-learning readiness in predicting learning engagement and performance among preservice teachers. Specifically, this research seeks to explore the following:

1. What is the relationship among preservice teachers' learning engagement, e-learning readiness, and learning performance in HyFlex learning environments?

2. What is the mediating effect of e-learning readiness between preservice teachers' learning engagement and performance in HyFlex learning environments?

Literature Review

Learning Engagement and Performance in HyFlex Learning Environments

The need for a more flexible modality that supports the complexities of the learning environment necessitates institutions to ideate a model providing multiple pathways to access course content, with the HyFlex learning environment seen as paramount. As institutions increasingly adopt this model, it plays a vital role in shaping students' performance. Consequently, preservice teachers must be equipped to navigate these nuances, with HyFlex as a viable tool for 21st-century educational progression.

Understanding and fostering learning engagement within HyFlex environments is critical. Learning engagement is a multifaceted construct that includes cognitive, emotional, and behavioral components, influencing students' active participation in the educational process (Calonge et al., 2024; Pietarinen et al., 2014; Rosen, 2021). These dimensions are interrelated and collectively shape students' learning experiences. Cognitive engagement involves the mental processes employed during learning activities, such as critical thinking, problem-solving, and deep information processing (Asay & Curry, 2003; Li et al., 2021). Research suggests challenging tasks and intellectual stimulation promote cognitive engagement, improving learning outcomes (Shin & Bolkan, 2020). Emotional engagement encompasses the affective aspects of learning, such as students' attitudes, interests, and motivation towards a particular subject area (Li & Lerner, 2012). Emotional engagement is closely tied to motivation: when students feel a sense of belonging or personal relevance in their learning, they are more likely to be emotionally invested, resulting in increased motivation and improved learning outcomes (Ozkan Bekiroglu et al., 2021; Pietarinen et al., 2014).

Various elements influence the degree of student engagement in the learning process. Teacher-student relationships, classroom environment, and motivation are significant in student engagement (Dikbas Torun, 2020). In HyFlex learning environments, engagement can be particularly challenging due to the diverse modes of participation, such as in-person, online synchronous, and online asynchronous. Studies suggest that well-designed HyFlex courses, which provide clear communication, structured activities, and support across all modalities, can foster high levels of engagement (Beatty, 2019; Miller et al., 2021).

This thoughtful integration is crucial for not only enhancing engagement but also improving learning performance. Learning performance in the HyFlex model encompasses a range of metrics designed to evaluate the efficacy of this educational approach. Several studies investigated HyFlex and its influences on students' academic performance and perceived learning satisfaction (Amiruddin et al., 2024; Matta, 2022). For example, Beatty (2019) used a mixed-method approach to assess academic outcomes in HyFlex courses, finding that students performed comparably to their peers in traditional settings while expressing higher satisfaction levels due to the flexible learning options. Similarly, Stewart and Bishop (2020) conducted a longitudinal study that revealed improved retention rates among HyFlex students, attributing this to the increased autonomy and accessibility of course materials. However, not all findings are uniformly positive; some research indicates potential challenges in maintaining consistent instructional quality and student engagement across modalities (Ugwu, 2021).

E-Learning Readiness and Learning Performance in HyFlex Learning Environments

The escalating prevalence of HyFlex learning modalities has generated scholarly interest in elucidating the influence of e-learning readiness on student learning performance (Wang et al., 2022). E-learning readiness endows students with a foundational comprehension of technology, fostering a sense of familiarity with the digital tools integral to HyFlex environments. According to Wagiran et al. (2022), augmented technological competence empowers students to participate in classroom interactions actively facilitating a more seamless technology integration into their educational milieu. Empirical studies suggest that students with well-developed e-learning readiness exhibit heightened classroom engagement, manifested through enhanced participation and adept use of technological resources (Karagöz et al., 2023). Moreover, individuals with a higher degree of e-learning readiness tend to demonstrate elevated levels of agency and self-efficacy (Dikbas Torun, 2020). This intrinsic self-regulation, coupled with a robust motivational orientation towards academic success, amplifies performance within the dynamic milieu of HyFlex learning environments (Kabir et al., 2021). Karagöz et al. (2023) affirmed that motivated students are more likely to adapt to the flexible nature inherent in HyFlex courses, establishing a positive correlation between e-learning readiness and academic achievement.

Beyond technological adeptness and self-regulation, e-learning readiness is pivotal in shaping the pedagogical dimensions of instruction and learning within HyFlex environments. Students with sophisticated e-learning readiness demonstrate a discerning comprehension of digital education's pedagogical strategies (Karagöz et al., 2023; Wagiran et al., 2023). This familiarity significantly influences their educational outcomes, enabling them to proficiently navigate and leverage technology to enhance their comprehension of course content (Dikbas Torun, 2020). The HyFlex model, which integrates in-person and online learning pathways, relies on students' preparedness to engage with digital learning platforms and tools (Karagöz et al., 2023; Wagiran et al., 2022; Wang et al., 2022).

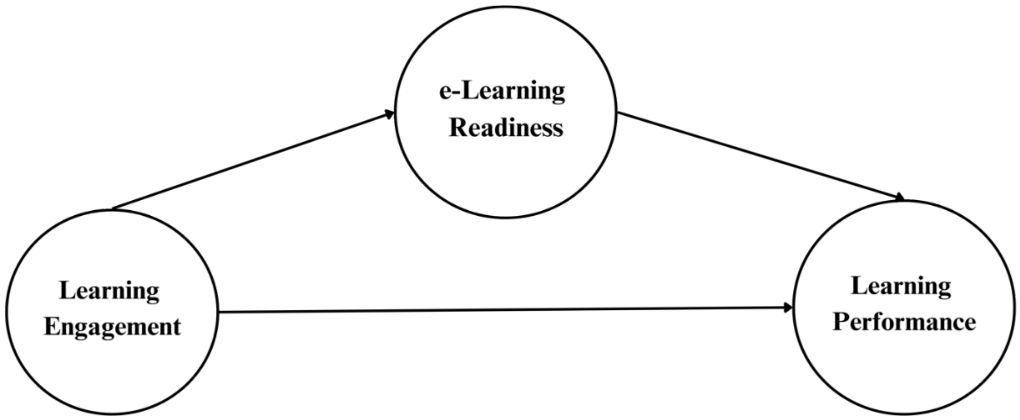
E-learning readiness fosters autonomy, empowering students to self-regulate, think critically, and adapt to hybrid learning (Ucar & Yusuf, 2023). This autonomy is central to HyFlex environments, where students control how and when they learn, making readiness a key to success (Beatty, 2014; O'Ceallaigh et al., 2023). E-learning readiness enhances interactions with peers and teachers across online and in-person settings by bridging engagement and performance. These stronger connections drive improved learning outcomes in HyFlex environments.

E-learning readiness is indispensable for fruitful online engagement and academic success in HyFlex environments. Ji et al. (2022) found a substantial positive link between students' e-learning readiness, engagement, and satisfaction. Their study indicated that higher readiness led to greater satisfaction at the start of the semester, while learner engagement was a key predictor of sustained satisfaction toward the end of the course. This enhanced level of interaction catalyzes deeper academic engagement (Knapp, 2020), directly improving learning outcomes (Anwar et al., 2022). Therefore, students with robust e-learning capabilities are uniquely poised to excel in HyFlex learning modalities. The essence of the HyFlex learning model underscores the transformative impact students' perceptions of learning have on their academic performance. Indicators such as student satisfaction with the learning experience and their determination to persist are pivotal in determining the effectiveness of HyFlex learning environments. E-learning readiness skills are crucial for amplifying student engagement and demonstrating autonomy in merging learning engagement with e-learning readiness.

This research focuses on the pivotal role of e-learning readiness in enhancing student performance within HyFlex models. Acknowledging the multitude of factors affecting student success, this study examines how preparedness for e-learning fundamentally equips students with the necessary technological skills and self-directed learning abilities. These competencies are crucial for active learning engagement and critical drivers for effective participation and knowledge acquisition in HyFlex settings. Based on findings from previous studies about the relationships among learning engagement, e-learning readiness, and learning performance in HyFlex environments, we proposed the research model shown in Figure 1 and two hypotheses.

Figure 1

Hypothesized Research Model



H_1. Learning engagement will directly influence preservice teachers' learning performance in HyFlex learning environments.

H_2. E-learning readiness will mediate the relationship between preservice teachers' learning engagement and learning performance in HyFlex learning environments.

Theoretical Framework

This study draws on self-determination theory (SDT; Deci & Ryan, 1985), which posits that the fulfillment of autonomy, competence, and relatedness is essential for cultivating intrinsic motivation and facilitating optimal functioning in educational settings. SDT proposes that optimal engagement and performance are contingent upon the satisfaction of individuals' basic psychological needs. In the context of HyFlex learning environments, the theoretical tenets of SDT offer a robust framework for elucidating the complex interplay between e-learning readiness, learning engagement, and learning performance. Within HyFlex models, autonomy is a central tenet, enabling students to exercise choice regarding the temporal, spatial, and modal aspects of their learning engagement. E-learning readiness facilitates this autonomy by providing students with the technological proficiency and self-directed learning skills required for effective navigation of flexible learning modalities. Students demonstrate competence in HyFlex environments by mastering their technological and cognitive demands. High e-learning readiness builds competence by increasing confidence in using digital tools, managing time, and adapting to HyFlex instruction. Relatedness encompasses students' ability to form meaningful relationships with peers and instructors irrespective of the learning platform, whether face-to-face or online. This study hypothesizes that greater e-learning readiness leads to higher learning engagement and performance through facilitated interaction in hybrid settings. SDT provides a particularly apt theoretical lens for this study, as it highlights the intrinsic motivations and skills necessary for effective engagement in HyFlex learning contexts. By considering e-learning readiness as a mediator, this framework explains how students' psychological needs and technological preparedness affect engagement and academic performance.

Method

Participants

This study engaged preservice teachers from four universities in the Philippines, who were enrolled in HyFlex learning environments. In these learning environments, students had the autonomy to choose their mode of participation—face-to-face, online (synchronous or asynchronous), or a hybrid format relative to their needs and circumstances. This flexibility enabled students to engage with the course either through on-campus attendance or remotely via the learning management system (LMS) or synchronous online sessions.

Out of 1,197 preservice teachers enrolled across four universities, a total of 776 students participated in the study. One hundred students attended face-to-face classes on campus, 64 participated in synchronous online sessions via video conferencing, 32 accessed self-paced materials through the LMS, and 1,001 alternated between face-to-face and online participation, based on their needs. Among the respondents, 452 (58%) were male and 324 (42%) were female. The participants' ages ranged from 19 to 25 (see Table 1). The four universities facilitated HyFlex learning environments by offering face-to-face and synchronous online classes concurrently, enabling real-time interaction across both modes. Asynchronous learners engaged independently through the LMS but had access to the same resources and support structures as their peers. Additionally, specific academic activities (i.e., assessments, practicum sessions, and other critical in-person requirements) necessitated on-campus attendance for all students, regardless of their primary participation mode. This structure preserved flexibility while incorporating essential face-to-face components, ensuring meaningful interaction with instructors, peers, and course content.

A proportional stratified sampling technique was adopted to determine the total number of participants from the Bachelor of Secondary Education and Bachelor of Elementary Education programs across the universities. An online questionnaire was distributed to students via email and in-class facilitation. The questionnaire, consisting of 36 items concerning demographic characteristics, perceived learning engagement, e-learning readiness, and learning performance, took 15–20 minutes to complete. It was distributed via Microsoft Forms through the LMS and institutional email, with reminders sent three days before the deadline to encourage participation. Students were informed during virtual classes and group chats to ensure accessibility.

Table 1

Demographic Characteristics of Participants

Characteristic	*n*	%
Gender		
Male	452	58
Female	324	42
Age		
19–20	240	31

21–22	338	43
23–25	198	26
Program Level		
First year	166	21
Second year	120	16
Third year	236	30
Fourth year	254	33

Note. *N* = 776.

Measures and Data Analysis

This study employed six scales to measure the three constructs: learning engagement, e-learning readiness, and learning performance. Learning engagement was evaluated using Dixson's (2015) questionnaire, focusing on collaborative and performance engagement. The survey statements included, for example, "I actively participate in group discussions or peer feedback activities." E-learning readiness was assessed based on students' technological confidence, training, abilities, and technology access, adapted from Doculan (2016). Examples of the survey statements included: "I have attended workshops on online learning"; and "I can modify and add content using a learning management system."

Meanwhile, learning performance was measured by students' perceived learning satisfaction, career preparedness, and learning persistence. These factors were deemed more appropriate than achievement to measure students' learning performance. This is because the study focuses on a HyFlex learning environment, where students engage through various modes of participation. Direct measures of learning (i.e., assessment and task performance) may not fully capture the diverse and flexible ways in which students interact with their peers, teachers, and course content. That is why these measures better capture vital dimensions of their robust learning experience, participation, and long-term success. Sample survey statements included: "I feel a sense of accomplishment while studying with HyFlex learning"; and "HyFlex learning enhances my academic standing."

Learning satisfaction refers to the degree to which learners perceive HyFlex learning positively. Career preparedness measures the impact of exposure to various instructional formats in the HyFlex learning environment on future teaching style and approach. Learning persistence assesses the degree to which learners are committed to continuing and completing courses in a HyFlex learning environment. Perception of learning is a strong predictor of both continued engagement and learning transfer, which are crucial for preservice teachers transitioning into in-service roles. As future-ready educators, they must effectively apply their learning in the 21st-century classroom (Lee & Lee, 2018). The scales were pilot tested with 80 students from three universities. The computed Cronbach's alpha values for e-learning readiness, learning engagement, and learning performance were .819, .889, and .931, respectively (see Table 2).

Structural equation modeling was used to test the hypothesized research model and the proposed hypotheses. Data collected from the questionnaire were analyzed using IBM SPSS (Version 26.0) for descriptive statistical analysis and IBM SPSS AMOS (Version 23.0) for structural equation modeling.

Table 2

HyFlex Learning Environment Survey Instrument Variables and Their Reliability

Variable		Description	Reference	Items,	Reliability
Latent	Measured			*n*	coefficient
E-learning readiness	Technology access	The level of students' access to computers, mobile devices, applications, and connections for Hyflex learning.	Doculan (2016)	4	.71
	Technology confidence	The level of students' confidence in operating apps on computers or mobile devices relative to the Hyflex environment.		4	.72
	Training	The level of students' training in Internet surfing relative to online synchronous and asynchronous learning.		4	.83
	Ability	The level of a student's ability to operate and interact inside a Hyflex environment.		5	.82
Learning engagement	Collaborative	Students work within a small group, group discussion, and in-class activities.	Dixson (2015)	7	.72
	Performance	Achieving a good class standing during exams, quizzes, or any activities.		5	.78
	Emotional	The students' affective response toward the facilitation of learning	Zhu et al. (2023)	5	.92

		in a Hyflex environment.			
Learning performance	Satisfaction	The degree to which a learner perceives positively regarding Hyflex learning.	Shin & Chan (2004)	5	.86
	Persistence	The degree to which a learner deems to continue and finish a course in a Hyflex environment.	Guiffrida et al. (2013)	7	.89
	Career preparedness	The extent to which students perceive that the Hyflex environment adequately equips them for their chosen career path.	Wang et al. (2023)	5	.85

Results

Descriptive Statistics and Correlations of Measured Variables

The measured variables' means, standard deviations, skewness, and kurtosis were analyzed to identify whether the data met the multivariate normality assumption. Correlations were also examined to check the strength of the relationships among the measured variables of the latent constructs (i.e., learning engagement, e-learning readiness, and learning performance).

Table 3 shows the mean, standard deviation, skewness, and kurtosis values of the measured variables. The results confirm that the data meet the normality assumption for structural equation modeling (Browne & Cudek, 1992; Sovey et al., 2022). Moreover, e-learning readiness and learning engagement show a significant correlation at the alpha level of .01.

The Direct Effect of E-Learning Readiness and Learning Engagement on Preservice Teachers' Learning Performance

Anderson and Gerbing (1988) recommended a two-step approach. The first step was to confirm the adequacy of the measurement model, and the second was to test the structural model. We began by adjusting the items for each measured variable using the item-parceling method. Given that the study's scales contained 51 items, which were grouped into 10 parcels, each parcel consisted of four to seven items.

Table 3

Descriptive Statistics and Correlations of Measured Variables

Variable	1	2	3	4	5	6	7	8	9	10
1. TA	-									
2. TC	.815**	-								
3. T	.792**	.780**	-							
4. A	.384**	.383**	.429**	-						
5. CE	.615**	.505**	.509**	.370**	-					
6. PE	.763**	.729**	.728**	.361**	.543**	-				
7. EE	.747**	.712**	.696**	.376**	.517**	.823**	-			
8. LS	.762**	.720**	.711**	.424**	.495**	.721**	.761**	-		
9. LP	.786**	.761**	.726**	.386**	.525**	.765**	.762**	.798**	-	
10. CP	.808**	.753**	.765**	.412**	.535**	.769**	.745**	.816**	.834**	-
M	3.404	3.302	3.458	3.304	3.673	3.440	3.392	3.537	3.500	3.717
SD	.874	.849	.811	.813	.881	.778	.875	.866	.815	.895
Skewness	-.483	-.372	-.561	-.218	-.400	-.335	-.290	-.601	-.374	-.664
Kurtosis	.198	.124	.533	-.178	-.189	.600	.011	.145	.130	.232

Note. TA = technology access; TC = technology confidence; T = training; A = ability; CE = collaborative engagement; PE = performance engagement; EE = emotional engagement; LS = learning satisfaction; LP = learning persistence; CP = career preparedness.
** $p < .01$

Next, fit indices of the measurement model and factor loadings between the measured variables and latent construct were examined to assess the goodness and validity of the models based on this item-parceling (Lee & Lee, 2018). Factor loadings, first used to verify that the measured variables had a reasonable level of convergent validity to assess the latent variable, are shown in Table 4.

Table 4

Factor Loading Estimates in the Measurement Model

Variable		*B*	*β*	*SE*	*t*
E-Learning readiness	→ Technology access	1.140	.920	.022	37.385***
	→ Technology confidence	1.063	.884	.031	34.415***
	→ Training	1.000	.869	.030	37.851*
	→ Ability	.520	.451	.040	14.161***

Learning engagement	→ Collaborative engagement	.685	.610	.036	19.255***
	→ Performance engagement	.902	.910	.024	38.172***
	→ Emotional engagement	1.000	.896	.024	36.217***
Learning performance	→ Learning satisfaction	1.000	.880	.032	39.897***
	→ Learning persistence	.969	.907	.026	37.813***
	→ Career preparedness	1.080	.922	.028	39.219***

*$p < .05$. ***$p < .001$.

Then we selected four criterion indices to measure fit: chi-square value, Tucker-Lewis index (TLI), comparative fit index (CFI), and root-mean-square error of approximation (RMSEA). These indices were chosen primarily because they are less sensitive to sample size despite the complexity of the model. The goodness of fit indices for the measurement model were used to estimate the convergent and discriminant validity of the measured variables.

The correlation coefficients among the latent variables ranged from .374 to .822, indicating that each latent variable was distinct. Since all variables in the measurement model were adequate for estimating the structural model, the hypothesized structural model was examined. As shown in Table 5, the fit indices of the structural model indicated a good fit for the data.

Table 5

Goodness of Fit Measure for Hypothesized Structural Model

Fit measure	X^2	*df*	TLI	CFI	RMSEA	
					Value	95% CI
Value	159.614 (p = .000)	32	.975	.982	.072	[.061, .083]
Recommended values			>.900	>.900	<.080	

Note. TLI = Tucker-Lewis index; CFI = comparative fit index; RMSEA = root-mean-square error of approximation. CI = confidence interval.

Based on the fit of the structural model, the statistical significance of all path coefficients in the original structure was examined. Table 6 shows that all path coefficients (i.e., learning engagement → e-learning readiness; learning engagement → learning performance; e-learning readiness → learning performance) were statistically significant. Therefore, there was no need for model trimming (Lee & Lee, 2018).

Table 6

Path Coefficients of the Hypothesized Structural Model

Variable		*B*	*β*	*SE*	*t*
Learning engagement	→ E-learning readiness	.914	.822	.028	29.457***
	→ Learning performance	.384	.374	.059	6.371***
E-Learning readiness	→ Learning performance	.590	.638	.066	9.65***

***$p < .001$.

Mediating Effect of E-Learning Readiness

Since e-learning readiness seemed to play a pivotal role in the final structural model, the mediating effect of this construct was tested using bootstrapping. Table 7 displays the overall path estimates on the direct, indirect, and total impact on e-learning readiness, learning engagement, and learning performance.

Table 7

The Direct, Indirect, and Total Effect of E-Learning Readiness on Learning Engagement and Learning Performance

Path		*B*			*β*		
		Direct effect	Indirect effect	Total	Direct effect	Indirect effect	Total
Learning engagement	→ E-learning readiness	.822		.822**	.914		.914**
Learning engagement	→ Learning performance	.374		.374	.384		.384
E-learning readiness	→ Learning performance	.638	.525	.638**	.59	.539	.590**

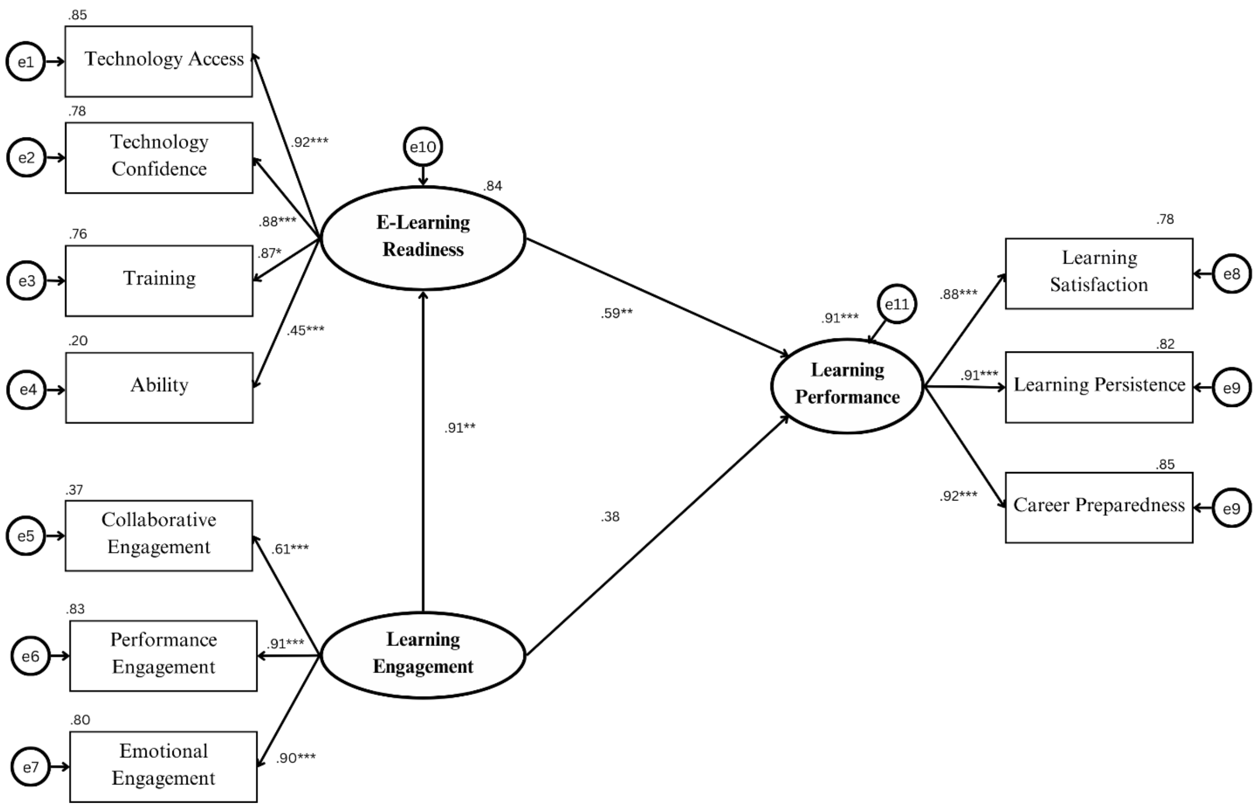
**$p < .01$.

Table 7 also shows the mediating role of e-learning readiness. E-learning readiness was statistically significant on learning engagement and learning performance. The direct effect of learning engagement on learning performance was not statistically significant when e-learning readiness was included, indicating that e-learning readiness had a full mediating effect between learning engagement and learning performance.

As a result of this analysis, all path coefficients in the final statistical model and the relationship among learning engagement, e-learning readiness, and learning performance were identified and are presented in Figure 2.

Figure 2

Standardized Path Coefficients in the Statistical Model



Note. The statistical model demonstrates a mediating effect involving e-learning readiness, learning engagement, and learning performance. Specifically, learning engagement indirectly influences learning performance (β = .38) when mediated by e-learning readiness (β = .59, p < .01). The error terms (e1–e11) represent the residual variances for each observed variable in the model.

**p < .05; **p<.01; ***p < .001.*

Discussion and Conclusion

This study investigated the relationship among learning engagement, e-learning readiness, and learning performance in HyFlex learning environments in the context of preservice teachers.

While previous research has suggested a direct link between learning engagement and learning performance (Nelson et al., 2022), this study reveals a more nuanced picture. The findings indicate that learning engagement indirectly affects learning performance, mediated by e-learning readiness. Students who are highly engaged may only outperform their less engaged peers if they are also prepared for the learning environment and possess strong technology skills, time management, and self-directed learning abilities. This aligns with Rosen's (2021) research, which suggested that e-learning readiness amplifies the benefits of online engagement, leading to more robust academic performance. Students actively involved in learning and possessing the necessary technological skills to navigate the online environment effectively are more likely to achieve better learning performance (i.e., learning satisfaction, learning persistence, and career preparedness).

E-learning readiness directly affects perceived learning performance, consistent with previous research on the importance of e-learning readiness in HyFlex learning environments (Çebi, 2022; Dikbas Torun, 2020; Wagiran et al., 2022; Wang et al., 2022). E-learning readiness fully mediates the relationship between students' learning engagement and learning performance. It helps create a collaborative and engaging learning experience within a HyFlex environment, improving students' learning performance (Kim et al., 2019). Therefore, e-learning readiness should be crucial in preparing students for e-learning in the HyFlex learning environment.

E-learning readiness emerges as a decisive factor directly influencing academic achievement. Given its mediating role between learning engagement and academic performance, educators should prioritize initiatives that enhance students' technological access, competence, training, and overall e-learning proficiency. In the HyFlex environment, educational institutions are encouraged to invest strategically in comprehensive training programs, ensuring equitable access to technological resources and fostering an environment conducive to effective navigation of online platforms (Çebi, 2022).

The study revealed the complex link between learning engagement and performance, with e-learning readiness playing a crucial mediating role. Educators and instructional designers must foster a HyFlex environment that fully integrates technological elements for optimal academic results. Emphasizing technology access, skill development, and training is critical to enabling students to navigate learning challenges effectively.

The findings of this study have several implications for enhancing e-learning readiness, learning engagement, and learning performance of preservice teachers in HyFlex learning environments. First, educational stakeholders, including instructors, designers, and curriculum managers, are advised to adopt a comprehensive strategy that addresses facets of both learning engagement (performance, collaboration, and emotion) and e-learning readiness (technology access, skills, and training). By strategically supporting HyFlex learning environment, they can enhance the learning experience for preservice teachers. Additionally, ongoing evaluation and flexibility to adapt strategies in response to the evolving online education landscape are crucial for long-term success. Second, educational institutions are encouraged to invest in developing and implementing training programs that improve students' readiness for e-learning. These programs should address technological access, competence, and proficiency. Third, educators and facilitators should actively engage learners in classrooms and virtual environments (Bonk & Wiley, 2020). Fourth, educators can cultivate a supportive and inclusive learning environment conducive to enhanced engagement and academic performance by implementing pedagogical strategies that foster collaboration and encourage active participation. Addressing various aspects of the learning process, such as emotional and cognitive dimensions, effectively supports students' learning journeys and optimizes their educational outcomes. Fifth, instructional designers should integrate technology into the learning experience by designing user-friendly online platforms, providing technical assistance, and incorporating interactive learning tools. By working together, educational stakeholders can optimize student learning experiences in the evolving e-learning landscape while fostering academic success.

In conclusion, the current study clarifies how e-learning readiness and learning engagement are significant for preservice teachers' learning performance in HyFlex learning environments. The indirect effects of e-learning readiness on learning engagement and learning performance have been identified. The findings recommend that facilitators of learners, instructional designers, and curriculum managers focus on improving learning engagement (i.e., performance, collaboration, and emotion), technology accessibility, competence, and training to scaffold a thriving HyFlex learning environment for preservice teachers.

This study has some limitations and recommendations. First, the findings on learning engagement, e-learning readiness, and learning performance rely on self-reported data, which may be affected by the overconfidence effect, potentially inflating actual performance. Although learning performance can be assessed through metrics such as learning satisfaction, persistence, and career preparedness, it is important to consider additional variables that may influence learning outcomes. Future research could expand on the current study by incorporating measures of learning achievement or academic success. Second, e-learning readiness may have been influenced by the participants' universities (e.g., private, public, and state colleges), with varying technological support and preparedness strategies for the HyFlex learning environment. Therefore, university-specific practices and characteristics may have impacted the reported data. Further research should include more qualitative data, such as interviews with all students in the class, to identify how their perceptions may differ regarding learning engagement, e-learning readiness, and learning performance in HyFlex learning environments.

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Teacher Perspective on MOOC Evaluation and Competency-Based Open Learning

Wen-Li Chang and Jerry Chih-Yuan Sun[*]
Institute of Education, National Yang Ming Chiao Tung University
[*]Corresponding author

Abstract

Quality MOOCs (massive open online courses) ensure open learning under the top-down guidance of established criteria and standards. With an evaluative approach, course providers can use the guiding frameworks in designing and refining courses while fostering students' targeted open learning competency. This study explores the openness embedded into MOOC course design and the anticipated core competency, gathering insights from interviews with in-service teachers preparing MOOC lessons. The findings suggest that teachers' evaluative approach remains necessary in its cyclical practice, using prior experience as the primary foundation while also referencing national and international frameworks for course refinement. However, the teachers' observed high reliance on early experience has resulted in an unstable foundation, where only a bottom-up experiential perspective is adopted, instead of an ideal balance with the top-down standards. From the teachers' perspective, task completion is prioritized as the only primary learning outcome, despite open learning providing students with extensive opportunities to extend beyond in-class task challenges. Future studies should address this unbalanced perspective with a more diverse respondent pool and continue efforts to triangulate data through mixed-method approaches.

Keywords: course evaluation, criteria and standards, competency-based instruction, open learning, MOOCs, quality MOOCs, teacher perspective

Introduction

Open education surged in 2008 and gained momentum in 2012, as summarized in Yousef and Sumner's (2021) evolution timeline. Due to the COVID-19 pandemic, the year 2020 marked a successive milestone in the progression of open learning which has increasingly assumed a primary form of the massive open online courses (MOOCs), according to Ossiannilsson (2021). MOOCs have become widely recognized as affordable and flexible tools for valuable opportunities to learn and access knowledge, introduce personalized learning environments, and deliver quality educational experiences. Reflecting this ongoing trend toward open learning, Pelletier et al. (2021) in the EDUCAUSE Horizon Report emphasized MOOCs' expanding contribution to microcredentialing in a widened scope of competency-based instruction within university settings. In response, the underlying design and implementation of online curricula have broadened, not only to scale student achievement levels but also to ensure online course quality by incorporating dynamism and inclusiveness. As MOOCs continue to expand in reach, their alignment with quality standards becomes crucial not only for enhancing individual learning experiences but also for addressing broader goals, such as educational equity and lifelong learning opportunities on a global scale.

In an ideal competency-based instructional setting for growing skills through MOOCs, embedding secure and reliable evaluation into open learning is essential for consolidating the fundamental process approach to aligning teaching with learning (Johnstone & Soares, 2014). Criteria and standards should therefore be widely adopted for ongoing assessment at all levels (individual, organizational, governmental), namely supporting self- and co-assessment of MOOC teaching and learning, meanwhile responding to an overall paradigm shift to contextual and personalized assessment (Chiang, 2007; Sadhasivam, 2014; Zulkifli et al., 2020). Queirós (2018) and Sandeen (2013) emphasized the role of assessment in maximizing the effectiveness of MOOCs and encouraged standard assessment methods for validating student learning. Parallel efforts focus on assessing course quality by comparing course arrangements with predetermined national and international standards intended for optimizing learning conditions for each student and for moving beyond common reliance on scholarly reputation and prestige as quality standards. In this sense, the precise and evaluative nature of competency-based instruction should be fulfilled in MOOCs assessed, which ideally expands inclusive educational opportunities for students of diverse demographic and socioeconomic backgrounds (Mazoué, 2013).

This study is grounded in competency-based instruction principles and draws on constructivist theories to examine how teacher evaluation practices influence MOOC learning outcomes. By aligning instructional design with learner-centred frameworks, the study highlights teacher insights in enhancing both instructional quality and student engagement. Open learning competency refers to the ability to self-regulate within a flexible learning environment, equipping learners to effectively navigate and engage with online resources. Through this instructional approach, quality MOOCs are expected to provide equitable access to education and advance lifelong learning efforts, both of which have gained increased significance in a post-pandemic landscape. As opposed to top-down standards which often rely on predefined criteria benchmarks, the bottom-up experiential perspective highlights practical teaching insights gained from firsthand experience, emphasizing the role of teachers in shaping MOOC design based on real-world dynamics.

This study draws on first-hand interview responses to explore teachers' perspectives on designing and evaluating MOOCs on ewant, one of the pioneering MOOC platforms in Taiwan. While global platforms such as Coursera and edX emphasize consistency via institution-driven frameworks, ewant balances teacher autonomy with competency standards. With reference to relevant research attempts, such as Ferreira et al.'s (2022) proposed quality criteria deriving from the ENQA (European Association for Quality Assurance in Higher Education), this study resumes the thread of discussion and contributes to a deepened understanding of teachers' knowledge and acceptance of fulfilling existing standards, as well as to the enhancement of intersecting relationships between teachers' achieved understanding of evaluation standards and their perceived core competency for open learning. This study also accommodates the necessary attempt to use an interview approach as one evaluative measure or one reflective opportunity within open teaching and learning contexts. Specific research questions to be addressed are as follows.

1. What do individual teachers perceive as key components of quality MOOCs?
2. How does a teacher's perspective on MOOC evaluation interact with macro-level standards and frameworks?

Relevant Studies

In response to ENQA's efforts to establish quality criteria for considerations in e-learning provision (Grifoll et al., 2010), the United Nations Educational, Scientific and Cultural Organization (UNESCO) proposed sets of criteria for measuring and determining course quality by respectively considering learning in general, online learning, and MOOC-specific settings (Patru & Balaji, 2016). The OpenupEd framework was especially highlighted for quality assurance of any MOOC, upon which course-level quality labels are clearly stated with a focus on learning outcomes, course content and materials, teaching and learning strategies, and assessment methods. Studies of quality assurance frameworks, including OpenupEd, highlight the importance of top-down standardization for consistent quality metrics (Rosewell & Jansen, 2014). Similarly, prior research studies on quality assurance criteria for online courses, including Wang and Chou (2013), proposed standards that consider course content, learning assistance, information credibility and currency, technique and connections, website interface design, and general openness.

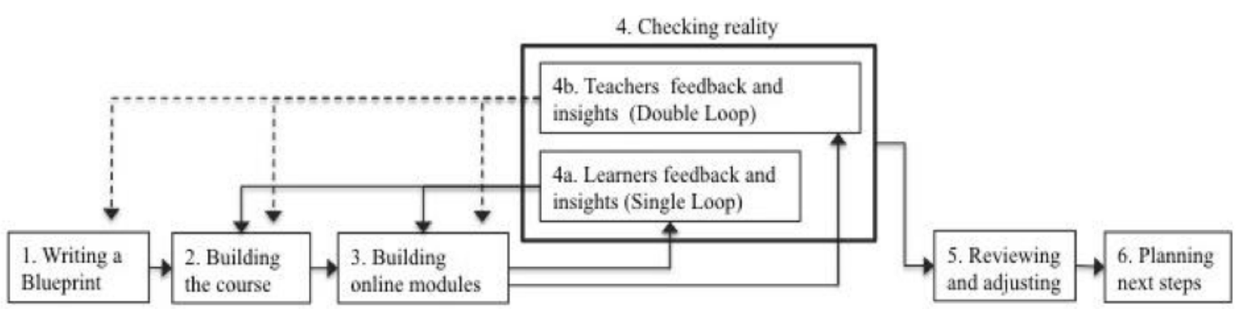
Acosta et al. (2020) shared the similarity in encouraging expert-based evaluation following international standards, namely Web Content Accessibility Guidelines (WCAG), for generating guiding principles in developing perceivable, operable, understandable, and robust MOOCs. From the enhanced expert perspective, the study maintained the focus on quality courses helping students develop a clear notion and proper use of MOOCs with their own sense of direction, i.e., knowing what, how, and why, during their engagement in online open learning that most ideally brings meaningfulness and learner efficacy. The research on teacher perspectives also emphasized the significance of incorporating experiential insights to create adaptable learning environments (Acosta et al., 2020). By integrating teacher insights with learner-centred competency frameworks, the research pointed out the evolving role of educators in shaping flexible yet robust MOOC quality standards. For an essential addition to course evaluation, Su et al. (2021) measured student perceptions of content material, instructional effect, interaction process, as well as the operational learning system. Recent studies on MOOC evaluation continue to explore the importance of learner-centred, competency-based frameworks (e.g., Steffens, 2015) and teacher perspectives (e.g., Koukis & Jimoyiannis, 2019).

Aside from technical, organizational, and social aspects, this pedagogical aspect in quality assessment is considered one necessary factor in evaluating web-based educational software or programs in general for teaching and learning in the triple Student-Teacher-Institution framework of interdependent actors (Lopes et al., 2015). The adopted systematic review approach has prioritized a clear focus in relevant studies on learning process quality and on infrastructural functionality, flexibility, and adaptability, over the practice of community-based interactions and/or management cost and efficiency. Best practices for scalable interaction and formative feedback in MOOCs, as emphasized by studies including Kasch et al. (2021) and the OpenupEd quality framework (Rosewell & Jansen, 2014), further illustrate that maintaining quality at scale requires a combination of automated, peer, and content-based interactions. Out of the continued attempt to explore relevant studies on MOOCs, Stracke and Trisolini (2021) maintained the mixed combination of aspects and extended the quality dimensions with a broadened scope of the pedagogical aspect by further considering instructional design, learner perspective, theoretical framework, MOOC classification, overall context, and evaluation.

Prior research has significantly advanced the classification of quality evaluation aspects. To further refine the definition of quality, Hovhannisyan and Koppel (2019) were opposed to its association with any objective, but instead inclined toward it being a measure for a specific purpose, including primary considerations of quality from learners' point of view, within a MOOC pedagogical framework, in relation to input elements, and on the basis of outcome measures. For full inclusion of teachers and students at the forefront of assessing MOOC quality, Cirulli et al. (2017) proposed a double-loop evaluation cycle for MOOC design, highlighting the need to balance student and teacher feedback and insights in checking reality and aligning open learning outcomes with objectives. Figure 1 shows the interacting relationship of evaluation with course development and student achievement.

Figure 1

Double-Loop Evaluation Cycle of MOOC Design



Note. From "A Double-Loop Evaluation Process for MOOC Design and Its Pilot Application in the University Domain," by F. Cirulli, G. Elia, and G. Solazzo, 2017, *Knowledge Management & E-Learning*, *9*(4), p. 440 (https://doi.org/10.34105/j.kmel.2017.09.027). CC BY 4.0.

The Ministry of Education (MOE) in Taiwan established a national framework for evaluating locally produced MOOCs, encouraging course providers and class participants at the forefront to carefully consider teaching contents and learning outcomes, as illustrated in Table 1. By these government-proposed standards, online courses are examined mainly from an expert perspective and should meet the objectives of open learning, maintain attention, facilitate progress, and enhance learning efficiency and motivation, via instructional design, visual support, and integrated technology, for the enhancement of learning engagement in an accessible environment. It is apparent that the MOE is broadening local perspectives on open course evaluation and has further extended evaluation methodology for a massive-scale inclusion of criteria and standards, though a thoroughly mixed perspective that combines teacher and student viewpoints remains lacking in course evaluation and even in the overall open teaching/learning process.

Table 1

Summary of MOE Standards for MOOC Evaluation

Dimension	Criteria	Description
Teaching content	Instructional design	Aligns with learner needs/objectives
	Visual quality	Maintains learning attention
	Learning efficiency	Facilitates learning progress
	Technology integration	Enhances learning efficiency and motivation
Learning outcomes	Course accessibility and learning engagement	Measures enrolment rate, time-of-use rate, and completion rate

Note. MOE = Ministry of Education in Taiwan; MOOC = massive open online course. Adapted from *Criteria for Evaluating Benchmark MOOC Courses* (Evaluation Method section), by eLearning Movement Office, 2021, Ministry of Education, Taiwan. In the public domain.

This review synthesizes previous research on how top-down standards and bottom-up perspectives contribute to shaping MOOC quality, emphasizing the need for further alignment between these approaches. By integrating these perspectives, this review highlights the ongoing challenge of achieving a balance that supports both quality and flexibility in MOOC design. The present study builds on these insights to examine the unique role of teachers in ensuring MOOC quality, particularly through teacher-driven evaluations that align with both learner needs and established standards. These developments provide a broader context for exploring teacher-driven quality assurance, allowing for more tailored feedback and adaptable learning pathways that align with competency-focused frameworks. By examining ewant's approach within this broader context, this study also highlights the applicability of these findings to other platforms and regions. This approach aligns with challenges observed on the ewant platform, where balancing teacher-driven flexibility with established quality metrics remains essential for supporting diverse learning needs and effective quality assurance across regions.

In-Depth Interviews

Context

The target open learning context is focused on the local ewant platform, which has recruited in-service English language teachers for a 2023 English-medium-instruction (EMI) MOOC program. This program aims at scaffolding students to complete their concurrent, personal online micro-credentialing process on a global MOOC platform (FutureLearn) where English is the primary instructional language. For students to achieve an understanding of English-taught course contents using ewant learning scaffold, the English-as-a-second/foreign-language (ESL/EFL) learning objective is both medium- and content-focused, therefore widening to the coverage of multi-faceted competencies necessary on their way to ultimate attainment of digital certificates. In this dual-track online learning program, the certificates of achievement, if both successfully attained, are issued by ewant and FutureLearn at the end of the two-month program.

Participants

The four teacher respondents (A, B, C, and D) currently work at local public schools at different educational levels, from primary to higher education, and in various regions of the same country, ranging from northern to central Taiwan. Table 2 provides detailed background information about the participants. Despite the teacher respondents' young age, all have accumulated extensive professional experience as English language educators, with an average of ten years in the field. Their teaching background covers the use and integration of web-based, digital technology in class, especially in planning for and producing video content (shared both synchronously and asynchronously, on web-based video channels such as YouTube). Although most of the teachers are new to delivering lessons on a MOOC platform, they possess up to three years of practical experience in designing and managing online classes, primarily due to the impact of the COVID-19 pandemic.

Table 2

Demographic Information About Teacher Respondents

English Teacher	A	B	C	D
Position	Full-time primary school teacher in northern Taiwan	Full-time secondary school teacher in northern Taiwan	Full-time secondary school teacher in central Taiwan	Part-time college teacher in central Taiwan
Age	Middle-aged	Middle-aged	Middle-aged	Middle-aged
First Language (L1)	Chinese	Chinese	Chinese	Chinese
Education Background	Graduate-level education major	Graduate-level education major	Graduate-level education major	Graduate-level education major
MOOC Experience	MOOC learner	MOOC learner	MOOC teacher and learner	MOOC teacher and learner

ewant Experience	Novice	Novice	Experienced	Experienced

Data Collection and Analysis

Following a qualitative methodology, this study used a semi-structured interview approach and applied thematic analysis to interpret teachers' perspectives on MOOC evaluation and competency-based instruction. Interview data were collected, analysed, and interpreted from the four teacher respondents. Each respondent participated in their own one-on-one online meeting with the researcher. All meetings were conducted in Chinese, with the researcher translating the responses. To ensure accuracy and consistency with the original meaning, back-translation methods were employed and cross-checked with the interviewees. These in-depth interviews, averaging 1.5 to 2 hours, provided qualitative data for thematic analysis, capturing detailed views on competency-based instruction and key elements of quality MOOCs. Each interview session occurred during the preparatory stage for the dual-track EMI MOOC program.

The primary research tool was an interview guide for the semi-structured interviews that were designed and administered to explore teacher perspectives on key elements of quality MOOCs and their intersecting relationship with the perceived core competency for effective open learning. With permission from all teacher respondents, the interview sessions were video recorded for word-for-word transcription using Google Meet, and subsequently analysed with a focus on addressing the proposed research questions. Given the exploratory nature of the research, a sample of four experienced teachers was used, supplemented by triangulation through multiple data coders. This approach allowed for a detailed exploration of teacher perspectives on MOOC quality, with triangulation enhancing the reliability of the findings despite the small sample size. These interviews served as a foundation for analysing the practical implications of teacher insights in competency-based instruction.

Interview Guide

The semi-structured interview questions were developed for the collection of expert responses that suggest the teachers' accumulated knowledge and demonstrated acceptance of the existing MOOC standards. Their self-reports on quality course design also provide a hidden path to personal interpretations of necessary competenc in the open learning process. The interview questions are mainly concerned with MOOC teaching contents and learning outcomes, following the Taiwan MOE quality evaluation standards for MOOCs (see the Appendix for full questions). Centered around the government-mandated core concepts, the questions were expected to help, in an evaluative manner, to examine teachers' notions and perceptions in the present course design and preparation stage, and were believed to provide the underlying ground for further discussion over how the collected teacher thoughts responded to existing governmental or institutional standards.

Research Trustworthiness

Lincoln and Guba (1985) stated that trustworthiness is one measure of evaluating a qualitative research study and that trustworthiness involves a study being credible, transferrable, dependable, and confirmable. This study included multiple sources of data (teacher respondents), presented in the interview excerpts and quotes shown in the following section, to support and ensure the truthfulness of findings. The credibility level is enhanced with member check, through which the respondents were asked to review the findings for accuracy. By including detailed descriptions of the research context, participant characteristics, and data collection methods, this study gains its trustworthiness in terms of transferability, namely, the increased applicability of findings to different settings. The study also established dependability and reproducibility of the findings, providing a complete account of the research process achieved through transcription. To minimize the potential for researcher bias and achieve confirmability at the same time, the study has engaged multiple independent investigators for data triangulation.

Research Findings

Teachers' Perceived Openness in Quality ewant Courses

In the research context of using MOOCs to pave the way for effective open learning, ewant courses are perceived as one of the trending options among the various locally developed and produced MOOCs. The collected interview responses show teachers' perceptions of the key components of quality MOOCs (research question 1). Although the teacher respondents might have accumulated their own ewant experience prior to this research (as either teacher or student or both), they all described finding the platform to be highly accessible and available online when performing proper web-based search strategies under secure Internet infrastructure: Teacher A remarked, "No difficulty at all [in searching for the ewant platform]. I just googled the name, and there it was." Teacher D noted, "Yes, [I] reached the site soon after I entered the search keywords."

Despite claims that ewant is not particularly attractive in its interface design, the teacher respondents stated that they had little difficulty navigating the platform, even during their first visit to the site for personal learning purposes. Their searches for topics and courses were often mentioned, with emphasis on the overall ease of use as well as the wide course variety. Teacher A told us, "Not fancy how it looks, personally . . . but not to the point of saying no, thank you." Teacher C remarked on the wide variety of course topics:

> I was not expecting to have so many course options, to be honest. Now, upon all these topics that came to me right at my first search, I don't know where to continue . . . of course, in a good way. I want them all, if possible.

Teachers noted the importance of easy navigation and a wide course variety for student engagement, while some expressed a desire for more dynamic instructional features to better accommodate diverse learning preferences. This reflects a broader commitment to enhancing accessibility and inclusiveness in MOOCs, revealing teachers' interest in balancing functionality with educational quality. The findings suggest that teachers' approach to MOOC evaluation aligns closely with broader goals in open education, supporting course-specific improvements and lifelong learning principles by promoting adaptable and competency-based learning pathways. The findings are consistent with previous qualitative studies on MOOC evaluation (e.g., Haavind & Sistek-Chandler, 2015), which emphasize the importance of balancing experiential insights with standardized quality benchmarks. This consistency with existing research reinforces the role of teacher-driven perspectives as a valuable component of quality assurance, bridging the gap between practical insights and formal standards. Teacher D stated, "From entering the search keywords to landing

[on] a course or two I like, I'll say, yeah, pretty good. The design in general can be a bit outdated . . . but I'm okay with it."

Concerning the teacher respondents' shared assignment to provide ewant courses for dual-track open learning, the role-to-role transition appeared fairly manageable, allowing them to evolve from learning through ewant to teaching lessons while still learning with ewant. Being clearly aware of their teaching responsibility, the teacher respondents extended their previous MOOC learning experiences and emphasized the pedagogical use of technology-assisted class or learning management resources (e.g., calendars, announcements, notifications, and discussion forums) in addition to teacher's real-time guidance. They believed that through these basic settings that encourage social interactions and optimize learning conditions on the site, students would be guaranteed an enhanced level of motivation and engagement, and possibly, most ideally, the attainment of self-regulation in open learning or learning in general. Teacher B described it this way: "Like I was a student studying MOOCs, [and] now [I'm] a teacher ... to-be, but I know that it'll be pretty similar, especially the part about time management and self-discipline." Teacher D spoke of how the learning tools would help with self-regulation:

> It matters to get MOOC students to think, and think all the time . . .. Students should think and reflect, and then think again, as in an ongoing cycle. And MOOC teachers should help by allowing the students to think with digital learning support, in different forms such as collaborative worksheets [and] individualized, calendar-based reminders . . .. They really help, at least to me . . . to prepare, to recap, or simply to catch up when feeling lost.

Given that a motivating learning environment encourages students' persistent efforts, and that learner engagement facilitates behavioural, emotional, and meta/cognitive commitment, half the teacher respondents directed themselves from the mere focus on course display and settings, to combining the parallel emphasis on student orientation and self-directed course content exploration. The design and implementation of class activities for the dual-track MOOC program, at this time, gained the greatest attention for promoting not only teacher-led content presentation (incorporating step-wise guidance from the experienced) but also learner-centred content acquisition and critical thinking (encouraging higher-order participation of the novice). This necessary balance between teacher and student efforts ensures and maintains course quality, as demanded in an effective open learning process. Teacher C stated:

> So, early on, I was wondering how this dual track of learning works . . .. I've sorted it through and kind of figured out, I guess. The purpose ... should be the learning objectives of students . . . to develop open learning strategies using the scaffolding MOOC and to obtain the certificate of achievement from the target MOOC . . .. Students using this worksheet are able to navigate the target MOOC site with focus on information required for completing the gap-fill task.

Alignment of MOOC Evaluation With Core Competency for Effective Open Learning

A quality ewant course or MOOC in general, as defined by the teacher respondents, lies in its adaptiveness towards and open inclusion of teacher/student needs and basic/advanced learning scopes. This closely aligns with existing criteria and standards for course evaluation, where the focus is placed on class participants at the forefront, mainly concerning learner needs, attention, progress, motivation, outcome, and overall efficiency (to the level of strategic employment), as suggested in both local and global frameworks (Grifoll et al., 2010; Patru & Balaji, 2016). The ENQA and MOE standards both emphasize core quality criteria for online courses, including course structure, accessibility, and assessment, which are essential for enhancing learner experience (Rosewell & Jansen, 2014).

In relation to research question 2, the local government-mandated MOE evaluation standards, however, appeared to lack necessary interactions with the teacher respondents and were rarely known or referred to as either success criteria for quality MOOCs or sample guidelines in their own course design and development. The balance between teachers' personal experience and formal standards affects MOOC quality in distinct ways across educational levels, highlighting the need for flexible evaluation practices. This dynamic tension indicates that a one-size-fits-all approach may not be suitable in diverse educational contexts, emphasizing the importance of adaptable standards that can accommodate both teachers' experiential insights and formal quality criteria (Su et al., 2021).

Using the ENQA and MOE standards as a reference, the study sheds light on teachers' perceptions of quality, revealing the alignment and gaps between these frameworks and the practical challenges teachers encounter in MOOC evaluation and content alignment. Meanwhile, a relatively low acceptance level was observed when national and international course frameworks were referred to, though the respondents' limited MOOC experience is likely to be a possible contributor to this phenomenon. In this regard, Teacher A told us:

> Sorry, but [I've] never heard of these norms and standards .... From what I'm reading about here ... [I'm] not sure if I do understand [the evaluation items] ... the so-called "learning outcomes" can be hard to define, right? And I see the need to add some other points for consideration. You think?

While a quality MOOC course should facilitate class interaction and provide learning support and feedback for a positive learning loop, a competent and effective open learner should be independent and self-oriented in their online learning journey. Teachers emphasized that developing students' self-regulation and independent learning skills is crucial for success in MOOCs. By designing activities that encourage students to take initiative and reflect on their learning, teachers aim to build these competencies, aligning with prior research that highlights how MOOCs are not just about content delivery but also about nurturing lifelong learning skills (e.g., Buhl & Andreasen, 2018; Steffens, 2015), exhibiting the broader educational potential of MOOCs. For the cultivation of competency for effective open learning, students are therefore encouraged to respond flexibly but responsibly to web-based open resources and practice opportunities, and teachers are to include and ensure the openness with content currency, real-life relevancy, accuracy, authenticity, and purposefulness. Half of the teacher respondents brought up the concept themselves and insisted on differentiated and personalized design of class material (by theme and form) instead of basing their self-generated handouts and worksheets entirely on convenient formats or templates (e.g., sample text material provided by an experienced teacher from the previous semester). Teacher B explained:

> No need to have all of the lessons taught using first-hand, teacher-made videos, I believe. Just as students learn differently, the class material and learning tasks provided should be differentiated so as to accommodate varied needs and styles. Some lessons can be simply text-based, some with audio and video contents, and some ... mixed, maybe.

Teacher D's comments on the subject of tailoring video content for specific contexts showed agreement:

> Sources of instructional videos can be students' own recommendations or their own options to make, among teacher recommendations. Those already-existing online videos from outside sources, such as YouTube, can be of great help, as the videos are widely accessible to most students, and the videos can be watched in a way that better meets students' different learning preferences [than some self-made, low-quality ones]. You know, like at a lower speed or with captions or even subtitles on.

Apparently, a learner-centred, competency-based open learning environment is preferred, with most of the teacher respondents stating that they believe that quality MOOC courses are very likely to have these characteristics. Such attributes enable students to grow into competent and effective open learners (most ideally, at the end of the dual-track MOOC program). Whether on the proposed MOOC learning track or not, students are expected to demonstrate the ability to transfer context-appropriate knowledge, skills, attitudes, and values from the scaffolded open learning context to the real world with no guaranteed learning support. In other words, knowledge and skills transfer is fundamental to strategic open learners who are often cast in multiple roles (e.g., constant assessor, critical thinker, careful planner, and monitor) and take on different assignments (e.g., learning what, learning how to learn), therefore necessitating transfer ability as an essential part of the core competency for effective open learning.

Indeed, providing structured and extensive training on flexible transfer of all aspects (knowledge, skills, attitudes, and values) may be a practical way to realize the precise and adaptive nature of competency-based instruction in quality MOOCs. Yet, the teacher respondents who possessed expertise in course design did not highlight the need of doing so at the course preparation stage, not to mention the necessary practice on evaluation and assessment that has been widely recognized as an effective tool for training on transferring learning to new contexts. More than half the teacher respondents began with their design for student orientation, probably in hope, though not clearly stated, of commencing a fixed and linear instructional order in which the guided students would further explore course contents and engage themselves in interest-led, new content. It appears that just as most teacher respondents paid little attention to criteria for evaluation, as mentioned above, the evaluative approach that should support a successful learning process receives equally little attention, both in realizing the approach in class activities and aligning it with teaching and learning objectives. Teacher C gave an example:

> There would be a pilot in my own homeroom class this semester at school, and tomorrow would be the first class-time. It would be the time for me to test my own design, yeah, as a pilot. Unfinished though, I mean the overall course design, but [the pilot is] sure to be a lesson that helps students with their orientation for the [ewant] site. Let me repeat myself. In this first class, I'll get the students to know better about the site, using my self-developed worksheet that engages them in a gap-fill task.

An evaluative approach to course design and preparation can be highlighted in the later development and implementation of MOOCs, which does not necessarily hinder the cultivation of core competency for effective open learning (i.e., flexible transfer of knowledge, skills, attitudes, and values, as manifested in content learning, critical thinking, and even problem solving). However, the necessary but missing element of assessment and evaluation at an early stage is likely to hinder the ideal alignment of teaching and learning for effective and meaningful competency building. Given that such an evaluative approach, using either widely-accepted criteria or personal standards, introduces opportunities for demonstration, feedback, and reinforcement of the importance of transferring ability, the lack of these opportunities may reduce the flexibility being brought to cultivate students on their way to becoming effective open learners.

Pedagogical Implications

The MOOC platform has introduced openness to education, mainly through teaching and learning resources and practice opportunities. However, the teacher respondents, whose limited knowledge or low acceptance is clearly observed, tend to plan and design their open courses with a heavy reliance on prior experience that comprises hidden standards and personal guidelines. This reliance could lead to an over-simplified focus within these MOOC programs on task completion, diverging from an ideal, learner-centred process approach to students' open learning journey. While teachers prioritize task completion, they also place importance on encouraging critical thinking, which highlights MOOCs' potential to foster deeper engagement and improved learning outcomes on a larger scale. Several teachers also reflected on the role of MOOCs in reaching underserved communities, noting that high-quality design and accessible course structures are essential for enabling wider participation. This perspective aligns with the view that MOOCs, when supported by balanced quality standards, can be powerful tools for providing equitable educational access. A recommended pedagogical strategy is to combine task-focused assignments with reflective activities, embedding evaluation directly into the learning process for both teachers and students.

Additionally, using competency-based instruction as a framework not only aids in structuring course evaluations but also provides a basis for enhancing instructional quality across different educational settings. This approach supports a consistent method for assessing and improving course content, ensuring that MOOCs meet both educational standards and the diverse needs of learners globally. To optimize the general MOOC learning conditions, teachers are encouraged to seize every possible evaluative opportunity by opening up their course preparation to perspectives from experts of diverse backgrounds or stakeholders at different involvement levels ranging from individual to institutional (e.g., students, colleagues, administrators, and policy makers).

These insights from the case study on Taiwan's ewant platform in competency-based MOOC design may be applicable across different regions facing similar challenges in balancing task-oriented learning with the competency-building opportunities found in MOOCs. By acknowledging the need for adaptable evaluation methods that can harmonize regional standards with teacher-driven perspectives, this study provides a valuable pedagogical framework for global MOOC platforms. The similarities between ewant and other MOOC platforms highlight the importance of developing evaluation frameworks that align competency-based learning with standardization requirements. By addressing these shared challenges, platforms can better support flexible learning pathways and adapt to global educational needs, enhancing MOOC effectiveness across diverse settings.

To maintain course quality, a broadly-defined evaluative approach that considers personal teaching and learning experience foundational is recommend. A positive attitude toward evaluation criteria and standards (national or international) is also encouraged for ongoing, whole-scale assessment that enhances the precise nature of competency-based instruction, especially in the widely open learning context. Cirulli et al.'s (2017) double-loop evaluation cycle presents a pedagogical blueprint for placing true MOOC participants back onto the centre of their personalized MOOC teaching and learning process for either micro-credentialing or open learning in general. The learning process is sure to be optimized when both teacher and student are involved, and when both national and international frameworks are carefully considered, in that the progressive nature is to be strengthened in this double- or multiple-loop design for ongoing evaluation and effective self-paced open learning. Meanwhile, ongoing discussions in open educational resources (OER) are advancing with emphasis on how competency-based standards in MOOCs can facilitate diverse lifelong learning journeys. The integration of adaptive learning technology and learner analytics can further support this approach by enabling teachers to implement competency-based instruction effectively. Through real-time data-driven insights, these tools allow educators to closely monitor student progress closely and adjust instructional strategies to address diverse learner needs, ultimately enhancing the impact of teacher-driven evaluation practices in MOOCs.

Conclusion

The teachers' responses demonstrate their overall perception that competent open learners grow core knowledge, skills, attitudes, and values along their MOOC learning journey. In examining these responses, several thematic areas emerge as critical components of quality MOOCs: course accessibility, content depth, and learner engagement. Each of these highlights the importance of creating learning conditions that support diverse student needs and expectations. Teachers value a balance between foundational knowledge tasks and opportunities for critical thinking, as this dual approach helps students become adaptable and reflective learners. These thematic areas also reflect the teachers' belief that a successful MOOC integrates both aesthetic appeal and substantive content to enhance engagement and learning outcomes. Each of the optimal conditions necessarily accepts a flexible definition, evolving with societal openness and individual differences that are reflected in or shaped by the adopted criteria and standards.

The study's findings further reveal a complex interplay between teachers' perceptions and established standards, highlighting that teachers often rely on personal teaching experience over formal standards, which can lead to a task-focused rather than a fully competency-based approach. Although frameworks such as the MOE and ENQA standards provide a reference points, many teachers remain unfamiliar with these benchmarks, resulting in inconsistencies when aligning MOOC content with quality requirements. This dynamic points to the need for a balanced approach that incorporates both teacher-driven insights and competency-based standards, allowing both teacher autonomy and adherence to established quality frameworks. Therefore, the exploration of teacher (or participant) perspective, along with the underlying evaluative approach that adapts to the shifting assessment paradigms, requires continued practice and reinforcement toward inclusive and sustainable online educational models. The integration of teacher perspectives in competency-based evaluation aligns this study with recent advancements in the field, offering a model that supports both teacher autonomy and standardized quality measures. This approach provides a pathway for future MOOC designs to accommodate diverse learning environments globally.

For future research directions, the adopted qualitative methodology (i.e., interviews) should be combined with quantitative measures, for a mixed research method and the necessary enhancement of data triangulation. This would address the limitations of a less diverse sample population whose representativeness is challenged due to its small size. Additionally, given that interviews serve as an effective way to engage front-liners (teachers) as respondents and meanwhile encourage an open mind towards the open learning trend, participants in different roles, including students, teachers, administrators, and policy-makers, should all be invited to join in-depth discussions and share personal thoughts and ideas. By involving a broader range of perspectives, future research could deepen understanding of factors that contribute to effective open learning environments and create a framework that balances top-down standards with teacher-led insights. Following the suggested directions, the data collected are sure to continue meaningful efforts to re-examine existing criteria and standards and to fulfil the broadened definition of competency, as an overall response to open learning trends for both students' and teachers' cyclical evaluation and improvement.

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Appendix

Interview Guide

Part A: Personal Background

Your prior MOOC experiences

1. What was your reason for taking MOOCs?

2. What was your choice among the MOOC platforms?

3. What were your primary considerations in choosing a MOOC?

4. How did you enjoy this (first-time) MOOC experience?

5. At that time, what were your expectations for the next-time MOOC experience?

Part B: Overall MOOC Design

Your current task to design and teach an ewant course

1. Prior to this teaching opportunity, did you know about ewant?
   If yes, from where did you learn about ewant?
   If no, then please go on to the next question.

2. How was your first visit to the site?
   What are the pros and cons of ewant that you have discovered so far?

3. Ever since you started to design this ewant course, what have you considered for your preparation?

4. What makes a perfect MOOC course in addition to platform quality?

5. From your teaching experience, what are your guiding principles in designing your ewant course?

6. From your prior online teaching experience, if any, how do you manage to plan your ewant course for its best operations in a web-based learning environment?

7. Specifically for MOOC students, how do you plan to have your ewant course fulfill their learning objectives?

8. Who, if any, has been supportive in the preparation process and how?

Part C: Future Directions Under Criteria and Standards

Your awareness of and attitude toward existing standards and criteria

1. What are the standards and criteria you know for designing and implementing MOOCs?

2. How much does it help for you to refer to MOE standards or other international frameworks in planning for the ewant course?

3. For any possible additions to your selected standards for reference, what are your suggestions and why?

4. How do you think that standard-based assessment contributes to course quality maintenance?

5. How do you think it is necessary for MOOC providers to consider and apply standards and criteria in planning for a course?

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What Did We Learn About Massive Open Online Courses for Teachers? A Scoping Review

Ella Anghel[1], Joshua Littenberg-Tobias[i 2], and Matthias von Davier[1,3]
[1] Department of Measurement, Evaluation, Statistics, and Assessment, Lynch School of Education and Human Development, Boston College; [2] GBH Education, Boston, Massachusetts, USA; [3] TIMSS and PIRLS International Study Center, Lynch School of Education and Human Development, Boston College

Abstract

The growing interest in professional development for teachers via massive open online courses (MOOCs) raises the need for identifying the existing gaps in the literature on the topic. In this literature review, we were able to identify 68 relevant studies. They mostly used mixed methods (57%) and surveys (82%), and only reported descriptive statistics (52%). They also tended to measure participants' attitudes (41%) and engagement (40%). Based on our findings, we recommend that future researchers consider additional data collection and analysis methods (e.g., clickstream data, objective performance measures) and use correlational, longitudinal, and experimental designs.

Keywords: massive open online courses, scoping review, teacher professional development, in-service teachers

Introduction

Professional development (PD[ii]), understood as activities educators engage in to improve education in the classroom (Day, 1999), is considered a vital part of efforts to improve students' achievement (Yoon et al., 2007). Educators' need for high-quality PDs that are also flexible and accessible has led to an increase in the popularity of online PDs (Liu, 2012), particularly during and after the COVID-19 pandemic (Lockee, 2021). Such courses fit more easily into educators' busy schedules (Collins & Liang, 2015) and are received positively by teachers (Gunter & Reeves, 2017; Wasserman & Migdal, 2019), with some studies showing that they can also be effective in enhancing educators' learning and students' achievement (Dash et al., 2012; Magidin de Kramer et al., 2012).

One type of online course for educators is the massive open online course (MOOC). Unlike other online courses, they are available for free or for a very low price, making them accessible to large numbers of learners. MOOCs in general are extremely popular among educators (Carapezza, 2015; Seaton et al., 2015), showing educators' need for and willingness to take MOOCs to enhance their practice. Indeed, many studies focus on MOOCs designed specifically for educators' PD. For example, researchers have described the design and pedagogical impact of MOOCs as PDs about teaching (Butler et al., 2016; Hodges et al., 2016; Jobe et al., 2014; Kleiman & Wolf, 2015) and about specific subjects such as math (Taranto et al., 2017; Tømte, 2019), language (Ibáñez Moreno & Traxler, 2016), and science (Dikke & Faltin, 2015). Studies have also explored these MOOCs empirically, describing participants' attitudes, persistence, and changes in practices (Avineri et al., 2018; Mishra et al., 2019; Van de Poël & Verpoorten, 2019; Wang et al., 2018).

Research on MOOCs as PDs is valuable from an educational technology perspective given how educators are a large subset within the general group of MOOC learners, so these studies may help understand MOOC learners and improve MOOCs more broadly. They are also important for the field of teacher PD as they expose educators' PD needs, potentially contributing to the development of future online and offline PDs. In spite of the popularity of studies about MOOCs for PD and their significance, there are no existing reviews on the subject. A review of the current research about PD MOOCs can help researchers understand what is known and what remains to be explored, thus contributing to future studies in the field.

In order to understand what is known about topics related to MOOCs for educators, we present a brief overview of existing reviews of studies on MOOCs and online PDs. We were able to identify dozens of reviews about MOOCs published since 2013 with varying foci. Some of them summarized studies about MOOCs in general (e.g., Bozkurt et al., 2017; Despujol et al., 2022; Ebben & Murphy, 2014; Meet & Kala, 2021; Raffaghelli et al., 2015; Yousef et al., 2015; Zawacki-Richter et al., 2018; Zhu et al., 2018; 2020). These reviews largely reached similar conclusions: (a) most studies about MOOCs apply a quantitative approach, specifically using surveys; (b) most studies were conducted in North America or Europe; and (c) these studies can be generally grouped into learner-focused (e.g., retention, motivation, and experience in the MOOC), course-focused, and instructor-focused, with learner-focused studies being the most common. The reviews we identified also made suggestions for future studies, one of them being conducting more research about MOOCs for specific disciplines or subpopulations (Deng et al., 2019; Liyanagunawardena et al., 2013; Veletsianos & Shepherdson, 2016).

Other reviews were more specific, focusing on certain publication avenues (e.g., Babori et al., 2019; Gašević et al., 2014), methods (e.g., Lu et al., 2021; Montes-Rodríguez et al., 2019), theories (e.g., Alonso-Mencía et al., 2020; Jacoby, 2014), or sub-topics such as assessment methods (e.g., Alturkistani et al., 2020) and motivation (Badali et al., 2022; Hew & Cheung, 2014). A relatively small number of reviews surveyed MOOCs about certain topics (e.g., Fang et al., 2019, about MOOCs and language learning). Relevant to the current study, Paton et al. (2018) explored research about vocational education and MOOCs and identified common topics such as student perceptions and engagement in MOOCs. Gonçalves and Gonçalves (2019) reviewed studies about teachers' motivations for taking MOOCs and found that teachers were interested in expanding their digital and technological skills. However, they only explored motivation and not any empirical studies about MOOCs for PD.

Reviews about non-MOOC online PDs are also ubiquitous. Similar to the aforementioned reviews on MOOCs, we identified reviews of online PDs studies in general (Dede et al., 2009; Dillie & Røkenes, 2021; Lay et al., 2020), dividing the existing literature into effectiveness studies, design-focused, teacher-focused (e.g., their attitudes and perceptions), and interaction-focused (with peers and leaders in the course and in the school). Other reviews are more specific, for example focusing on online communities as PD (Macià & García, 2016) or the impact of online PDs on various outcomes (Bragg et al., 2021).

The existence of a large number of reviews about MOOCs and online PDs demonstrates the popularity of the topics among researchers, making the lack of reviews about MOOCs for teachers particularly striking. While one may surmise that studies about MOOCs as PDs follow the same general trends as described in the other reviews, there are several reasons why this may not be the case. Researchers of MOOCs for teachers may have different agendas than researchers of other MOOCs that are mostly aimed at college students (Olsson, 2016) because teachers have different motivations and engagement patterns compared to other learners (Brooker et al., 2018; Seaton et al., 2015). In addition, MOOCs are different from other online courses in their availability and because they are usually self-paced rather than being formally organized by school districts. Therefore, studies about MOOCs used for PD may have different emphases or findings in comparison with studies about smaller-scale online PDs. So, a review of the existing literature on MOOCs for teachers is warranted.

The current study is meant to address this gap by examining empirical studies on MOOCs as PDs using a scoping review technique (Arksey & O'Malley, 2005). Beyond simply filling a gap, we hope to identify what topics have been studied (e.g., teachers' attitudes or motivations) and what remains to be studied (e.g., specific subpopulations of teachers). By summarizing the existing literature on the topic, we hope to assist researchers and practitioners to understand what is known about PD MOOCs, how the findings were discovered, and what remains to be explored, thus potentially guiding future research. So, our research questions are:

1. What are the research methods used in the existing literature about MOOCs for educators' PDs?

2. What are the topics and findings of studies about MOOCs for educators' PD?

In order to describe the research methods used, we recorded what courses were studied, data collection methods, and data analysis methods applied in the reviewed studies. The methods as well as the main variables at the center of the studies were used to guide the discussion of the studies' findings. We then discuss the findings in light of the existing reviews and make suggestions for future research.

Methods

Our review was guided by Arksey and O'Malley's (2005) framework for rigorous scoping reviews. We chose a scoping review approach as opposed to a systematic review because we were interested in the state of the field: the constructs being studied (or understudied), the methods used, and so on (Arksey & O'Malley, 2005). For the same reason, we did not evaluate the studies' quality or assess their biases as is generally expected in systematic reviews (e.g., the PRISMA guidelines; Page et al., 2021), but still recorded our search and analysis strategy to allow for future replication. Arksey and O'Malley's framework consists of five stages: identifying the research question, identifying relevant studies, study selection, charting the data, and collating, summarizing, and reporting the results. Note that although the stages are presented here linearly, the research process was iterative, with the search process and inclusion criteria being revised at different stages of the study.

Identifying the Research Question

This stage involved defining the research question of the review and the main variables of interest that were to be extracted from the reviewed studies. As our research questions involved MOOCs for educators' PDs, we defined MOOCs as courses given remotely and available to the public. So, we were not interested in blended courses or in online courses given privately to a small group of teachers. We also defined educators as K–12 teachers and administrators; while studies about MOOCs for higher education instructors are valuable, they were beyond the scope of the current work. Finally, we used a broad definition of PD as involving any action that could improve educational practice, so we included any relevant MOOCs and not only those formally acknowledged as PD.

Identifying Relevant Studies

This stage included the search strategies used. We looked at electronic databases, reference lists, and key journals. All of our searches were conducted throughout December 2022. We first searched the websites Web of Science, Scopus, and ERIC. Although we had used rather specific definitions in the previous stage, we wanted our search to be as broad as possible. As a result, we used relatively general terms when searching these databases: MOOC* OR "Massive open online course*", "professional development OR professional learning OR professional growth OR professional training", and "teacher* OR educator*", all connected with the Boolean AND. These were searched in each paper's title, abstract, and keywords. We also searched Google Scholar, but due to the large number of results, we limited our search to articles that had these search terms in their title. These searches yielded 214 articles, and after removing duplicates, we found 152 unique articles.

Next, we searched for publications in important journals in the field. We chose the three most impactful journals in educational technology (*Computers & Education*, *British Journal of Educational Technology*, and *Education and Information Technologies*) and teacher education (*Teaching and Teacher Education*, *International Journal of Instruction*, and *Journal of Teacher Education*) based on Google Scholar's ratings in December 2022. Most of the results were previously identified in the database search, but we found two additional articles using this method.

After an initial round of study selection, where we narrowed down the results based on our inclusion criteria (see the Study Selection section), we hand-searched the references of the remaining 53 articles. This search yielded 15 more relevant articles, and we reviewed their references for further relevant studies. We also examined the titles of the references of key articles that were not included in this study because they did not meet our inclusion criteria (see the Study Selection section; e.g., Gonçalves & Gonçalves, 2019; Hodges et al., 2016; Jobe et al., 2014). No new references were identified.

Study Selection

Before the initial search, we developed several criteria to narrow down the results. First, we only included peer-reviewed studies from journals and conferences to ensure that studies adhered to at least some quality standards. We also focused on papers in English. Next, in order to make sure that the studies were relevant to our research questions, we focused on studies about MOOCs (namely, not blended or small-scale courses) for K–12 educators. Based on these criteria, we performed our initial reading of the studies' abstracts; if it was unclear whether a study met our inclusion criteria, we also read its methods and the results sections. Out of the 154 studies we had identified at that point, 20 studies were removed because they were not peer-reviewed journal or conference papers (e.g., book chapters and dissertations), 20 were removed because they did not center around MOOCs, 24 were removed because participants were not K–12 teachers, and six studies were removed because we were not able to find them online or via our institution's library, resulting in 84 remaining studies.

After this first reading of the manuscripts, we decided to add two exclusion criteria. As we were interested in teachers' PD and not initial training, we decided to remove studies focusing on pre-service teachers. Ten studies were removed as a result. We also noticed that many of the studies included a narrative description of a MOOC or a program's development process and pedagogical philosophy, with no or very little data reported in them (e.g., only completion rates). While such articles are valuable for those interested in course design, we were interested in empirical findings, so we decided to exclude this type of study. This resulted in the removal of 21 more papers. Following these exclusion criteria, our sample included 53 papers. Then, we searched the reference sections of these papers as described above. After applying our criteria, we identified 15 more articles, so our final sample included 68 articles.

Charting the Data

The next step was coding the identified articles for the key data to be reported. Arksey and O'Malley (2005) proposed documenting where and when each study was published as well as its aims, population, methodology, measures, and important results. We read the studies carefully several times to identify these elements with special attention given to the studies' purpose based on their research questions and reported results. We also recorded the MOOCs studied in each of those papers (their subject matter, where they were developed). In cases where the course's name was given but who developed it was not, we searched for the course online. If we found an exact match and the information was available, we recorded the country where it was developed.

Collating, Summarizing, and Reporting the Results

Finally, based on the data extracted from the selected studies, the findings were summarized and are presented in the Results section.

Results

Research Methods Used

In our first research question, we asked: What are the research methods used in the existing literature about MOOCs for educators' PDs?

The papers we identified (see Appendix) were published between 2014 and 2022, and 63% were published in journals and the rest in conference proceedings. Most of the studies focused on specific MOOCs: 76%[iii] explored one MOOC, and 19% explored several MOOCs (the rest surveyed teachers about MOOCs regardless of whether they took any, e.g., Hilali & Moubtassime, 2021). The MOOCs covered a variety of topics, most commonly general pedagogical methods (47%), but there were also subject-specific courses in math (13%), computer science (12%), language (8%), and other topics. It is noticeable that most of the courses about teaching and pedagogy (27 out of 33) were related to the use of technology in teaching or remote teaching (e.g., Castaño-Muñoz et al., 2018). The MOOCs studied were produced in 18 different countries, most commonly in the United States (18%) and China (15%). About two thirds (66%) of the courses were developed in North America and Europe. However, some of the studies involved the use of a MOOC from one country by participants from another country. For example, Chavez (2020) studied Filipino teachers who took a U.S.-based MOOC.

Looking at the studies' design, most of them (57%) used mixed methods, 35% used purely quantitative methods, and 7% were purely qualitative, with some studies also discussing the pedagogical approach behind the course they reviewed (e.g., Garreta-Domingo et al., 2015). The studies' sample sizes ranged from four (Bonafini, 2018) to over 10,000 (Chen et al., 2020), though a large proportion of the studies (32%) had fewer than 100 participants. The common data sources used in the identified studies were pre- and post-course surveys (82%), followed by the course's forum (37%) and automatically recorded engagement measures (32%): 18% were binary indicators such as course or assignment completion (e.g., Rutherford-Quach et al., 2021), and 15% were more elaborate clickstream data (e.g., Fan et al., 2022). Other, less common data sources included interviews, performance measures, and other text-based information such as social media posts.

In terms of analysis, a plurality of the quantitative and mixed-methods studies (44%) only reported descriptive statistics. The other common analysis methods applied in these studies were group comparisons using inferential statistics, for example, *t*-tests or analysis of variance or ANOVA (19%) and correlational methods including regression models and structural equation modeling (12%). Few studies used social network analysis (SNA), natural language processing (NLP), data reduction methods (factor analysis, principal component analysis), or different machine learning algorithms (19% across all of these methods). Table 1 presents a summary of these findings.

Table 1

A Summary of the Frequency of Analysis Methods

Method	%	Example
Descriptive only	44	Evaluating a MOOC's reach and impact by describing its participants, their attitudes, and achievement (Laurillard, 2016)
Group comparison (*t*-test, ANOVA)	19	Comparing the learning effects of those studying individually and those studying in groups (Li et al., 2021)
Correlational	12	Predicting course completion based on learners' motivation and grit (Davies, 2022)
Social network analysis	9	Describing patterns of peer interaction in the course (Banerjee et al., 2018)
Natural language processing	3	Exploring teachers' discussion topics in the course (Xie et al., 2021)
Data reduction	3	Constructing a scale on teachers' readiness and perceptions of MOOCs (Arnavut & Bicen, 2018)
Other	4	Using cluster analysis to detect learning strategies and changes in them among MOOC retakers (Fan et al., 2022)

Note. MOOC = massive open online course; ANOVA = analysis of variance.

Topics and Findings

In our second research question, we asked: What are the topics and findings of studies about MOOCs for educators' PD?

In order to discuss the studies' topics and findings, we decided to divide them based on their general methodology and the variables at their center.

A majority of the studies was purely descriptive (62%), that is, they only reported means or percentages of variables without considering the relationship among them. Many of them described a MOOC or a group of MOOCs and their pedagogical model, only providing data to demonstrate the learners' satisfaction and engagement with the MOOC. The most common variable described in these studies was participants' perceptions of and attitudes toward the course (41%). Generally, they reported high levels of satisfaction among participants in MOOCs for educators (e.g., Karlsson et al., 2014; Kennedy & Laurillard, 2019). The participants also described what contributed to their engagement and mentioned factors such as the course pedagogy, prior knowledge, and learning habits; factors that hindered engagement were challenging course content and lack of time (Falkner et al., 2018; Li & Yu, 2019; Shah et al., 2018).

Other common variables were related to course engagement (40%), ranging from binary indicators (e.g., Koukis & Jimoyiannis, 2020) to clicks and views by course unit or over time (e.g., Boltz et al., 2021). Some studies also compared the level of engagement in the target course to the engagement of learners in other

MOOCs in general or MOOCs for educators that were reported in the literature (e.g., Koukis & Jimoyiannis, 2019b; Vivian et al., 2014), suggesting that the engagement in MOOCs for educators is relatively high.

Studies also described participants' self-reported implementation of the course material when teaching (16%), quality and quantity of interaction among participants (16%), topics of posts on the forum (12%), participants' performance (12%), self-reported knowledge (9%), motivation for taking the course (4%), and prior experience with MOOCs (4%). Table 2 presents selected findings related to these variables. These findings generally show that educators taking MOOCs as PDs experience knowledge gains and apply their knowledge when teaching, though not all results were positive (e.g., Zou et al., 2020 reported a completion rate of less than 5%).

Table 2

Selected Findings in Descriptive Studies

Variable	Findings
Implementation	Interviewees described applying skills in their professional context (Kennedy & Laurillard, 2019)
	A high agreement that the learned skills were useful in practice (4/5) and that they saw improvement in students' outcomes (4.35/5; Silvia, 2015)
Interaction among participants	Participants' interactions in the forum were categorized into groups such as elaboration, opinionated elaboration, etc. (Banerjee et al., 2018)
	Teachers helped each other learn about different tools presented in the course (Koutsodimou & Jimoyiannis, 2015)
Forum topics	Teachers' discussed the link between specific subjects they teach and the MOOC topic, digital technologies (Falkner et al., 2017)
	Participants discussed pedagogical issues relevant to their practice and the use of MOOCs as PDs (Koukis & Jimoyiannis, 2017)
Performance	Reported mean scores on each of the MOOCs' units, amounting to about 90% (Huang et al., 2020)
	4.34% of enrollees passed the course (Zou et al., 2020)
Knowledge	Over 50% of the participants felt they gained knowledge about teaching the course material (Burbaitė et al., 2022)
	Increase in self-reported knowledge of digital skills (Vázquez & Montoya, 2015[a])
Motivations	Most teachers enrolled to learn about innovative practices and to find useful resources (Cinganotto & Cuccurullo, 2019)
	Teachers took the MOOC to develop professionally and experience online learning (Wambugu, 2018)
Prior MOOCs experience	Learners in MOOCs for teachers had significantly higher rates of first-time MOOC users than learners in other MOOCs (Castaño-Muñoz et al., 2018)
	76% of participants had not taken a MOOC before (Spradling et al., 2015)

Note. In (a), the authors only use descriptive statistics and do not report whether the increase is significant or substantial

A special group within the descriptive studies did not focus on teachers who took a MOOC but rather on teachers in general (10%). These studies explored variables such as MOOC readiness (e.g., Arnavut & Bicen, 2018) or attitudes towards MOOCs (e.g., Vlachou et al., 2020) among teachers, and found that while most teachers viewed MOOCs positively, they were concerned about barriers such as access to the Internet and maintaining motivation over time (Kennedy & Laurillard, 2019; Yıldırım, 2020).

Next, we turn to discuss studies that went beyond describing their target variables. One such group of studies explored the associations among two or more variables (18%). One tenth of the studies tried to predict performance or course completion. The most common variable associated with course completion was engagement with the course content, for example, watching more videos and taking more assessments (Bonafini, 2017; Fan et al., 2022; Ma et al., 2022; Tang, 2021). Another common variable was interaction with other learners, though there is some disagreement about the role of this variable in predicting course performance. After controlling for engagement with content, Ma et al. (2022) and Bonafini (2017) found that interactions with peers (e.g., number of forum posts) predicted course performance, while Tang (2021) found that they did not. Other studies looked at learner factors that were associated with higher performance such as grit (Davies, 2022) and digital competence (Ramirez-Montoya et al., 2017). Finally, Rutherford-Quach et al. (2021) found that support at the school level, particularly structural support (dedicating time to learning, offering monetary incentives) was associated with better performance in the course.

The rest of the associational studies (6%) compared different groups of learners. Chen et al. (2020) looked at the motivations and engagement patterns of MOOC retakers and one-time takers. They found that retakers were more likely to want to earn a course certificate and had higher scores relative to one-time takers. Li et al. (2021) and Wollscheid et al. (2016) looked at the interactions and performance of learners taking the course alone vs. in groups. They found that working in groups in schools had a better sense of community within the school (Wollscheid et al., 2016) and had higher performance and more interactions with other learners within the MOOC (Li et al., 2021).

The last group of studies focused on MOOCs' impact (16%). Most of these studies compared the levels of a target outcome before and after the course. The studies' most common target outcome was self-reported knowledge (e.g., Taranto et al., 2021), but other outcomes included awareness of and attitudes toward the course's subject (Falkner et al., 2018; Garreta-Domingo et al., 2015). They generally found that the MOOC at their center had the expected impact and improved participants' knowledge of and about the course's topic. Notably, few studies looked at changes in knowledge or learning using objective measures (i.e., exams; Gordillo et al., 2019; Shemy & Al-Habsi, 2021; Xie et al., 2021). In addition, although these studies generally aimed to demonstrate the course's effectiveness, almost none used an appropriate study design: only Luo et al. (2022), Tzovla, Kendraka, Karalis, et al. (2021), and Xie et al. (2021) used a quasi-experimental design, and only Shemy and Al-Habsi (2021) used a true experimental design, finding that a MOOC designed to train teachers to use open educational resources resulted in an increase in the teachers' knowledge and a positive attitude towards the use of open educational resources in schools.

Discussion

In spite of the popularity of studies about MOOCs for teachers in recent years, there are no existing reviews of these studies. This scoping review summarized the literature about MOOCs as PDs with an emphasis on commonly used methods and topics. We found that the existing works mostly focused on a single MOOC, about technology in education, that was created in North America or Europe. Most studies used mixed methods and were descriptive, with few predictive or longitudinal studies. They often measured variables such as teachers' perceptions of the MOOC and their engagement; perhaps as a result, they almost always used surveys as a data source.

When considering commonly identified topics in prior literature reviews on MOOCs and online PDs (impact, design, instructors, and learners), we found that most studies focused on the learners and very few focused on the instructors, as was also reported in prior reviews. The courses' impacts were also of interest in the reviewed studies, although most of their designs could be improved to truly detect course impact. However, many of our studies described course design elements. Since we removed some studies whose focus was course design, it is clear that PD design was a more attractive subject to PD MOOCs researchers in comparison with researchers in similar fields (Alturkistani et al., 2020; Babori et al., 2019; Dede et al., 2009; Despujol et al., 2022).

In terms of methods, many of these studies used mixed methods, a suggestion endorsed in prior reviews as a way to expand on the existing knowledge in the field (Alturkistani et al., 2020). On the other hand, most of the studies used surveys, were conducted in Western countries, and were learner-focused, looking at learners' perceptions and engagement. All of these points resemble the findings of past reviews.

This brings us to some suggestions for future studies based on our findings:

1. Target MOOCs: As online PDs require many resources to develop (Hollands & Tirthali, 2014), it seems unsurprising that most studies about MOOCs as PDs were conducted in the West. This is the case in studies about MOOCs more generally as well. Multiple authors have suggested conducting more studies about MOOCs in other countries to learn how they design MOOCs and what their learners value (van de Oudeweetering & Agirdag, 2018). Although there has been an increase in the number of studies from nations such as China (Meet & Kala, 2021), as seen in this review as well, there is still room for improvement.

   Another interesting point is that many studies focused on courses about technology in education. This is probably the case because PD designers familiar with MOOCs are likely to also be interested in educational technology more generally and more likely to want to teach the topic. While it is certainly positive that the use of technology is being taught to teachers at a large scale, more studies are needed about MOOCs focusing on other topics such as science and social science teaching.

2. Data collection and analysis: Most of the reported studies used traditional data collection methods, namely surveys and interviews. As such, they did not take advantage of the wealth of data available from MOOCs platforms. Even studies that do use automatically collected data mostly use rather simple binary indicators of engagement, making their results almost obvious (e.g., course completion is often

conditioned on completing assignments and watching videos, so the association between these engagement measures and completion is not very surprising).

Existing studies have rarely used the complex data available on what pages or videos learners viewed, when they viewed them, and for how long. This is also a problem in other studies about MOOCs and online PDs (Alturkistani et al., 2020; Dede et al., 2009; Raffaghelli et al., 2015), but the fact that it exists in studies about MOOCs for teachers is somewhat surprising. Education researchers who usually design MOOCs as well as the studies about them are often interested in understanding and improving teaching and learning processes, which are best measured by looking at participants' actions in the course. Therefore, it would seem the use of automatically collected data would be particularly relevant in research on MOOCs for teachers.

Another underused form of data is performance data. While we did identify studies interested in learners' performance, many of them used self-reported knowledge rather than an objective measure. Self-reported knowledge is important in order to understand whether teachers felt the course is helpful, but it is not enough in order to see if teachers' objective knowledge has improved (Raffaghelli et al., 2015; Reich, 2015). Even studies that did use objective performance measures such as the course's assessment rarely report on these assessments' development and validation processes. More use of valid assessments as well as transparency concerning their quality is important for MOOC evaluation.

Related to teachers' performance is the course's impact on practice. While several studies asked teachers whether taking a MOOC affected their practice, no studies measured actual pedagogical changes or effects on students. Self-reported data are limited, measuring only teachers' perspectives rather than true changes. So, to understand whether the course actually had the desired effect, studies should follow teachers in schools via observations or student-level assessments (Dede et al., 2009).

Regarding data analysis, the most popular methods were traditional, mostly descriptive and some inferential statistics. This may be attributed to the use of surveys administered once or twice rather than the more complex data available from MOOC platforms. While traditional statistics are valuable when the research question requires them, researchers in the field should also consider more complex methods that allow for answering other types of research questions. For example, studies using SNA, NLP, or machine learning techniques (Chen et al., 2020; Fan et al., 2022; Kellogg et al., 2014; Xie et al., 2021) can be used to describe learners' interactions with each other or with the course in ways that are impossible using inferential statistics alone (Lu et al., 2021; Moreno-Marcos et al., 2018; Sangrà et al., 2015; Zhu et al., 2018; 2020). Considering alternative data analysis techniques may potentially expand the research topics available to scholars.

3. Study design: Most of the studies we reviewed were purely descriptive, although some of them used descriptive analyses to make claims about the course's effectiveness (e.g., show that the participants were satisfied with it). Describing learners' experiences is important, but there is also room for other types of studies. As an example, to show that a course was successful in causing the desired change, one must measure the learners' status before taking it. Ideally, impact studies should also have a control group. A simple description of learners' status at the end of the course is not enough to show that the course was effective. This is also an issue in studies about other MOOCs and online PDs (Joksimović et

al., 2017; Yousef et al., 2015). For example, Reich (2015) argued that existing MOOC studies are rarely experimental. Even the experimental ones tend to take a simple A/B testing form, checking whether changing a course component (e.g., introducing badges) has an impact on performance or engagement. He suggests going beyond such simple interventions and conducting experiments to check whether specific pedagogical methods have an impact on learning. Alternatively, Alturkistani et al. (2020) suggested using longitudinal designs with several measures throughout the course in order to track participants' learning over time. Again, given how those who create MOOCs for teachers are often interested in course impact, these suggestions seem to be pertinent.

Although the need for experiments is urgent, there is also room for more correlational studies, describing the relationships among variables (Deng et al., 2019; Moreno-Marcos et al., 2018). For example, there is a clear interest in predicting learners' performance in MOOCs for teachers. However, few studies used variables other than engagement to do so. Studies using variables such as pre-course knowledge about the content and about MOOCs, reasons for enrolling, and interactions with other participants in order to predict performance have the potential to contribute to the field. Of course, there is also value in predicting or finding the correlations among other constructs such as engagement, knowledge, or implementation of what was learned.

4. Target variables: Related to the other points above, there are several understudied topics on MOOCs for teachers. We were able to identify only a handful of studies about participants' objective performance, motivations, previous experience with MOOCs, expectations, and barriers and supports at the school level. All of these topics are important; for instance, understanding whether a teacher took the MOOC because they were made to or because they were interested in the course topic might be important in understanding their performance and engagement (Meet & Kala, 2021; Sprague, 2006).

   Of course, many topics were not studied at all in the articles we reviewed. We already mentioned the implementation of the course content in class, student-level impact, and the impact of certain design elements. Other topics were suggested by other authors, for example, engagement in specific parts of the course (Moreno-Marcos et al., 2018), comparisons of subpopulations' engagement, performance, and so forth by culture or teaching subject (Reich, 2015; Zhu et al., 2018), MOOCs-specific instruments and assessments (Deng et al., 2019), learners' support in the course (Bozkurt et al., 2017; Bragg et al., 2021), MOOCs designers and instructors (Dillie & Røkenes, 2021; Meet & Kala, 2021; Veletsianos & Shepherdson, 2016), MOOCs in comparison with blended courses (Sprague, 2006), business models of MOOCs for teachers (Kennedy, 2014), and social issues such as equity in access to the courses (Bozkurt et al., 2017; Despujol et al., 2022).

In spite of the potential contribution of our findings to the literature, this study has several limitations. First, in terms of inclusion criteria, we only reviewed English-language studies published in conference proceedings or journals. As a result, we might have missed relevant studies published in other languages or venues. Second, as we focused solely on MOOCs for in-service K–12 teachers, we did not survey studies about related topics that might be of interest to the reader such as blended courses or pre-service training. Future studies could expand the scope of this research by including other types of MOOCs for teachers. Finally, as we conducted a scoping review, we did not evaluate the studies' quality. Although all of the studies were published in peer-reviewed venues, some of them may not meet some formal quality standards (e.g., a detailed description of the measures used in the study; see the PRISMA guidelines, Page et al., 2021). Therefore, they could be less valuable than the rest of the studies. Future reviews should explore the studies' quality or focus on high-quality studies only.

Conclusion

This study provides a scoping review of the literature on MOOCs for teachers' PD. Based on our findings, we suggested that future research diversify studies' (a) target MOOCs, (b) data collection and analysis methods, (c) study designs, and (d) target variables. These suggestions will help enrich future studies about MOOCs for teachers. In addition, this review might inform research about MOOCs or PDs in general, as some of our findings and suggestions may apply to other fields, as well. We hope our review will help improve and expand our knowledge of how to better educate teachers, thus contributing to education as a whole.

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Appendix

Studies Included in the Review

Authors	Course topic	Purpose	Type	Data sources
Arnavut & Bicen (2018)	Unspecified	Develop a MOOC readiness scale	QN	Survey
Bakogianni et al. (2020)	Unspecified	Measure MOOC readiness and perceptions of MOOCs among teachers	QN	Survey
Banerjee et al. (2018)	Pedagogy (technology)	Measure course effectiveness in enhancing learners' interactions	MM	Survey, forum
Boltz et al. (2021)	Pedagogy	Describe engagement and learners' challenges	MM	Survey
Bonafini (2017)	Math	Identify demographic engagement variables that predict course completion	QN	Course data
Bonafini (2018)	Math	Describe the learners who posted the most on the course's forum	MM	Course data, survey, forum
Brennan et al. (2018)	Computer science	Describe what teachers value in the course	QL	Interview
Burbaitė et al. (2022)	STEM	Describe teachers' perceptions of the course and what they learned	QN	Survey
Castaño-Muñoz et al. (2018)	Pedagogy (technology)	Describe Spanish teachers taking MOOC in comparison with non-MOOC taking teachers and non-teachers MOOC participants from Spain	QN	Survey
Chavez (2020)	Language	Describe participants' attitudes towards the course	MM	Survey, interview
Chen et al. (2020)	Pedagogy	Compare the motivation and engagement of one-time and multiple-times takers of a MOOC	MM	Survey, course data, interview
Cinganotto & Cuccurullo (2019)	Pedagogy	Describe participants' engagement, motivation, and interactions	MM	Survey, course data, forum, social media posts
Davies (2022)	Computer science	Predict course completion based on participants' grit, motivation, and intentions	QN	Survey

Falkner et al. (2018)	Computer science	Describe MOOC participants' engagement and perceived challenges	MM	Survey, course data, forum
Falkner et al. (2017)	Computer science	Describe MOOC participants' engagement	MM	Survey, course data, forum
Fan et al. (2022)	Pedagogy	Compare the learning strategies in the first and following MOOC attempts and their effect on performance	QN	Course data
Garreta-Domingo et al. (2015)	Pedagogy (technology)	Describe teachers' experiences over time	QN	Survey
Gonçalves & Osório (2018)	Pedagogy (technology)	Describe the course's impact on teachers' knowledge	MM	Survey, interview, observations
Gordillo et al. (2019)	Pedagogy (technology)	Describe the course's impact on teachers' knowledge	QN	Survey, artefacts
Griffiths et al. (2022)	Physical education	Describe teachers' experiences in the course	MM	Survey, interview
Herranen et al. (2021)	STEM	Describe teachers' perceptions of the course	QN	Survey
Hilali & Moubtassime (2021)	Unspecified	Describe teachers' MOOC readiness, use, and attitudes	QN	Survey
Hollebrands & Lee (2020)	Math	Describe teachers' experiences and attitudes towards the course	MM	Survey, course data, forum
Huang et al. (2020)	Pedagogy (technology)	Describe learners' engagement and performance	QN	Course data, forum
Johnston (2016)	Math	Describe MOOC enrollment after an intervention	QN	Course data
Karlsson et al. (2014)	Pedagogy (technology)	Describe participants' attitudes and interactions	MM	Survey, social media posts
Kellogg et al. (2014)	Pedagogy (technology)	Describe participants' interactions	MM	Survey, forum
Kennedy & Laurillard (2019)	Pedagogy (technology)	Describe learners' engagement and attitudes towards the course, describe teachers' perceptions of MOOCs potential	MM	Survey, course data, forum, interviews
Koukis & Jimoyiannis (2017)	Language	Describe learners' engagement and attitudes	MM	Survey, course data, forum, interviews

Koukis & Jimoyiannis (2018)	Language	Describe learners' engagement and attitudes	MM	Survey, course data
Koukis & Jimoyiannis (2019a)	Language	Describe learners' engagement and attitudes	MM	Survey, forum
Koukis & Jimoyiannis (2019b)	Language	Describe learners' engagement and attitudes	MM	Survey, forum
Koukis & Jimoyiannis (2020)	Language	Describe learners' engagement and attitudes	MM	Survey, course data, forum
Koutsodimou & Jimoyiannis (2015)	Language	Describe learners' engagement and attitudes	QN	Survey, course data, forum
Laurillard (2016)	Pedagogy (technology)	Describe learners' engagement and attitudes	MM	Survey, course data
Laurillard et al. (2018)	Pedagogy (technology)	Describe a tool and its use within a MOOC	MM	Survey, forum
Li & Yu (2019)	Pedagogy (technology)	Describe course engagement and teachers' perceptions of what affects use	MM	Survey, course data, forum
Li et al. (2021)	Unspecified	Compare the performance and interactions of individual learners vs. learners in groups	MM	Course data, forum
Luo et al. (2022)	Pedagogy (technology)	Test the effectiveness of an intervention on learners' engagement and interactions	MM	Course data, forum
Ma et al. (2022)	Pedagogy (technology)	Predict course performance based on interactions with content and peers and learners' traits	QN	Survey, course data
Ostashewski et al. (2018)	Pedagogy (technology)	Describe participants' perceptions of MOOC-related benefits and challenges	QL	Response to prompt
Panero et al. (2017)	Math	Describe participants' attitudes towards the course's evaluation criteria	QL	Survey, learner-provided texts
Rahimi et al. (2018)	Computer science	Describe changes in knowledge and attitudes over time	MM	Survey
Ramírez-Montoya (2017)	Pedagogy (technology)	Predict teachers' knowledge and its application from teachers' traits, teachers' perceptions of course-	MM	Survey, course data, observation

		related opportunities and challenges		
Rivera Vázquez & Ramirez Montoya (2015)	Pedagogy (technology)	Describe changes in knowledge and attitudes towards the course	MM	Survey, interview
Rutherford-Quach et al. (2021)	Language	Test the effects of school-level supports on course completion and knowledge	MM	Survey, course data, interview
Salmon et al. (2015)	Pedagogy	Describe participants attitudes towards the course	MM	Survey
Shah et al. (2018)	Pedagogy (technology)	Describe participants attitudes towards the course and factors that made the engage	MM	Survey
Shangying & Jing (2017)	Pedagogy	Describe engagement patterns	QN	Course data
Shemy & Al-Habsi (2021)	Unspecified	Test the MOOCs' impact on knowledge and learners' attitudes	QN	Survey, achievement test
Silvia (2015)	Pedagogy	Describe participants attitudes towards the course	QN	Survey
Spradling et al. (2015)	Computer science	Describe learners' motivation, engagement, and attitudes	QN	Survey, course data
Tang (2021)	Pedagogy (technology)	Predict completion from learners' interactions with the content, the instructor, and other learners	MM	Course data, interview
Taranto & Arzarello (2020)	Math	Describe participants attitudes towards the course	MM	Survey, forum
Taranto et al. (2017)	Math	Describe the forum content	MM	Forum, learner-provided texts
Taranto et al. (2021)	Math	Describe changes in knowledge and participants' attitudes towards the course	MM	Survey, forum
Tzovla, Kendraka, & Kaltsidis (2021)	STEM	Describe participants attitudes towards the course	MM	Survey
Tzovla, Kendraka,	STEM	Track changes in learners' self-efficacy throughout the course	QN	Survey

Karalis et al. (2021)				
Vivian et al. (2014)	Computer science	Describe learners' engagement and attitudes towards the course	MM	Survey, course data, social media posts
Vlachou et al. (2020)		Describe teachers' use and attitudes towards MOOCs	QN	Survey
Wambugu (2018)	Pedagogy (technology)	Describe participants attitudes towards the course	MM	Survey, focus group
Wollscheid et al. (2016)	Math	Compare participants' interactions by the course's format	MM	Interviews
Xiao et al. (2020)	Pedagogy (technology)	Predict course achievement and satisfaction from variables related to technology acceptance	QN	Survey
Xie et al. (2021)	Pedagogy	Test course impact on performance and engagement	QN	Course data, forum
Yıldırım (2020)	STEM	Describe attitudes towards MOOC	QL	Interview
Yoon et al. (2020)	STEM	Describe attitudes towards MOOC and forum interactions	MM	Survey, forum, interview
Yurkofsky et al. (2019)	Computer science	Describe what teachers view as valuable in the course	QL	Interview
Zou et al. (2020)	Pedagogy (technology)	Describe engagement and content of the forum	QL	Course data, forum

Note: Course data refers to any data automatically collected by the platform such as engagement and performance. QN = quantitative; QL = qualitative; MM = mixed methods.

[i] Joshua Littenberg-Tobias was affiliated with the Teaching Systems Lab in the Massachusetts Institute of Technology while doing some of the work on this project.

[ii] Note that throughout the paper, we sometimes use the abbreviation "PDs," meaning "professional development courses," as opposed to using the general term "professional development."

[iii] The percentages throughout the paper are out of the full sample of 68 studies. The percentages may not sum up to 100 because of rounding.

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Identifying Reasons That Contribute to Dropout Rates in Open and Distance Learning

Kokila Ranasinghe[1,*], T. Lakshini D. Fernando[1], Nimali Vineeshiya[2], and Aras Bozkurt[3]
*[1]Department of Chemistry, The Open University of Sri Lanka, Nugegoda, Sri Lanka; [2]Department of Social Studies, The Open University of Sri Lanka, Nugegoda, Sri Lanka; [3]Department of Distance Education, Anadolu University, Eskişehir, Türkiye & Department of Social Sciences, Western Caspian University, Azerbaijan; *Corresponding author*

Abstract

This study examined the reasons for high dropout numbers in programs offered through open and distance education (ODE). A mixed method approach was employed to collect data from a purposive sample of instructors and students at the Open University of Sri Lanka. A total of 38 reasons were revealed, of which aligned with existing dropout models as well as a few country- and institute-specific reasons. Results indicated that internal and external reasons mainly influenced students to drop out; student characteristics and skills also contributed to the students' decision. The most influential reasons were job and family commitment, workload, time management, and flexibility, indicating that employed students were the more severely affected fraction of the dropout population. The researchers attempted to create a holistic picture of the dropout phenomenon in ODE, providing a foundation for policymakers and educators to implement targeted interventions and individualized support mechanisms to foster student retention.

Keywords: dropout, student retention, open education, distance education, open and distance learning, online learning, higher education, Sri Lanka

Introduction

United Nations Educational, Scientific and Cultural Organization (Carlsen et al., 2016) defines distance education as a form of education in which the instructor and the student are separated in time and space, with knowledge-sharing occurring through printed resources, online learning, blended learning, or any other convenient delivery mode. Even though there are many advantages to open and distance education (ODE), the relatively high dropout rates and comparatively low retention rates in ODE programs have been identified as the main challenges (Elibol & Bozkurt, 2023). Earlier studies identified dropping out as a complex and diverse phenomenon (Bağrıacık Yılmaz & Karataş, 2022). Accordingly, a vast number of reasons ranging from personal, academic, social, and institutional factors could be directing or forcing the learners to discontinue their studies. Especially in the case of ODE, dropout reasons vary widely, as students come from different demographic, educational, social, and economic backgrounds, with various abilities and intentions.

Despite growing demand for distance learning, ODE institutions have suffered from financial and reputation damages caused by low retention and, thus, high dropout rates (Reissman, 2012). In addition to the common factors identified by dropout models (Bean & Metzner, 1985; Rovai, 2003; Tinto, 1975) or reasons identified through empirical studies (Bağrıacık Yılmaz & Karataş, 2022; Mohammad et al., 2012; Musingafi et al., 2015; Shikulo & Lekhetho, 2020; Thistoll & Yates, 2016), universities delivering learning content through ODE may have experienced high dropout rates due to a specific set of reasons based on their own circumstances. Thus, various researchers have been encouraged and motivated to identify the underlying causes for dropouts within specific institutions and to propose mitigation measures (Banks & Dohy, 2019; Herath et al., 2022; Mohammad et al., 2012; Muljana & Luo, 2019; Musingafi et al., 2015; Reissman, 2012; Shin & Kim, 1999; Zuhairi et al., 2019).

This study addressed the question of why students in open and distance education (ODE) programs drop out. This study employed an exploratory sequential mixed methods design, which offers a more comprehensive understanding of the research problem by integrating both quantitative and qualitative data (Creswell & Guetterman, 2018). In the initial phase, data were collected from students who dropped out of the Bachelor of Science (B.Sc.) degree program as well academic staff of the Open University of Sri Lanka (OUSL) via face-to-face interviews. Insights from the qualitative data were then used to develop the quantitative phase and an online survey was administered to former students who had dropped out. Researchers expected to identify the reasons contributing to a learner dropping this program and, thereby, to portray a holistic picture of the dropping out phenomenon relevant to ODE setting thus enabling the implementation of mitigation strategies.

Significance and Originality of the Research Problem

Historically, ODE institutions have had high dropout rates (Elibol & Bozkurt, 2023, Qayyum et al., 2019). According to a study conducted based on 27 open universities from Commonwealth countries, the average attrition rate was 84.74% (Mishra, 2017), indicating the vital and immediate need to investigate the reasons behind dropouts and thereby to implement measures to increase student persistence. According to internal data from OUSL, within the six consecutive academic years 2016 to 2023, 7,516 students registered for the Bachelor of Science degree and 48% of them (i.e., 3,583) were identified as having dropped out. This number may increase over time. Except for a few limited studies (Herath et al., 2022, Liyanagama, 2019) no comprehensive studies have been done to identify the reasons behind the dropping out of this particular program or any program at OSUL.

Most studies on the dropout issue have been conducted in North America and Europe (Rahmani et al., 2024) and most have focused on dropout in traditional education (Lorenzo-Quiles et al., 2023; Véliz Palomino & Ortega, 2023). As well, most used cross-sectional data, and the number of studies on understanding the dropout phenomenon with longitudinal data has been very limited. Analysing longitudinal data allowed us to gain a deeper perspective on dropout. In addition, such research within the context of a university in Asia enriched the related literature by providing a different socio-cultural and economic perspective.

Literature Review

ODE has bridged the geographical gap between institutions and learners and also created opportunities for learners to achieve their educational goals, which may otherwise not be achieved due to life commitments such as family responsibilities and employment (Elibol & Bozkurt, 2023). Reportedly, the dropout rate in ODE has been much higher than that in traditional education (Moore & Kearsley, 2012). As ODE has provided educational opportunities to a wide spectrum of students coming from any social, academic, or economic background, the high dropout numbers could be a cumulative result of a plethora of reasons (Bağrıacık Yılmaz & Karataş, 2022; Budiman, 2018; Elibol & Bozkurt, 2023; Park & Choi, 2009).

Several studies have offered valuable insights into the reasons why students drop out of ODE programs. For instance, Tinto's theoretical framework (Tinto, 1975) highlighted that academic, social, and institutional factors influence dropout. Some obvious reasons behind high dropout rates in ODE have included (a) poor goal commitment (Rovai, 2003); (b) low student-instructor interaction (Hawkins et al., 2012; Shikulo & Lekhetho, 2020); (c) a student's employment status and gender (Li & Wong, 2019); (d) students' physical separation from instructors and other students (Budiman, 2015); (e) student's intellectual development (Rovai, 2003); (f) prior academic performance (Muljana & Luo, 2019); (g) time management (Muljana & Luo, 2019); (h) computer and technology skills (Rovai, 2003); and (i) difficult exam conditions (Okur et al., 2019). Further, not-so-obvious reasons such as the instructor's qualifications (Thistoll & Yates, 2016), low student-student interaction (Muljana & Luo, 2019), and the tone of the instructor's e-mail to students (Stone & O'Shea, 2019) have also been cited as reasons that influenced student retention. Collectively, these findings demonstrate that dropout rates have been influenced by a complex interplay of pedagogical, technological, and socio-institutional factors, emphasizing the need for comprehensive strategies to improve student retention in ODE programs.

Definition of Dropout

A wide range of definitions for dropout can be found in the literature. One commonly accepted version is a student who has abandoned the program at any level of the program and who will never return to complete the course (Botelho et al., 2019). In most studies, passive students have also been considered dropouts (Bağrıacık Yılmaz & Karataş, 2022). In this study, we adopted the definition proposed by Botelho et al.

(2019) and defined the dropout rate as the percentage of students who left the program at any stage and were not expected to return to complete the course.

Existing Study Models of Dropout

Tinto's student integration model (1975) was based on research conducted in a traditional education setting, while Bean and Metzner's (1985) student attrition model was a theoretical framework designed for nontraditional students. Kember (1989) proposed a longitudinal process model to test dropout in distance education. Rovai's persistence model (2003) explained the factors that affected a learner's decision to drop out of online learning. Each of these models was either inspired by previous models or modified versions of them. Rovai's model encompassed variables identified by Tinto, and Bean and Metzner. It also included student needs, learning styles, and teaching styles. Rovai categorized variables into two stages based on when they affected the student—prior to admission and after admission. Student characteristics and skills were considered in the prior-to-admission stage. The after-admission stage considered internal factors such as variables related to education, and external factors such as the non-educational variables that came into effect after students enrolled in a program.

Recently, Bağrıacık Yılmaz and Karataş (2022) conducted a comprehensive study to identify influential reasons for high dropout rates in ODE by collecting data from not only the students but also from various other stakeholders, namely, field experts, instructors, administrators, and support staff. Bağrıacık Yılmaz and Karataş's (2022) study was an improved version of Rovai's (2003) persistence model and comprehensively summarized numerous possible reasons for the discontinuation of study programs in ODE. The four major themes identified by Rovai, namely, internal and external factors, student characteristics, and student skills, were adopted as is by Bağrıaçık Yılmaz and Karataş (2022). However, Rovai's model was updated with newer data to revise some variables, remove some variables, and introduce new variables. For example, social life was incorporated as a secondary reason under external factors; some key reasons such as resources, instructor characteristics, exams, and motivation were introduced under the internal factors group. Study habits and goal commitment were moved from internal factors to student characteristics, and ethnicity and gender were removed from the model. While improving Rovai's (2003) model, Bağrıacık Yılmaz and Karataş (2022) included time management in the self-regulation variable.

Method

Research Design

This study adopted an exploratory sequential mixed methods design consisting of two phases. Data were collected from students who dropped out of the B.Sc. degree as well as academic staff of OUSL via face-to-face interviews during the qualitative phase, and then an online survey was used to collect responses from dropped-out students during the quantitative phase.

Study Group and Sampling

The study group consisted of B.Sc. program students at OUSL who enrolled in the program structure initiated in 2016, which includes revised course content, assessment methods, evaluation criteria, and related components, implemented through a program review. The target dropout student population was classified into the following three categories and data were collected from all three (Table 1).

- Non-starters officially withdrew from the program without participating in any academic activities or never sat for any of the continuous assessments or exams.
- Official dropouts had not registered (or at least obtained studentship) for five consecutive academic years.
- Potential dropouts had abandoned the program but did not belong to any of the above two categories.

The classified lists of registrants under each of these categories were obtained from the university's information technology division. Within the six consecutive academic years considered from 2016 to 2023, out of 7,516 registered students, 3,583 (48% of total registrants) were identified as the total dropout population. This total was made up of 1,002 non-starters (28% of total), 2,120 potential dropouts (59%), and 461 official dropouts (13%).

Table 1

Study Sample Populations: Number of Participants in Each Category

Category	Population	Sample for qualitative interviews	Sample for quantitative survey
Non-starters	1,002	02	153
Potential dropouts	2,120 [a]	20	180
Official dropouts	461	02	22
Academic staff	89	14	--
Total		38	355 out of 3583[b]

Note. [a]The potential dropout number is an approximation, as students may return to the program until they are officially phased out; [b]Total dropout population was 3583.

Data Collection

In the qualitative phase, in-person semi-structured interviews were conducted with 24 student participants and 14 instructors. To ensure in-depth analysis, the target student population was identified using the stratified simple random sampling method covering all three dropout categories. To obtain an unbiased sample, a sample of 16% of staff was selected from the whole population, covering all the departments of the Faculty of Natural Sciences. Most of the student participants were interviewed via phone or Zoom as per each participant's request. Staff interviews were mostly conducted face-to-face on site. Due to travel difficulties, only a few academic staff from regional centers were interviewed online. The interviews were conducted in Sinhala or English, depending on each participant's preference. All participants were volunteers and a consent form was given before the interview. Most of the pre-prepared interview questions were open-ended allowing the interviewees to express their views and opinions freely. Based on the participants' answers, follow-up questions were asked to elicit more information, provide an in-depth perspective, or confirm their answers, if necessary. In this phase, participants' experiences, perceptions, and opinions of student dropouts were obtained. This included qualitative aspects into the reasons behind dropouts, challenges faced by students, and the support mechanisms available.

In the second phase of the research, an online survey was developed based on the outcomes of the qualitative analysis; the survey link was distributed among the whole study population via e-mail and/or SMS. The survey request was sent three times within one month. Responses were collected until the sample was statistically saturated. Some of the responses were collected over the phone as per the participant's request.

Data Analysis

Qualitative data analysis was conducted using both deductive and inductive techniques.

Content analysis was used as the main research method based on the constructivist epistemology which reflects the participant's experiences and their perception of reality. This made it easier to systematically code the data and put it into a systematic set of words, phrases, and themes within the data. The deductive approach helped us contextualize dropout reasons into predefined themes, while the inductive approach allowed us to look for new themes and reasons.

Dropout reasons were categorised into four themes based on Bağrıacık Yılmaz and Karataş (2022), namely internal and external reasons, student skills, and student characteristics. However, the inductive approach defined some new secondary reasons as needed during the data analysis. The collected data, including interview transcripts from both students and academic staff, were carefully organized, ensuring that all identifying information was removed to protect participant anonymity. The interviews conducted in Sinhala/Tamil languages were translated into English. One of the researchers fluent in both languages cross-checked the translations.

The online survey combined the reasons identified by the qualitative study and the reasons listed in Bağrıacık Yılmaz and Karataş (2022). Data were collected separately for different student groups (i.e., non-starters, potential dropouts, and official dropouts) by using the conditional sequence method. First, demographic information (see Table 2) and academic-related details were collected, including the registered center, language medium, and subject combination. A total of 45 potential dropout reasons were listed under six major categories (i.e., academic, university and administrative, student skills and characteristics, student preferences, external reasons, and other opportunities) for the students to choose from. A Likert scale was provided based on the degree of influence each reason made on the decision to drop out. The Likert scale was 0 to 3—0 represented *no effect* or *very low influence,* 1 indicated *low influence*, 2 represented *strong influence,* and 3 indicated *very strong influence*. The neutral option was avoided to obtain specific opinions. Respondents could also write in any other dropout factor(s) not listed in the survey.

Table 2

Demographic Data of Study Participants

Category		Non-starters	Potential dropouts	Official dropouts	Total (%)
Total number		153	180	22	355
Gender	Male	69	56	7	132(37)
	Female	84	124	15	223(63)
Age	19–29 years	132	155	21	308(87)
	30–39 years	15	20	1	36(10)
	40–49 years	2	5	0	7(02)
	≥50 years	4	0	0	4(01)
Civil status	Single	119	130	18	267(75)
	Married	34	49	4	87(25)
	Separated	00	1	0	1(00)
Employment	Unemployed	61	60	3	124(35)
	Government	44	50	7	101(28)
	Semi-gov't	13	7	2	22(06)
	Private	30	57	10	97(27)
	Self-employed	5	6	0	11(03)

The collected data were analyzed using SPSS software to examine mainly descriptive statistics. To determine if there were any statistically significant differences among student groups or demographic groups, the researchers used Mann-Whitney U test (if two independent groups) or Kruskal-Wallis H Test (if more than two independent groups) appropriately. These rank-based nonparametric tests were used because the Kolmogorov-Smirnov normality test, histograms, skewness, and kurtosis tests confirmed that the collected data did not fit a normal distribution. Statistical data is available upon request.

Research Ethics

Prior to the qualitative interviews and quantitative online survey, ethical review approval was obtained from the Ethical Clearance Committee of the Research Unit of OUSL. No risks associated with this research were expected or predicted—participants' privacy and anonymity were protected, and sensitive questions were not included in the interview. Participants in qualitative interviews singed a consent form prior to the interviews. Further, the first part of the online survey was a consent form, which participants indicated they read and agreed to before accessing the survey questions. The participants were given the right to refuse to answer or withdraw from the study at any point without any penalty. The interview data (i.e., interview responses, voice recording, consent forms, and online survey responses) have been stored in an online cloud storage service with restricted access.

Results

Qualitative Data Analysis

The qualitative results helped us gain a deeper understanding of the common root causes of the dropout phenomenon in ODL and also identified institutional-, faculty-, country-, and region-specific reasons for dropping out. Themes and reasons from Bağrıacık Yılmaz and Karataş (2022) were used to represent data (Table 3). The program fit reason, which was listed in the Bağrıacık Yılmaz and Karataş study was not included since its exact definition was not found in the literature. In addition to the reasons present in Bağrıacık Yılmaz and Karataş, some new reasons, such as academic burden, academic delays, competency in second language, commute difficulties, social and political disappointment, and issues with regional centers were also revealed. These represented country- and/or institution-specific reasons.

Table 3

Frequency of Dropout Themes and Reasons as Revealed in Interviews

Theme	Reason	Code frequency	
		Instructors	Students
Internal	Academic integration	5	1
	Social integration	11	7
	Resources	--	1
	Accessibility	3	1
	Instructor characteristics	2	3
	Program compatibility	10	1
	Utility	4	0
	Exams	3	--

	Perceived ease of completion	--	--
	Institutional commitment	--	1
	Absenteeism	1	2
	Anxiety	--	2
	Course availability	--	--
	Flexibility	1	3
	Orientation	1	1
	Diploma validity	3	3
	Motivation	4	2
	Satisfaction	2	1
	Academic burden*	10	1
	Regional centers*#	1	4
	Academic delays*	2	1
	Internal theme total	63	35
External	Business life	12	11
	Financial reasons	10	3
	Family life	9	2
	External support/obstruction	6	2
	Social life	1	-
	Life crises	1	1
	Opportunity to transfer	5	7
	Commute difficulties*	2	3
	Social and political disappointment*	2	1
	External theme total	48	30
Student characteristics	Personality structure	2	3
	Study habits	1	--
	Goal commitment	3	1
	Belief/preconception	--	--
	Age	--	--
	Self-suitability	2	1
	Academic background	3	1
	Un/consciousness	2	1
	Technical equipment facilities	--	1
	Student characteristics theme total	13	8
Student skills	Digital literacy	3	--
	Self-regulation (Time management)	7	7

	Competency in second language*	7	1
	Student skills theme total	17	8

Note. *Reasons not present in Bağrıacık Yılmaz and Karataş (2022); #There are nine regional centers spread across the island.

Table 3 was based on the responses from 38 participants. Of these, 14 academic staff members responded to the open-ended question "Why do you think a student would drop out of the Bachelor of Science degree program offered at OUSL?" Concurrently, 24 randomly selected students who had dropped out of the programme were asked about the reason(s) for their decision to drop out. While academic staff listed all the possible dropout reasons they could think of, each student only mentioned the dropout reason/s they experienced. Thus, the total frequency values were usually smaller in the student column compared to the instructor column.

Based on the data collected from the academic staff, the most influential themes contributing to student dropout, in order of significance, were external reasons, internal reasons, student characteristics, and student skills. The most influential dropout reasons selected by instructors under external reasons were business life, family life, and financial reasons. According to one of the academic staff, "our student community is a diverse group. Since most of them are female students, the majority have family commitments restricting them from allocating enough time for studies. Another high number of students are employees." This statement highlighted the challenges students face in balancing their studies with other responsibilities, which may ultimately contribute to their decision to drop out. Some instructors pointed out that occasionally, students who did well in their first semester stopped studying by the next semester, since the second payment was due at the beginning of the second semester. For internal reasons, most instructors mentioned (a) social integration (i.e., student-instructor, student-student, and student-administrative interactions); (b) program compatibility, specifically, the inability to get familiar with the ODL mode; and (c) academic burden (i.e., high workload) as the highly influential reasons. Many instructors mentioned that a high workload may be created because students enrolled in a higher credit load than they could handle. Further, they linked high workload to the student's difficulty in time management. Some academic staff selected high workload, indicating that students had a great deal of work to complete within a limited period.

> Having two or three continuous assessment tests (CATs) and a final exam (per course) placed within a short period could be too much for students. If they have taken several similar courses, imagine the number of exams they would have to sit in per semester! They have no time to absorb knowledge but to get ready for those exams.

Several reasons related to the period before admission, such as time management (under self-regulation) and competency in a second language (both written and spoken English), were frequently mentioned by the instructors.

Regarding the other two reasons, business life and self-regulation (time management), both the instructors and students agreed that these were the most influential reasons for dropping out. The following statement exemplified cases in which many students mentioned both reasons together, showcasing that job commitment and time management were interrelated.

> I did well during the first semester, but then I got a job . . . then I could not manage my time to balance the job and the studies. I was tired and stressed. I missed most of the lectures and some CATs. Since I was newly appointed, I could not get leave to do . . . [my] practical.

Students and instructors also mentioned opportunity to transfer as a reason for dropping out. There were several cases in which the only reason to give up on the degree was to get a job-oriented study opportunity. In addition, an opportunity to transfer to another local or foreign university, a job in a rural area, or migration to some other situations were mentioned under this category.

In addition to academic burden and competency in a second language, several other new reasons emerged from the analyzed data. Two of these were regional centers and commute difficulties, both directly related to the physical location, less than optimum facilities, and other issues in regional centers. Several students mentioned that they had to drop out because they lived far away from a regional center, and it was costly and time consuming to participate in academic activities, which also indicated limited accessibility. Some students mentioned that though they had registered for a particular regional center, they often had to go to another regional center where facilities were available for certain compulsory activities, particularly practical laboratory sessions. Further, some mentioned that the resources and help they got at certain regional centers were poor, especially during the orientation period; this discouraged them from continuing.

> I first registered at X regional center. . . . I was not given correct information regarding how to plan my academic year or how to choose courses. . . . I was not clear about how things worked, and I missed several deadlines at the very beginning, so I gave up. . . . I registered as a new registrant again at Y regional center this year, and . . . was my counselor. She/he explained everything slowly and helped me to choose courses according to my future goals.

Political and social disappointment was also mentioned as a reason for dropping out, perhaps because Sri Lanka had been in an economic collapse since 2019. Another new internal reason mentioned was academic delays, which could be due to recent global and local calamities such as COVID-19 and the Easter bombings in 2019.

Quantitative Data Analysis

A total of 45 potential reasons were included in the survey within six major categories: (a) academic, (b) university and administrative, (c) personal skills and characteristics, (d) personal preferences, (e) external reasons, and (f) other opportunities. This categorization was used to help the respondents select appropriate dropout reasons in the correct context, and thereby improve the accuracy of the collected data. Participants responded to a four-point Likert scale for each reason. Responses were reassigned into 38 reasons/codes, 32 from Bağrıacık Yılmaz and Karataş (2022) and six new reasons before feeding the data into SPSS software. Two reasons, perceived ease of completion and belief/preconception, received no responses in the qualitative analysis and thus were not included in the survey. Further, two other reasons, namely age and opportunity to transfer, were evaluated separately, as using a Likert scale to measure them would be inappropriate. Respondents' age was collected through a short-answer question, while their opportunity to transfer (if any) was assessed using a multiple-choice question. Reliability analysis of the data was conducted by performing Cronbach's alpha (α) test, which confirmed the internal consistency of the responses (i.e., 0.947).

Significance of Dropout Reasons

A total of 355 responses (153 non-starters, 180 potential dropouts, and 22 official dropouts) were analyzed as part of the overall dropout group. According to the definition of *official dropouts*, only one batch (2016/2017) could be incorporated into the sample, contributing only 6% to the total dropout responses. The results of the official dropouts can be specific to the academic and external reasons of that particular academic year/batch; thus, this group was not analyzed separately but included in the overall dropout group. Calculated mean values of the responses were compared to determine the significance order among the dropout reasons (Table 4). In Figure 1, the mean values calculated based on the responses of the overall dropout group are presented in a column chart. According to the mean values, business life, academic burden, flexibility, self-regulation (time management), and family life were the reasons reported most often by dropout students. These reasons could be identified as interrelated and specifically relevant to part-time students. Employed students may have difficulty managing their time between studies and job and family responsibilities. As well, the flexibility of the academic activities was limited, and the academic workload was high, so learners may have been forced to abandon the program.

Table 4

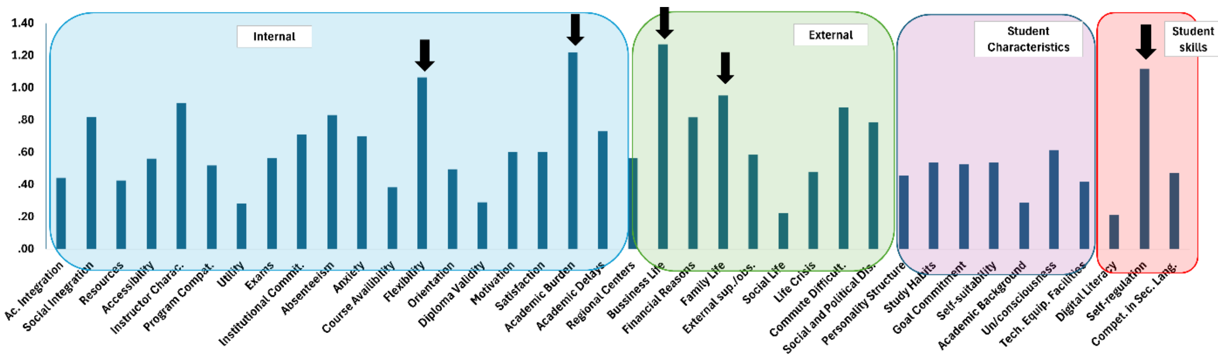
Dropout Reasons Ranked by Significance Based on Calculated Mean Values for Each Dropout Group

Significance	Non-starters	Potential dropouts	Overall dropouts
1.	Business life	Business life	Business life
2.	Self-regulation	Academic burden	Academic burden
3.	Academic burden	Flexibility	Self-regulation
4.	Family life	Self-regulation	Flexibility
5.	Flexibility	Family life	Family life
6.	Instructor characteristics	Social integration	Instructor characteristics
7.	Absenteeism	Commute difficulties	Commute difficulties
8.	Commute difficulties	Instructor characteristics	Absenteeism
9.	Financial reasons	Financial reasons	Social integration
10.	Social integration	Social and political disappointment	Financial reasons
11.	Social and political disappointment	Absenteeism	Social and political disappointment
12.	Academic delays	Academic delays	Academic delays

13.	Institutional commitment	Institutional commitment	Institutional commitment
14.	Anxiety	Anxiety	Anxiety
15.	Un/consciousness	Motivation	Un/consciousness
16.	Satisfaction	External support/obstruction	Satisfaction
17.	Study habits	Satisfaction	Motivation
18.	External support/obstruction	Regional centers	External support/obstruction
19.	Accessibility	Un/consciousness	Exams
20.	Regional centers	Exams	Regional centers
21.	Self-suitability	Program compatibility	Accessibility
22.	Goal commitment	Competency in second language	Study habits
23.	Motivation	Accessibility	Self-suitability
24.	Life crisis	Orientation	Goal commitment
25.	Exams	Academic integration	Program compatibility
26.	Program compatibility	Study habits	Orientation
27.	Resources	Goal commitment	Life crisis
28.	Technical equipment facilities	Self-suitability	Competency in second language
29.	Personality structure	Personality structure	Personality structure
30.	Orientation	Life crisis	Academic integration
31.	Academic integration	Course availability	Resources
32.	Competency in second language	Resources	Technical equipment facilities
33.	Course availability	Technical equipment facilities	Course availability
34.	Academic background	Diploma validity	Diploma validity
35.	Social life	Utility	Academic background
36.	Utility	Academic background	Utility
37.	Diploma validity	Digital literacy	Social life
38.	Digital literacy	Social life	Digital literacy

Figure 1

Mean Values Calculated for Each Dropout Reason: Responses From the Overall Dropout Group



Note. Black arrows indicate the top five reasons selected.

Internal Reasons

Academic burden, flexibility, and instructor characteristics were the most significant internal reasons identified. Academic burden was not present in Bağrıacık Yılmaz and Karataş (2022), but several researchers have mentioned the influence of high academic workload on dropping out (Vergidis & Panagiotakopoulos, 2002; Xavier & Meneses, 2021). During our qualitative analysis, both students and instructors mentioned that if the academic workload per course/semester/academic year is too heavy to manage, it influences the students to abandon the entire program. In the quantitative study, this reason was gauged by three secondary reasons—high assigned workload per course, tight/packed semester schedule, and complex/heavy course content. Flexibility within an ODE program is defined as the degree of the program's adaptability in response to the individual needs of students (Moore, 1993). A program structure should not be too rigid or too flexible, because either one will lead to high dropout rates (Moore, 1993). Given the limited physical and human resources available, many compulsory academic activities (i.e., exams and practical sessions) in the program we studies had fixed dates and times or limited alternative options. This made the program's structural rigidity high and was perhaps the reason why many dropped out students selected the flexibility factor. Instructor characteristics was another significant internal reason identified by respondents, which comprises a range of instructor qualities including (a) qualifications, (b) field knowledge, (c) degree of care about the courses, (d) ODE experience, (e) feedback to students, and (f) way in which e-mails were responded to (Bağrıacık Yılmaz & Karataş, 2022; Shikulo & Lekhetho, 2020; Yuan & Kim, 2014). Students may feel isolated or helpless when the instructor does not connect with them promptly or their goals and intentions are not synced, both of which may contribute to dropout.

External Reasons

The most significant external reasons were business life and family life. Managing time between studies and other work, life, and social responsibilities has been shown to be one of the biggest challenges for ODE students (Xavier & Meneses, 2021). In addition to the hours of employment, other secondary reasons such as the mental comfort of being employed (obtaining a degree could be a secondary choice for some employed students), and legal procedures related to employment were also considered under business life.

The family life reason was comprised of the responsibilities of caring for children, sick parents, or siblings, as well as pregnancy and marriage. Many studies exhibited that family life has a greater effect on female students (Aydın et al., 2019; Bağrıacık Yılmaz & Karataş, 2022; Lakhal & Khechine, 2021), however, as discussed later, this study showed that males were most severely affected by family life.

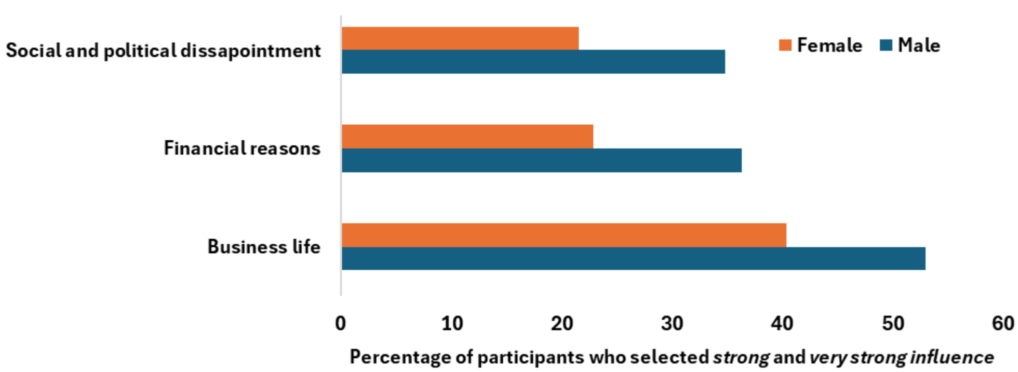
Student Characteristics and Skills

Goal commitment, study habits, knowledge of technology and technical equipment, communication (both written and oral) in English, and prior academic knowledge all play an important role in students' retention within a study program. However, the most influential reason identified by this study was time management skills. The ability to manage study with other work or commitments was considered under self-regulation, a quality that students must have acquired before program enrolment. Many students realized the importance of allocating enough time to self-learn only when exams were coming up, and were thus unable to achieve adequate academic performance to remain within the program (Aydın et al., 2019; Stiller & Bachmaier, 2017).

When analyzing the relationships or differences among the student or demographic groups with respect to their dropout reasons, the 15 most significant dropout reasons corresponding to each group were considered. There was no significant difference observed between non-starters and potential dropouts, leading us to conclude that the two groups had similar reasons for dropping out, more or less. However, *opportunity to transfer* was significantly prominent in the non-starters group; 63% of the non-starters mentioned this reason as the main factor for dropping out while it was not a prominent reason for the potential dropouts. Three external reasons, namely business life, financial reasons, and social and political disappointment, significantly affected males compared to females (Figure 2). Within the dropout population, 37% were males and most of them (73%) were employed. Clearly, job commitment had a prominent influence on their dropout decision. In contrast, 60% of dropout females were employed. In the Sri Lankan cultural context, a majority of households have a male breadwinner and/or a decision-maker who is responsible for securing the social and economic well-being of the family. Perhaps this could be the reason why most of the dropout males were severely affected by the above three inter-relatable reasons.

Figure 2

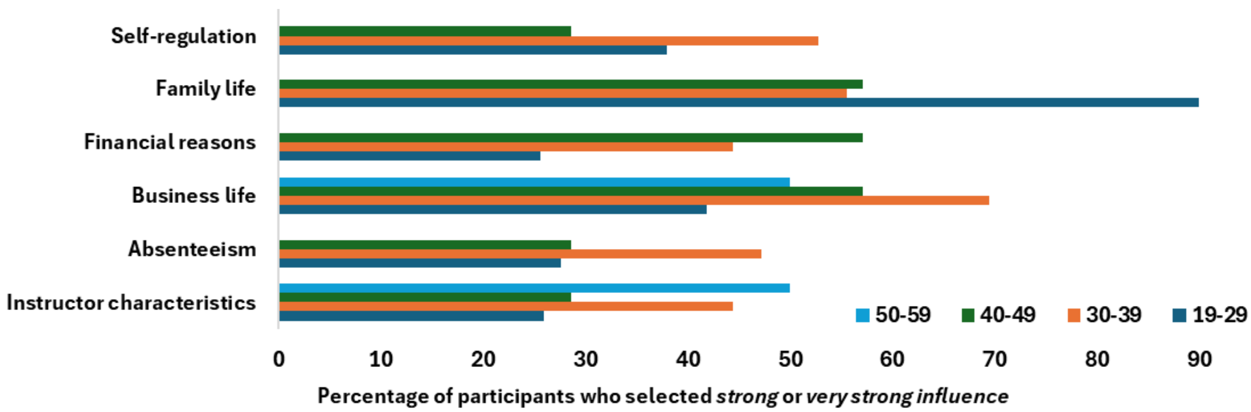
Dropout Reasons That Varied Significantly With Respect to Gender



Most of the dropout participants in this survey were between 19 and 29 years of age (87% of the sample population). A positively skewed age distribution was observed (skewness coefficient = +2.473) with a mean value of 25.95. Figure 3 shows the six factors that were found to be significantly different influences on the dropout numbers within different age groups. Family and life responsibilities greatly affected the younger students (i.e., 19 to 29 years of age) while time management and job commitments were mainly involved in the dropout decision of the 30 to 39 years of age group.

Figure 3

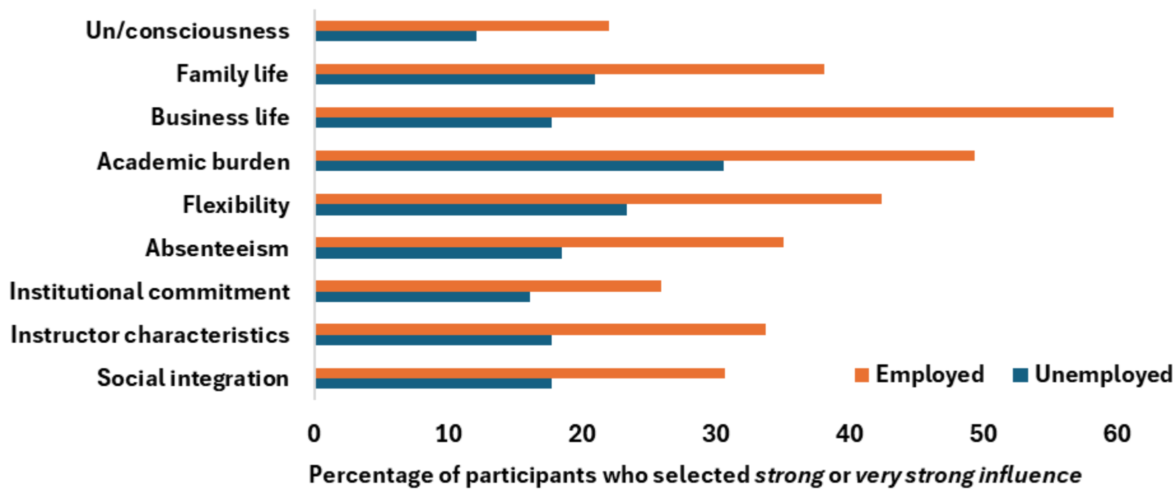
Dropout Reasons That Varied Significantly With Participants' Age



A majority of the dropout group (65%) was employed during the time they dropped out. According to the Kruskal-Wallis H Test, nine reasons, as shown in Figure 4, severely affected the employed students compared to the unemployed students. Among the different employment sectors (i.e., government, semi-government, private, or self-employed), students in the private sector were shown to be most severely affected by these reasons.

Figure 4

Dropout Reasons That Varied Significantly With Respect to Employment Status



In addition to the obvious factor, business life, the employed dropouts were affected more by family life compared to those who were unemployed. Some internal reasons that significantly affected the employed dropouts such as (a) social integration (e.g., low interaction with instructors and peers); (b) absenteeism; (c) un/consciousness (e.g., missing important deadlines); and (d) institutional commitment (e.g., poor attachment to the university) can be directly correlated to the limited time spent in the university or academic activities due to their busy schedules. Other internal reasons such as academic burden, flexibility, and instructor characteristics implied that these students did not receive enough academic support or program flexibility to maintain a proper study-work balance.

Limitations and Future Directions

Even though this study provided a broader and deeper understanding of the dropping out phenomenon in ODE, the presented model can be further improved by incorporating the views and perspectives of other stakeholders such as administrators, non-academic staff, support staff, and students' families. Further, dropping out is a dynamic and multifaceted scenario; frequent surveying to identify trending dropout reasons in order that treatment strategies can be modified promptly, is required to maintain low dropout rates in ODE programs. As well, research could investigate the specific challenges faced by diverse student populations, including those from underrepresented backgrounds or with unique educational needs. By addressing these reasons, ODE institutions can tailor support mechanisms to better meet the needs of all students and enhance overall retention rates.

Conclusion and Implications

Although many studies have attempted to identify the key reasons contributing to low student retention and to propose mitigation measures, student dropout rates in ODE continue to rise. Researchers are encouraged to analyze the dropout phenomenon based on their own geographical, institutional, and cultural context. With that rationale in mind, this study was focused on identifying the reasons leading to student dropout in the B. Sc. program offered by the Open University of Sri Lanka. As explained, the identified results were consistent with the related literature—it was mainly internal and external reasons that affected students' decisions to drop out, while certain student characteristics and skills were catalysts to the students' decision. The most significant dropout reasons identified were (a) business life; (b) academic burden; (c) flexibility; (d) self-regulation (time management); and (e) family life. These have been shown to be prominent dropout reasons among ODL programs globally (Bağrıacık Yılmaz & Karataş, 2022; Shikulo & Lekhetho, 2020; Xavier & Meneses, 2021; Yuan & Kim, 2014) In addition, some institutional or country specific-reasons such as social and political disappointment and commute difficulties were also revealed. Further, results indicated that employed students were more likely to drop out from ODE programs compared to unemployed students. This could have been mainly because of the difficulty of managing time between studies and other commitments.

Academic burden and flexibility were the only two internal reasons that could be fine-tuned by higher education institutions. ODE practitioners and administrators need to prioritize flexibility in academic activities and implement effective monitoring mechanisms to identify at-risk students early on and provide timely support and guidance. By adopting these measures, ODE institutions can enhance student retention and promote academic success.

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Undergraduate Learning Gains and Learning Efficiency in a Focused Open Education Resource

Chrissy Spencer[1], Aakanksha Angra[2], Kata Dósa[3], and Abigail Jones[1]
[1]School of Biological Sciences, Georgia Institute of Technology; [2]American Society of Hematology; [3]Centre for Teaching and Learning, Corvinus University of Budapest

Abstract

The high cost of commercial textbooks in higher education creates barriers to equitable access to learning materials and negatively impacts student performance. Open educational resources (OER) offer a cost-effective alternative, but their impact on student learning remains a critical question. This study directly compared student outcomes between OER and commercial textbooks in a controlled reciprocal design. Forty undergraduate participants completed reading tasks and knowledge assessments using both textbook types, focusing on topics in DNA structure and function and population ecology. Results showed no significant differences in learning gains between OER and commercial textbooks, consistent with prior research. However, participants spent significantly less time on task when using the shorter, learning objective-aligned OER readings, particularly for jargon-heavy DNA content. These findings highlight the potential of OER to reduce cognitive load and improve efficiency without compromising learning outcomes. Future research should explore the role of textbook alignment, length, and student preparation strategies in optimizing learning with OER, particularly in flipped classroom contexts. This study supports OER adoption as a cost-saving measure that maintains academic integrity while enhancing accessibility and efficiency.

Keywords: open educational resources, OER, normalized learning gains, student learning outcomes, think-aloud semi-structured interview, undergraduate introductory biology

Open Education Resource Learning Gains

Textbooks remain central to educational practices in the United States (Crawford & Snider, 2000; Hilton, 2020; Seaman & Seaman, 2024). However, the high cost of textbooks in higher education creates significant barriers for students (Anderson & Cuttler, 2020; Brandle et al., 2019; Goldrick-Rab, 2016; Hendricks et al., 2017; Hilton et al., 2014; Katz, 2019; Martin et al., 2017; Wiley et al., 2012). When students attempt to complete course assignments without required textbooks, surveys indicate academic underperformance without access to necessary learning resources (Florida Virtual Campus, 2012, 2022; Goldrick-Rab, 2016; Nusbaum et al., 2020). These hidden costs exacerbate inequities in access to education (Blessinger & Bliss, 2016; Bossu et al., 2012; Hockings et al., 2012; Lane, 2008, 2012; Willems & Bossu, 2012).

Open educational resources (OER) provide a solution to this issue. OER are adaptable learning materials available for free use and repurposing that improve access and equity (Blessinger & Bliss, 2016; Bossu et al., 2012; Lane, 2008, 2012; Smith & Casserly, 2006; Willems & Bossu, 2012). Cost consideration is the first element in a student-centered research framework on the efficacy of OER called COUP, where cost combines with outcomes, usage, and perceptions (Bliss, Robinson, et al., 2013), and remains a pillar of the SCOPE model (Clinton-Lisell et al., 2023), which expands upon COUP by taking into consideration social justice and reconceptualizing usage to engagement. Most studies of OER engagement and perceptions leverage student or faculty survey data. Surveys reveal students appreciate the lower costs and yield useful insights into student usage and perceptions of OER (Bliss, Hilton, et al., 2013; Bliss, Robinson, et al., 2013; Cuttler, 2019; Grissett & Huffman, 2019; Hendricks et al., 2017; Illowsky et al., 2016; Jhangiani et al., 2018; Martin et al., 2017). Faculty awareness of OER is increasing (Seaman & Seaman, 2024), but real-time comparisons between OER and commercial materials remain vital for understanding student engagement and outcomes (Hilton, 2020).

Parallel to cost, usage, and perceptions, faculty considering OER adoption are guided by the principle of "do no harm" to student learning outcomes when replacing a textbook (Fisher, 2018; Lovett et al., 2008; Ryan, 2019), of principal importance in this research. The SCOPE framework developed by Clinton-Lisell and colleagues (2023) expanded the definition of cost to include emotional, social-political, time, and academic costs (such as course withdrawal rates and cognitive load), in addition to financial considerations. Time and cognitive load are of particular interest to our study. Cognitive load theory (Sweller, 1988) suggests that the perceived difficulty of an academic task (coupled with the required time investment) has a direct relationship with student goal setting, their willingness to put mental effort into learning, and their likelihood of persisting with learning (Feldon et al., 2019). This suggests that if an OER requires less time on task and is perceived by the student as less difficult, better learning outcomes are expected, compared to a commercial textbook.

Comparisons of student learning outcomes after course adoptions of OER indicate no significant impact on average to academic achievement (Clinton & Khan, 2019; Hendricks et al., 2017; Hilton, 2016; Tlili et al., 2023; Vander Waal Mills et al., 2019). Tlili and colleagues' (2023) and Clinton and Khan's (2019) meta-analyses of learning efficacy from up to 25 published studies found variation in the student learning outcomes across studies. Even given variation, Clinton and Khan (2019) detected no effect on learning or assessment scores after a switch from a non-OER to an OER textbook. Refining our understanding of how OER impacts learning achievement, Tlili and colleagues (2023) found a statistically significant but negligible effect on learning gains, tempered by subject matter, education level, and geographical location. While researchers have found both gains (Colvard et al., 2018; Grewe & Davis, 2017; Jhangiani et al., 2018; Smith et al., 2020) and losses (Delgado et al., 2019) in learning after a switch to OER, the majority of studies support meta-analysis findings of no effect (Clinton et al., 2019; Croteau, 2017; Fialkowski et al., 2020; Grissett & Huffman, 2019; Hendricks et al., 2017; Kersey, 2019; Nusbaum et al., 2020; Vander Waal Mills et al., 2019). In short, student learning gains after a conversion to an OER textbook are complex.

In a study that examined three OER learning gains studies, Griggs and Jackson (2017) also indicated the textbook format and preparedness generates variation in student learning. The variation and complexity mapped in the two meta-analysis studies (Clinton & Khan, 2019; Tlili et al., 2023) could have some of these same contributors to variance. In addition to different textbook types, studies on OER efficacy address length (Dennen & Bagdy, 2019), quality, and content of readings. Finally, a comparison of non-OER to OER requires alignment of both types of teaching resources with the course learning objectives (Fink, 2013; Wiggins & McTighe, 2006). Our research question addressed whether an instructor-curated focused OER textbook would yield better student performance on reading questions, less total time on the task, and equivalent learning gains relative to the same student using a commercial textbook. To control for these sources of variation, we conducted a controlled experiment that allowed the same student equal exposure to both OER and commercial textbooks. We hypothesized that students using OER would perform better on reading questions, take less time to answer reading questions, and show learning gains at least equivalent to the students using the non-OER text.

Method

We recruited undergraduate, non-biology majors to participate in a non-classroom study to directly compare learning from an OER and a commercial textbook in a within-subjects counterbalanced experiment. Study participants answered five short incoming knowledge evaluation (IKE) questions using either an OER or non-OER reading, then repeated the process with the other textbook type on a different subject-matter topic. We examined learning gains in a semi-structured interview.

Incoming Knowledge Evaluation

The reading questions, or IKEs, used in the study had five multiple choice questions based on the learning objectives and covered in the readings. IKE questions were written to require understanding, application, or synthesis of ideas, with one exception where the answer was almost verbatim in both texts. An example IKE question on population ecology was:

The exponential equation of population growth describes

a. a population where the growth rate slows as the population size increases.

b. population growth limited by the maximum population size that the habitat can sustain.

c. a population growing at its intrinsic rate of natural increase.

d. A and B.

e. B and C.

An example IKE question on DNA was:

A newly discovered bacterial species has 35% G in its DNA. What is the % A?

a. 35%

b. 15%

c. 30%

d. 25%

e. Not enough information to determine

Textbook Readings

The readings used in the study were from two textbooks: *Biological Principles* (Choi et al., 2015), an OER faculty-authored and curated text for use in an introductory biology course for science majors at a US university, and *Biological Science,* 5th edition (Freeman et al., 2014), a commercial textbook published by Pearson Education. *Biological Principles* was written from the outline of learning objectives authored by course faculty. The professionally-edited commercial textbook *Biological Science* was the second most assigned textbook in US college-level biology courses (Ballen & Greene, 2017). Freeman et al.'s *Biological Science* was the required reading in the course before OER textbook implementation. Readings from both textbooks were provided electronically to study participants; however, learning objectives were not provided to the participants.

We selected readings from these textbooks on DNA structure and function and population ecology. The readings included the information necessary to complete five short IKE questions, as well as content not assessed on the IKE. The commercial textbooks had higher word counts, more figures and images, more equations in boxes in the ecology reading (Table 1), and included topics beyond the learning objectives. Each OER text also included one 12–13 minute video. Some participants accessed only parts of one or both the texts; some participants did not view the video.

Table 1

Word, Image, and Equation Counts for Commercial and OER Textbooks by Subject

Content	Subject and type of textbook			
	Ecology		DNA	
	OER	Commercial	OER	Commercial
Word count	724	9,193	878	6,676
Number of figures	2	17 (+ 3 photos)	5	20 (+ 1 photo)
Number of equations	2	2	0	0
Boxes	0	1	0	0
Number of equations in boxes	0	10	0	0
Number of videos	1	0	1	0
Length of video	11 min 53 s		12 min 58 s	

Note. OER = open educational resource.

Participants

Study participants (*N* = 40) were undergraduate students at a doctoral granting research university (R1) in the southeastern United States. Their pre-surveys indicated they did not have prior exposure to college-level biology coursework, including AP credit. We distributed participants into four textbook-by-topic groups evenly, as we scheduled their interviews. Participants were compensated and recruitment was ongoing until 40 study participants completed the interview.

Reciprocal Design Overview

In a within-subjects counterbalanced design, each participant completed a think-aloud, semi-structured interview that contained two main tasks and several additional elements:

1. a pre-task prompt to “Draw DNA”
2. interview element
3. first reading task
4. interview element

5. second reading task
6. interview element, and
7. a post-task prompt to "Draw DNA."

Specifics of the interview elements are addressed in the next section.

In their interviews, participants accessed an open education and a commercial textbook resource to complete reading tasks with either DNA or ecology content. Each participant completed one task in an OER textbook and one task in a traditional commercial textbook. If their first task was on the DNA topic, then their second task was on the ecology topic, and vice versa. This design allowed for a direct comparison of the same student in two different textbook environments. Each participant completed two reading tasks and a "Draw DNA" pre/post-task prompt. We compared IKE scores and time on task of the *Biological Principles* OER versus the non-OER textbooks.

Detailed Interview Methodology

In the one-on-one interview session, each participant completed two reading tasks, one in each of two textbook environments: open education or commercial. Each reading task included simultaneous access to the assigned textbook-by-topic online reading and to the Internet while completing five multiple choice IKE questions. Participants accessed the readings and the Internet using pre-opened browser tabs on a laptop provided for the interview. Tasks were introduced as formative with no mention of grades for correct scores. IKE scores were recorded in Qualtrics. Reading task learning change scores were calculated from the proportion correctly answered (Marx & Cummings, 2007; Theobald & Freeman, 2014). We recorded the duration of each reading task in minutes using screen-recording software Camtasia (https://www.techsmith.com/camtasia/). All interviews were conducted by AA within two months in spring of 2018; interviews lasted up to two hours.

To confirm minimal prior knowledge for each topic, participants completed a pre- and post-assessment. We prompted participants to "Draw DNA" while narrating aloud. The "Draw DNA" pretest provided an independent metric of prior biology content knowledge. The "Draw DNA" posttest documented knowledge recall after both reading tasks were completed. The pre- and post-drawing assessment and narration were captured with LiveScribe software (https://livescribe.com). Using an inductive approach to quantify student prior knowledge about DNA, we scored each drawing with its verbal explanation for knowledge of DNA structure and function, awarding 0 or 1 point per concept out of 9 possible points. The knowledge types and categories are shown in Table 2. For the post-task "Draw DNA," we applied the same scoring rubric, adjusting the post score upward to include concepts from the pretest that were not explicitly restated post test. We assumed these correct concepts were not forgotten but rather omitted when considering newly learned or recalled information in the open-ended prompt to "Draw DNA." While we also polled a "Draw Ecology" prompt, the data were not readily scorable in a quantitative analysis.

Table 2

Categories of Knowledge About DNA Structure and Function

Knowledge type	Knowledge category
DNA structure	a double helix that includes lines like ladder rungs rungs on ladder represent two “things” (e.g., bases) two things pair in specific ways (e.g., base pairs of A = T and G = C) four different units (e.g., A, T, G, C or similar) chemical bonds (e.g., hydrogen) 5’ to 3’ directionality or reference to “antiparallel” structure nucleotide base with a backbone (e.g., sugar and or phosphate)
DNA function	processes (e.g., mutation, replication, transcription, recombination) codes for genetic information and/or traits

Data Analysis

We analyzed initial content knowledge using the pre-task “Draw DNA” prompt (interview element 1), learning change scores from the “Draw DNA” task (elements 1 and 7), and IKE performance and duration for each reading task (elements 3 and 5).

Prior DNA Knowledge

Three raters (CS, KD, and AJ) independently scored DNA content knowledge of participants before and after they completed the reading tasks. Each rater rated all 40 pre-task “Draw DNA” entries, then used interrater differences for 14 of 40 to reformulate the scoring rubric. Each rater again independently scored all 40 pre-task “Draw DNA” entries. We calibrated how raters interpreted the revised rubric, which informed the post-task rubric (Table 2). Each rater for a third time independently re-scored the pre-task and then scored the post-task “Draw DNA” entries. Rater agreement was assessed using Krippendorff’s alpha (Hayes & Krippendorff, 2007). We analyzed DNA pretest knowledge scores using the lm() function in R, with textbook and task order as explanatory variables. All statistical analyses were performed using R (Version 4.0.5).

Learning Gains

The post-task rubric was adjusted to account for participants who demonstrated the DNA knowledge types and categories as shown in Table 2 in the pre-task drawing that they did not include again in the post-task drawing. In these cases, we calculated an adjusted post-“Draw DNA” score to account for those points. We calculated normalized learning change scores as the ratio of the difference in the DNA knowledge score from pre- to post-task to the maximum possible gain, or $c = (post - pre) / (post_{max} - pre)$, where $post_{max} = 9$, the maximum possible score from the rubric (Marx & Cummings, 2007; Theobald & Freeman, 2014). The normalized change scores, which are equivalent to learning gains (Hake, 1998; Theobald & Freeman, 2014), were analyzed using lm() for differences between textbook and task order, and for interaction effects.

IKE Question Cognitive Profiles

We matched the 10 IKE questions to learning objectives. Then, using the Blooming Biology Tool (Crowe et al., 2008), three researchers and one co-author (CS) independently scored each question according to which level of Bloom's taxonomy of educational goals would be required to answer it: know, comprehend, apply, analyze, synthesize, or create (Anderson & Krathwohl, 2001).

IKE Performance and Time on Task

IKE performance and time on task were analyzed using mixed models with repeated measures (by participant) using the lmer() function in R. The full models included fixed-effects textbook, topic, and task order. Participant was a random effect. To identify the parsimonious models with the best fit, we used Akaike's information criterion (AIC) to identify and compare full models with less parameterized models. We present results from type III analysis of variance with Satterthwaite's method from the model with the lowest AIC. When log transformation better approximated a normal data distribution, we completed analyses with both untransformed and log-transformed data. Independent variables of IKE performance and time on task were centered using a *z* score. For participants who showed unusually high prior DNA content knowledge, we completed the mixed model analysis both with and without those participants. As an alternative analysis, we conducted a fixed effects analysis of variance aov() on the time on task data, where we replaced the random effect of "participant" with "taskorder," the order in which participants used each textbook (i.e., OER first or commercial first).

We completed a power analysis for the generalized linear model (GLM) using the power.f2.test() function with treatment number u = 4, degrees of freedom v = 40-2-1, significance level = 0.05, and power as 80% to determine the effect size (f2) required to see significant differences in our data.

If participants simply guessed at IKE questions, we would predict that limited time on task would generate low scores. To test for this, we screened for a relationship between time on task and the IKE performance with Kendall–Theil Sen Siegel nonparametric linear regression using mblm(), which is not robust to ties in the ranked data, and also using rank-based estimation regression rfit() in R.

Results

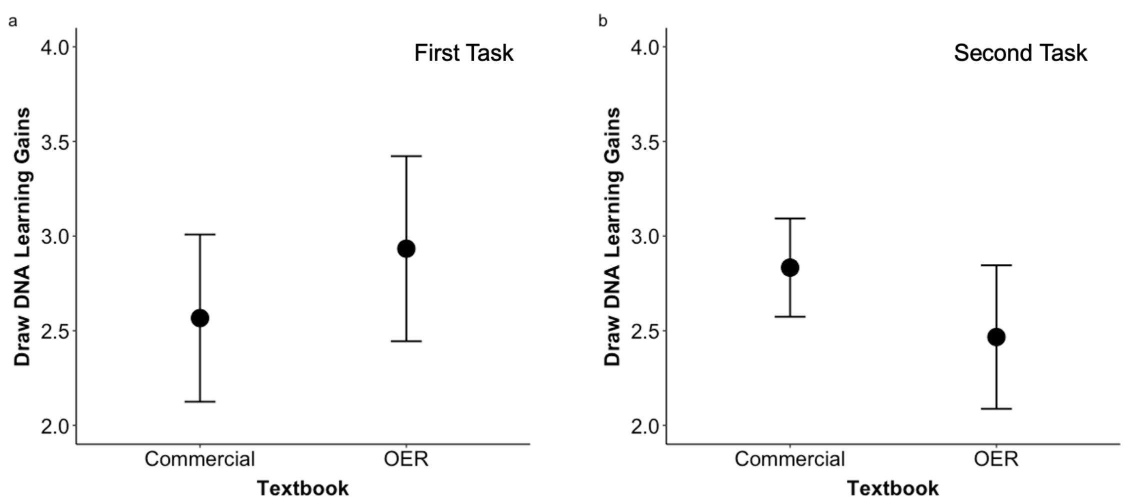
Pre/Post Recall of DNA Content Knowledge From "Draw DNA"

The three raters showed high agreement when ranking gains in DNA content knowledge from the pre-task (Krippendorff's alpha $_{40,3}$ = 0.927). For the post-task "Draw DNA" scores, raters had similarly high agreement (Krippendorff's alpha $_{40,3}$ = 0.901). Given the strong agreement between raters, we moved forward with analysis of DNA content knowledge using average scores from the "Draw DNA" data. Before the reading tasks, study participants scored DNA content knowledge of 3.02 ± 0.25 on average, with a range from 0 to 6.66, including two participants with scores above 5 out of 9 possible DNA content knowledge points. The division of participants into different textbook treatments and task order groups was random with respect to their pre-task DNA content knowledge (textbook $F = 0.999$, $p = .324$; task order $F = 0.018$, *p* = .895). Adjusted post-"Draw DNA" scores were on average 5.72 ± 0.26 (mean ± standard error). All participants increased in DNA knowledge score between the initial and final assessment.

Learning gains from "Draw DNA," calculated as normalized learning change scores, were on average 0.462 ± 0.029 (mean ± standard error) points (see Figure 1 showing DNA learning gains in both first and second task). Most of that change is attributable to increased recall of DNA structure knowledge (raw data $M = 2.1 \pm 0.167$) rather than knowledge about the function of DNA (raw data $M = 0.6 \pm 0.077$). "Draw DNA" learning gains revealed no significant differences in the gain of DNA content knowledge given textbook ($F = 0.095$, $p = .760$) or in the order those textbooks were presented ($F = 0.011$, $p = .917$), with no interaction effect between textbook type and the order of the tasks ($F = 1.055$, $p = .311$).

Figure 1

Learning Gains for Participants From the "Draw DNA" Pre- and Posttest



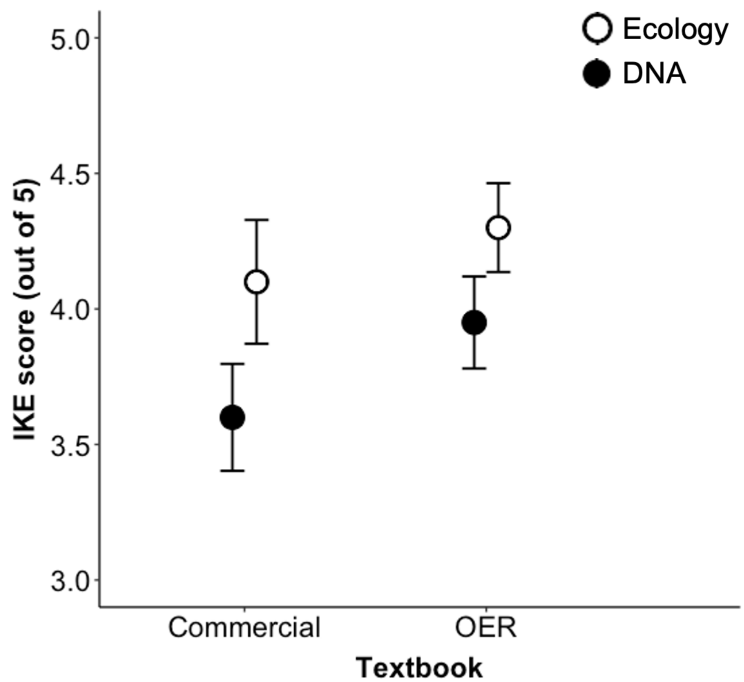
Note. Panel a: Participant scores after the first task. Panel b: Participant scores after the second task. OER = open educational resource.

Reading Task Performance

With the IKE questions, two ecology and three DNA questions required lower-order cognitive approaches while the remaining were higher order. Participants taking the ecology IKE scored a median of 4 out of 5 possible, a mean of 4.2, and 45% scored 5. For the 5 DNA questions, the median was 4, with a mean of 3.8, and 18% scored full marks. The model with the lowest AIC score was IKE_ZScore ~ Textbook + Topic, with the random effect of participant omitted. Participants showed no significant differences in IKE performance between commercial and open education textbooks, $F(1,77) = 2.09$, $p = .153$. See Figure 2. Participants performed significantly better on ecology than on DNA questions, $F(1,77) = 4.98$, $p = .029$. Removing two outlier participants with high prior content knowledge on the pretest did not alter these results (data not shown). Models fitted using linear mixed effects were all singular, indicating that the data distribution was on the boundary of feasible parameter space for the model. We therefore also applied the AIC to a fixed effect analysis of variance model aov(), omitting the random effect of participant. This analysis revealed the same result as the mixed effect model.

Figure 2

Student Performance on the Five IKE Reading Questions



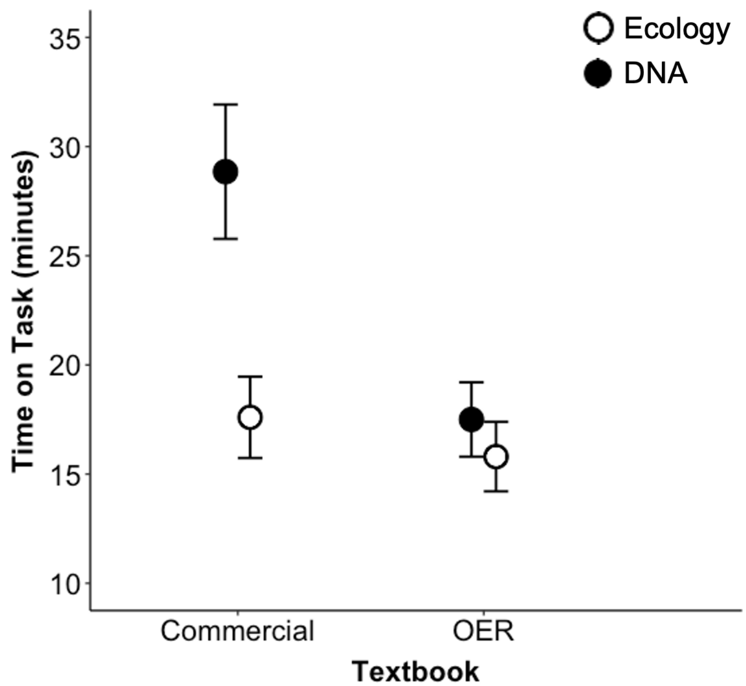
Note. IKE = incoming knowledge evaluation.

Time on Task

Participants spent significantly more time on the DNA task when using the commercial textbook (log-transformed and *z*-centered data: $F(1,38) = 21.55$, $p < .001$). See Figure 3. Participant was also a significant effect for time on task, with the likelihood ratio test 15.81, $df = 1$, $p < .001$.

Figure 3

Time on Reading Task When Using Each Type of Textbook

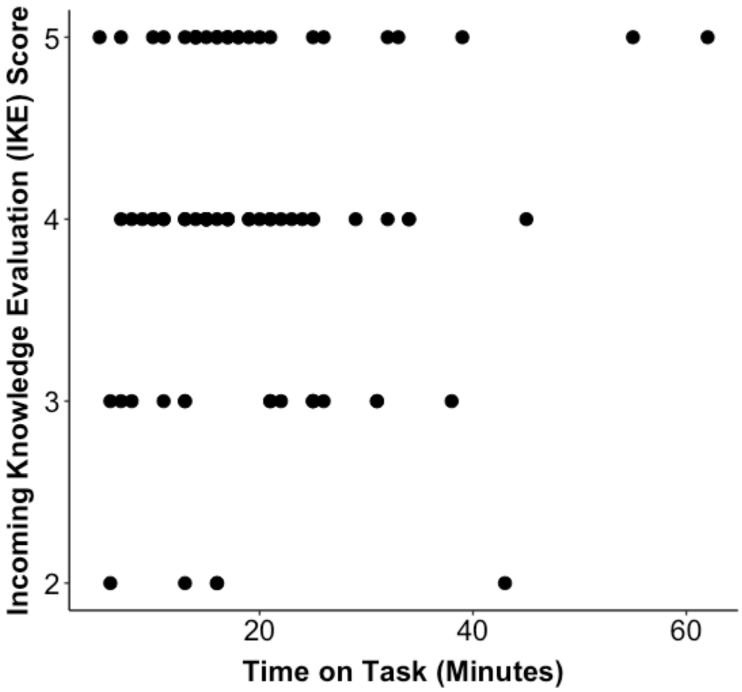


We conducted a fixed effects analysis of variance on the time on task data, replacing the random effect of participant with the order in which the participant used each textbook (i.e., OER first or commercial first). Data for this analysis were centered using the *z* score and also log-transformed to normalize the distribution. As with the mixed model analysis, we saw the significant effects of textbook ($F = 8.894$, $p = .039$) and topic ($F = 8.209$, $p = .0055$), but there was not an effect of task order ($F = 1.051$, $p = .3037$) for the participants. A Tukey's honestly significant difference (HSD) analysis of interactions showed that the DNA topic was more time-consuming overall, especially when paired with the commercial textbook, $F(1,72) = 4.22$, $p = .044$, or when DNA was the first task of the two each participant completed, $F(1,72) = 7.85$, $p = .007$.

There is no predictive relationship between time on task and the IKE score according to a rank-based estimation regression (Figure 4, $t = 0$, $p = 1$) and a Kendall–Theil Sen Siegel nonparametric linear regression ($V = 289$, $p = .886$).

Figure 4

No Relationship Between Time on Task and the IKE score



Note. IKE = incoming knowledge evaluation.

Power Analysis

Given the within-subjects counterbalanced design with a sample size of 10 in each of 4 treatments groups, power analysis for a GLM with 80% power and a 5% significance level indicated that a large effect size of 0.32 would be necessary to detect significant differences for time on task and IKE scores.

Discussion

Student learning outcomes from both the reading task IKE and the posttest learning gains did not decline with the switch from commercial to OER textbooks, in agreement with the majority of previous studies (Clinton et al., 2019; Clinton & Khan, 2019; Croteau, 2017; Fialkowski et al., 2020; Grissett & Huffman, 2019; Hendricks et al., 2017; Kersey, 2019; Nusbaum et al., 2020; Tlili et al., 2023; Vander Waal Mills et al., 2019). Given that the OER readings and IKE questions were aligned with the same learning objectives, we expected IKE performance to increase. Instead, the IKE scores showed only a non-significant trend toward higher performance when using the *Biological Principles* OER textbook. Our sample size was too low to detect moderate differences in learning gains between the commercial and OER textbooks.

Significant differences emerged in time spent on DNA content, with longer times for the commercial textbook (Figure 3). Participants completed ecology tasks more quickly, regardless of textbook type, and performed better on these IKE questions than on DNA questions (Figure 2). The relative ease of ecology content on growth may stem from greater familiarity, intuitive concepts, or reduced cognitive load (Feldon et al., 2019). Jargon-rich commercial DNA chapters likely increased cognitive load, reducing efficiency (Ou et al., 2022). Alternatively, students may be better primed for ecology from prior education, or the questions themselves were less challenging.

Longer time on task on the less-focused commercial readings suggests their length and complexity increased cognitive load, making it harder to retrieve relevant concepts for IKE questions. The commercial readings (Freeman et al., 2014) contained more jargon than OER readings, adding to comprehension challenges (Hsu, 2014). Future research should examine how factors such as concept density, sentence length, and jargon impact cognitive load and learning.

The shorter, objective-focused OER readings likely explain faster task completion in the OER DNA content. Brevity, though underexplored in OER research, appears beneficial for engagement (Dennen & Bagdy, 2019; Howard & Whitmore, 2020). The OER was designed directly from course learning objectives, unlike the commercial text (Freeman et al., 2014), which included additional material and presented concepts in a different order. Shorter, learning objective-focused OER are not the norm with OER adoption, but brevity and focus motivated the shift to OER in the course textbook transformation. Future studies should explore how brevity and focus in OER impacts student learning.

Pre-class preparation is key in flipped classrooms (Bassett et al., 2020; Heiner et al., 2014; Sappington et al., 2002). Shorter, directed readings improve engagement and reduce off-task preparation time, which may benefit learning (Baier et al., 2011). This contrasts with comprehensive, unfocused textbook chapters that can overwhelm students (Bloom et al., 1956; Fink, 2013).

The seemingly counterintuitive result that students working with a reading aligned to the reading questions still do not outperform those using less well-aligned course materials calls into question what the value of a textbook is and presents an interesting direction for future research on how reading structure can best help students prepare for class. One possibility is that students do not read effectively when preparing for class. In fact, we have ample anecdotal evidence of this from students enrolled in the course. Some students will passively read to study instead of using retrieval practice or other deep-learning strategies. Unpublished survey data from the course indicate that a subset of students omit the preparatory reading altogether, a pattern noted by other researchers (Gorzycki et al., 2020; Parlette & Howard, 2010), omitting the opening step in retrieval practice and instead turning their time resources elsewhere (Aagaard et al., 2014; Berry et al., 2010). Skipping the reading might not be a perceived cost if the student believes they will be provided with the opportunity to review and learn more in class. Additionally, cognitively higher-order learning objectives may exceed most students' ability to learn deeply from a first read alone, especially in a student population where reading has declined (Gorzycki et al., 2020; Parlette & Howard, 2010). While a few study participants completed the second task too quickly to have more than cursorily used the text, this was not common among the 40 study participants. This "phone-it-in" behavior may be more common for students in a course with readings and low-stakes reading quizzes. A next step is to analyze student behavioral approaches to using the textbook as a learning resource to help complete a reading quiz. New AI-enhanced digital textbooks present alternative strategies for textbook implementation and efficacy (Koć-Januchta et al., 2022).

Our findings that our OER at minimum did no harm to student learning enrich the OER literature on learning outcomes. These results invite new research directions into the quality and alignment of the textbook and how students engage with their reading materials. Our results from this direct comparison of the same study participants who engaged with OER and with commercial texts provides additional evidence that OER implementation saves students money while: (a) not detracting from student learning of content specific to course-defined student learning objectives, and (b) spending less time on their first pass at understanding course content. Future research directions for OER research include examination of how readings align with learning objectives (Fink, 2013; Wiggins & McTighe, 2006), how reading length influences student motivation and cognitive load to learn new ideas, and how students approach pre-class readings to prepare for deeper learning in a flipped classroom. The evidence we present on learning outcomes for the same student in OER and non-OER textbook environments deepens the discussion on how students learn from OER and provides insights into future research directions important to student learning.

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Quality Criteria for Online Courses Development

Maimoona Al Abri and Abdelrahman Elhaj
Sultan Qaboos University

Abstract

The rapid growth of online education has brought to the forefront the critical need for designing high-quality online courses that effectively engage learners and facilitate their success in the digital realm. This study explored the key components and practical guidelines for designing high-quality online courses. Qualitative research was conducted through a comprehensive literature review to determine a set of quality guidelines and analysis of existing online courses to assess the application of these guidelines. The study underscored the significance of robust and comprehensive course components in fostering student engagement and learning. It placed particular emphasis on the careful selection and organization of course materials, interactive elements, assessments, and multimedia resources, all of which play a vital role in creating a rich and immersive learning experience. Moreover, in light of the growing number of instructors transitioning to online teaching, the study has provided practical tips and guidelines for instructors. These insights may serve as valuable resources for educators seeking to enhance their instructional design skills and create engaging online learning environments that promote active participation and knowledge retention.

Keywords: guideline, key components of online courses, quality online courses, instructional design

Introduction

Because of the widespread adoption of hybrid and online learning, especially post-pandemic, digital learning has become vital to higher education. The EDUCAUSE Horizon Report (2021) noted that most institutions had embraced hybrid learning, incorporating both on-campus and online components. However, teaching online is not simply a shift from face-to-face instruction to hybrid or online formats; it involves ensuring the quality of the learning experiences provided to students. The quality of online and blended courses remains a concern. How are these digital courses designed? What criteria are used to ensure their quality? Are there guidelines that faculty can follow during the design process? For example, the University of Florida has developed a set of resources to guide faculty in course design, digital accessibility, online advising, and the implementation of learning technologies, all aimed at ensuring the quality of online teaching and learning (EDUCAUSE, 2021). The current study presents guidelines and principles that educators can use to design high-quality digital courses, thereby enhancing students' learning experiences.

In 2021, approximately 8.5 million students were enrolled in online classes at public colleges, and an additional 2.7 million attended private schools in the US, as reported by the National Center for Education Statistics (Hamilton, 2023). The COVID-19 pandemic significantly increased the prevalence of online learning in higher education, with over 14 million post-secondary students, or 75% of the total, taking online classes in the fall of 2020 compared to 36% in the fall of 2019.

To ensure the quality of online courses, several rubrics have been developed to measure the level of online course quality in terms of various indicators. For example, the quality matters rubric, developed by Maryland Online, stands out as a prominent course assessment tool in the realm of online education (Shattuck, 2015). This rubric addresses various criteria, encompassing aspects such as course introduction, learning objectives, assessment methods, instructional materials, learner interaction and engagement, course technology, learner support, and accessibility (McGahan et al., 2015).

More recently, Xu et al. (2020) developed a comprehensive online course quality rubric with six key components. These components covered:

- Website organization and presentation, focusing on the structure and guidance for navigating course content;
- learning objectives, emphasizing the design and communication of course goals;
- instructional materials, including guidance on using materials such as slides and video lectures;
- learning activities, encompassing various assignments and activities to reinforce learning;
- logistics and course management, addressing communication of policies and details; and
- targeted support for online learning, offering additional assistance to help students overcome challenges in a virtual environment, such as time management skills training.

This rubric has served as a valuable benchmark for those aiming to develop high-quality college-level online courses. It differs from other rubrics in that it has addressed the specific challenges of virtual learning environments. This current study was intended to offer valuable insights and guidelines for educators transitioning their courses to the online format. By synthesizing research findings and incorporating practical tips, it aimed to serve as a resource for instructors seeking to enhance their instructional design skills to create engaging online learning environments.

Principles of Instructional Design Models

Instructional design (ID) is a systematic approach to creating effective and engaging learning experiences. ID refers to the systematic process of planning, developing, and adapting instructional practices based on course requirements and students' needs (Jones & Davis, 2008). ID has been used for designing and assessing instructional products (Nichols Hess & Greer, 2016). Instructional design has been based on three prominent learning theories—behaviorism, cognitivism, and constructivism. This study focused on the principles of constructivism for creating quality online courses. Constructivism promotes the notion of learners constructing knowledge through real-world experiences (Bergstrom-Lynch, 2019). In addition, it emphasizes the importance of context, relevance, and collaborative construction of knowledge. Several instructional strategies have been highlighted, such as scaffolding, modelling and coaching, problem-solving, exploration, discussion, and negotiation (Dabbagh et al., 2019).

A key principle of instructional design is the use of design models. Several ID models have been used to design high-quality online courses, such as ADDIE, Successive Approximation Model (SAM), design thinking, backward design, and others (Abuhassna & Alnawajha, 2023). These models consist of various stages that guide instructional designers and educators to design courses, including online courses. The process of designing courses differs from one model to another based on the functionality of each stage in a particular model. For example, design thinking can be applied to create innovative and learner-centered learning experiences. The design thinking process begins by understanding the learners' needs, motivations, and challenges (Ní Shé, 2021). Instructional designers can gather data using surveys, interviews, or observations to gain insights into learners' needs. Then, they use this data to define the learning objectives and desired outcomes for the courses. Next, at the ideation stage, a diverse range of learning experiences is created to help learners achieve the desired outcomes. Finally, instructional designers create different formats of prototypes to be tested by users. Through these stages, designers test and validate courses and gather feedback from learners for further improvement until they achieve the desired results.

Backward design is a curriculum design method formulated by Wiggins and McTighe (2005). It involves defining the overarching goals first and then progressing to determine learning outcomes, activities, assignments, resources, and assessment methods. The model comprises three stages: identifying desired results, determining acceptable evidence, and planning learning experiences. Each stage includes several guiding questions to help instructors design the various components of the course.

Meaningful Online Learning Framework

To design high-quality digital courses, instructional design principles should be used to align learning outcomes with instructional strategies and assessment practices. Building high-quality digital courses offers better learning experiences for students, leading to better success in the digital age (Gunder et al., 2021). The meaningful online learning framework developed by Dabbagh et al. (2019) was developed to promote learning by doing and active learning through its five attributes: (a) active, (b) constructive, (c) cooperative, (d) authentic, and (e) intentional learning. Applying these attributes to the design of digital courses ensures the creation of high-quality learning experiences to foster students' success.

Universal Design for Learning

Universal design for learning (UDL) is a set of guidelines that can be used by educators and curriculum developers in any discipline. The aim of UDL is to ensure that all learners can access and participate in meaningful and challenging learning opportunities (CAST, 2018). The UDL guidelines address three aspects of learning. The first, why, focuses on providing multiple options for engagement. The second, what, involves offering multiple options for representing knowledge to learners. Finally, how includes providing multiple options for supporting learners in showing actions and expressing their learning. These three aspects offer opportunities at three different levels, namely access, build, and internalize. A recent study (Bedir, 2022) has shown that most schoolteachers in Turkey reported a positive attitude toward UDL practices. The study found that using UDL in teaching and learning contributed to (a) meeting individuals' needs, (b) supporting equity of opportunities in learning, (c) providing options for learning, and (d) ensuring accessibility to information. These practices contributed to increasing the quality of education. Nieves et al. (2019) conducted a pilot study at the University of Atlántico in Colombia, redesigning an open online course based on UDL principles. The study examined the impact of using UDL principles to promote inclusive virtual education to improve other courses accordingly. The study revealed that implementing UDL principles enhanced the quality of inclusive virtual education, improved access to information through the platform without additional requirements, and enhanced participants' engagement in the learning process.

Purpose of Study

This study had three key purposes:

- Explore the key components for designing high-quality online courses by adopting a theoretical research approach.
- Provide practical guidelines for instructors transitioning to online education.
- Examine the selected online college course to determine whether it adheres to the recommended guidelines.

Methodology

Qualitative research was conducted to explore the criteria and guidelines for designing quality online courses in higher education. In this study, a comprehensive literature review was undertaken, involving an exploration of existing research related to the quality of online courses. By synthesizing insights from diverse sources, this review aimed to identify key components and guidelines for high-quality online courses. After that, an existing online course was analyzed using the data obtained from the literature review. This research methodology combined the strengths of a thorough literature review and a data-driven analysis. The goal was to offer tips and guidelines for educators to design high-quality courses in digital learning environments. Three research questions guided this study.

1. What key components contribute to designing quality online courses?
2. Does the selected online college course adhere to the recommended guidelines?
3. What guidelines should educators follow to transition their courses to become online offerings?

Research Context

The course analyzed in this study was *Distance Education and Use of Internet*, taught at the affiliated university for instructional and learning technologies students. The course has been developed to equip students with essential knowledge and skills to design and facilitate online courses. Therefore, the course included both theoretical and practical content. It spanned approximately 15 weeks. It combined synchronous and asynchronous delivery modes, focusing on the design, development, management, and facilitation of online courses using instructional design models to create engaging and interactive online learning experiences. Learners studied a variety of pedagogical models, instructional strategies, and assessment methods, as well as a range of technologies for delivering online courses.

Research Procedures

The initial step in this study involved reviewing the literature related to criteria and key components for designing high-quality online courses. This review included research studies, scholarly articles, and academic publications, with a focus on materials dating from 2015 and onwards. Keywords were used to select relevant literature, namely (a) criteria of quality online courses, (b) rubric for course design, (c) components of online courses, and (d) engaging online courses. With the insights and recommendations gleaned from this investigation we examined the chosen online course using these guidelines.

Results and Discussion

In this section, we discuss the results of the literature review regarding key components and guidelines for designing quality online courses. The results of the course analysis are also presented.

Key Components of Quality Online Courses

To facilitate online teaching, it is beneficial to consider developing digital learning environments that supplement traditional classroom learning or serve as the main platform for course materials and education

(Gunder et al., 2021). Enhancing a digital learning space involves (a) creating simple and clear ways to access course materials; (b) offering synchronous classes such as live sessions; (c) providing environments for students to connect with both their peers and instructor; (d) interacting in virtual office hours and online discussion boards; and (e) offering formative assessments and activities.

Although there are similarities between the components of online courses and those of face-to-face and hybrid courses, online learning calls for particular factors that must be taken into account to ensure a positive learning experience. Moreover, it is crucial to make significant choices concerning the selection of materials and strategies (Cuesta, 2010). Zimmerman et al. (2020) showed that important components of course design, as identified by renowned online teachers, included (a) authentic and pertinent course materials; (b) multimedia resources; (c) activities that encourage learners to collaboratively generate digital content; (d) chances for learners to reflect on their own learning; and (e) "the instructor's explanation of the purpose of activities, technologies, and assessments in the online course" (Kumar et al. 2019, p.166). The following section provides an overview of the course components that are commonly found in different disciplines and types of courses, namely course content, course structure, interaction, and assessment.

Course Content (Materials)

Material designers are primarily concerned with identifying a framework that facilitates the process of customizing materials to align with the learning objectives, cognitive processes, topics, and subtopics that the material will cover (Cuesta, 2010). Consequently, the selection of course materials is a crucial aspect of providing robust learning experiences for students. While journal articles and textbooks are commonly used, online courses offer additional options to consider. In addition to traditional materials, instructors can also integrate online courseware and other digital content that can be easily incorporated into the learning management system (LMS). To help instructors identify appropriate resources, Course Gateway provides a selection tool, and EdSurge curates a range of courseware options (Gunder et al., 2021). Moreover, open educational resources available online at no or low cost and incorporating multimedia approaches are alternatives that can support an engaging and adaptable learning experience (Gunder et al., 2021). They can also be a more cost-effective solution than traditional textbooks. As well, instructors can use a wide range of multimedia resources such as audio and video content, interactive activities and games, and student-created learning resources to reinforce learning and enhance student engagement.

Course Structure

Creating coherent and logical arrangements of course content is crucial to help students engage with the materials effectively. One way to achieve this is by organizing the content into topic-based or weekly modules. To ensure that the course structure is effective, it is advisable to create a course outline or blueprint. This involves taking the course map and developing an outline that details the key components for each module. The blueprint serves as a guide to organizing the course content in the online space, whether LMS or a Website. By providing a clear and consistent flow of information, students can navigate through the course with ease.

In online teaching, creating an introduction that allows students to interact and get to know one another is crucial. This sets the tone for the course, establishes expectations, and fosters a sense of trust among learners (Gunder et al., 2021). While the syllabus of an online course serves the same purpose as in a face-to-face course, it requires additional information and customization to make it accessible and usable. The syllabus is also an opportunity to create a welcoming atmosphere and establish a learning community among students. An icebreaker or personal artifact-sharing activity can help teachers better understand their students' experiences and backgrounds. For example, Bryan Dewsbury invites his students to write an essay titled "This I Believe" to describe their daily life values (Gunder et al., 2021). Finally, Beach (2018) emphasized that the course structure is an important factor for designing online courses to encompass easy access to materials, clear deadlines for tasks and assignments, consistent announcements, and distributed assignments throughout the course.

In addition, Cuesta (2010) pointed out that when determining the structure for course materials, it is important to consider both organization and interactivity, as they provide users with accessible ways to use the material as well as engaging modes of content presentation.

Course Interaction

In an online setting, the interaction between students and faculty is a crucial indicator of quality. Interaction within the course can be classified into three groups: student-to-student, instructor-to-student, and student-to-content. According to Gilbert and Moore (1998), interaction refers to "an exchange in which individuals and groups influence each other occurring when there are reciprocal events requiring two objects and two actions" (p. 20).

Instructors' interactions with students in an online course can be facilitated through multimedia announcements, virtual meetings, and providing feedback. Regular and sustained interaction between learners and the instructor is crucial for the success of an online course; synchronous and asynchronous opportunities can be structured using basic tools available in the LMS. These opportunities include scheduled study sessions, collaborative work, virtual office hours, peer reviews, annotating group documents, and participating in discussion boards. (Cuesta, 2010; Gunder et al., 2021).

Assessments

Assessment and feedback are important components of the learning process, and for effective online learning, specific requirements need to be met. Learning outcomes should be specific, measurable, and clearly stated with active verbs. Grading policies should be clearly stated in the course information area or syllabus, and frequent and appropriate methods should be used to assess mastery of content. Criteria for graded assignments should be clearly articulated, and learners should have opportunities to review their performance and assess their own learning throughout the course. Learners should also be informed when a timed response is required and have access to an up-to-date gradebook. They should also have multiple opportunities to provide descriptive feedback on course design, content, their experience, and online technology. Finally, assessments should be authentic and designed with personal and real-world relevance (University of Toronto, 2023). Assessment instructions should be detailed and clear, including the deadline for submission (Dabbagh et al., 2019).

Tips and Guidelines for Designing Online Courses

To address our first research question, a comprehensive survey was conducted, drawing from a range of studies as well as guides from various reputable universities. The aim was to provide valuable insights for faculty members seeking to enhance the design of their online courses.

Creating a successful online course, in Web-based a hybrid format, can pose a significant challenge. It demands a substantial time investment from the faculty course developer. Various research studies have indicated that the effort needed to design and teach online courses is comparable to that of developing and teaching the same course in a traditional face-to-face setting. For example, at the University of Pittsburgh, the college of general studies academic affairs designed a guidebook for instructors developing online courses (Boettcher & Conrad, 2021). It included the following important guidelines.

- The course covers navigation guidance, introductions to the course and faculty, student introductions, clear expectations for netiquette, and specified technology/student skills/prerequisite knowledge requirements.
- The course learning objectives are clearly stated and comprehensible, outlining mastery, critical thinking skills, and measurable outcomes for learning skills.
- Assessments are straightforward and provide feedback while measuring the learning objectives consistently with course activities, resources, and the learning environment.
- Instructional materials support the learning objectives, are organized clearly with a well-defined purpose, and are cited accurately and appropriately.
- Learning activities encourage and facilitate the achievement of learning objectives and promote interaction.
- The course design sets availability expectations for instructors and encourages student engagement.
- Tools and media support the objectives, enhance interaction, are easy to download, and are compatible with delivery modes while taking advantage of existing economies of delivery.

In addition, the following tips and guidelines were intended to help instructors create a successful online course (O'Keefe et al., 2020).

- Clearly define the learning objectives of your course, identifying the knowledge and skills you want students to acquire by the course's end.
- Choose content that is suitable for your target audience, engaging, and relevant. Use multimedia elements like videos, images, and interactive activities to boost student engagement.
- Organize your course into modules or units with a clear and logical structure. Use headings, subheadings, and bullet points to make your content easy to navigate and comprehend.

- Provide students with clear, detailed instructions for assignments, assessments, and activities. Use examples and rubrics to clarify what is expected of them.

- Encourage interaction and collaboration among students by using discussion forums, group projects, and collaborative activities to create a sense of community and increase engagement.

- Provide timely and constructive feedback on assignments, assessments, and activities to help students understand their strengths and weaknesses and improve their performance.

- Choose appropriate technology that is user-friendly and accessible to all students. Ensure the technology you use is reliable and works seamlessly with your course content.

- Make sure your course is accessible to all students, including those with disabilities. Use captions for videos, provide alternative text for images, and ensure that your course is compatible with screen readers.

Example of Course Design Rubric Standards in Higher Education

As online learning continues to grow, institutions must prioritize the creation and verification of high-quality online courses and program offerings (Zimmerman, 2020). Course design standards for higher education can vary depending on the institution and program. However, a rubric should provide a clear and consistent framework for assessing the quality of a course and ensure that it aligns with institutional and program standards. A well-designed rubric can help ensure that courses meet expected standards and promote student success.

The State University of New York developed the OSCQR course design review scorecard, a quality rubric used to review and enhance the instructional design and accessibility of online courses. The rubric comprised 50 standards related to online best practices and covers categories such as course technology and tools, design and layout, content and activities, interaction, assessment, and feedback. This rubric was designed for targeted identification and improvement of aspects of online courses that require enhancement (Gunder et al., 2021).

In addition, Kent State University developed a guide for designing an online course (Kent State Online, 2023). This guide outlined a set of standards to support the creation of high-quality online courses. It was designed for use in developing new courses, reviewing previously developed ones, or providing suggestions for enhancing existing courses. The guide's checklist aligns with the quality matters rubric, which was grounded in online learning and instructional design research (Kent State Online, 2023).

The University of Toronto (2023) also developed online course design guidelines based on the SUNY online course quality review rubric OSCQR. These guidelines provided a roadmap for instructors during the course design process or as a self-evaluation tool to assist instructors in revising an existing online course using the rubric and suggested examples. Table 1 summarizes the main topic areas and components of a rubric to design or assess a quality online course.

Table 1

Components of a Quality Online Course Rubric

Course component	Description of quality
Course overview and objectives	Course goals and learning outcomes are clearly defined and aligned with institutional and program objectives. Course overview provides a clear and concise description of the course and its purpose.
Content and instruction	Course content is relevant, current, and aligned with best practices in the field. Instructional strategies and materials are varied, engaging, and promote active learning. The course includes opportunities for students to apply knowledge through hands-on activities, projects, or assignments. Learning activities are designed to accommodate diverse learning styles and needs.
Assessment and evaluation	Assessment methods are varied, authentic, and aligned with course objectives. Assessment criteria and expectations are clearly communicated to students. Feedback on student work is provided in a timely and constructive manner. The grading system is fair, transparent, and consistent.
Technology and resources	Technology is used effectively to support learning, communication, and collaboration. Course materials and resources are easily accessible and well-organized. Students have access to appropriate technology and resources needed for the course.
Course management and administration	Course policies and procedures are clearly stated and adhered to.

	The course syllabus includes important information such as course schedule, deadlines, and contact information.
	Communication with students is timely, effective, and professional.
	The course is well-organized and easy to navigate.
Instructor competencies	The instructor is knowledgeable, experienced, and qualified to teach the course.
	The instructor communicates effectively and engages students in the learning process.
	The instructor is responsive to students' needs and concerns.
	The instructor promotes a positive and inclusive learning environment education in the digital age.

Results of the Course Analysis

The course analysis was based on the guidelines and rubrics explored above. The results of that analysis is summarized in Table 2 and discussed in the section that follows.

- The course was designed to follow a weekly schedule, and each week covered specific topics. The instructor used the backward design model to design the online course and followed the three stages of design that begin by defining the desired results (i.e., big ideas) of the course

Table 2

Evaluation of the Selected Course as it Aligned With Rubric Guidelines

Course component	Rubric guidelines	Applied in selected course?
Course overview and objectives	Clearly define the learning objectives of your course, identifying the knowledge and skills you want students to acquire by the course's end.	Applied
Content and instruction	Choose content that is suitable for target audience, engaging, and relevant. Use multimedia elements (e.g., videos, images, interactive activities) to boost student engagement.	Applied
	Encourage interaction and collaboration among students by using discussion forums, group	

	projects, and collaborative activities to create a sense of community and increase engagement. Organize course into modules or units with a clear and logical structure. Use headings, subheadings, and bullet points to make content easy to navigate and comprehend.	
Assessment and evaluation	Provide students with clear, detailed instructions for assignments, assessments, and activities. Use examples and rubrics to clarify what is expected. Encourage interaction and collaboration among students by using discussion forums, group projects, and collaborative activities to create a sense of community and increase engagement. Organize course into modules or units with a clear and logical structure. Use headings, subheadings, and bullet points to make content easy to navigate and comprehend. Provide timely and constructive feedback on assignments, assessments, and activities to help students understand their strengths and weaknesses, and improve their performance.	Applied
Technology and resources	Choose appropriate technology that is user-friendly and accessible to all students. Ensure the technology you use is reliable and works seamlessly with your course content. Make sure course is accessible to all students, including those with disabilities. Use captions for videos, provide alternative text for images, and ensure that course is compatible with screen readers.	Applied, but without considering learners with disabilities
Course management and administration		Applied, but effectiveness and usability need to be examined

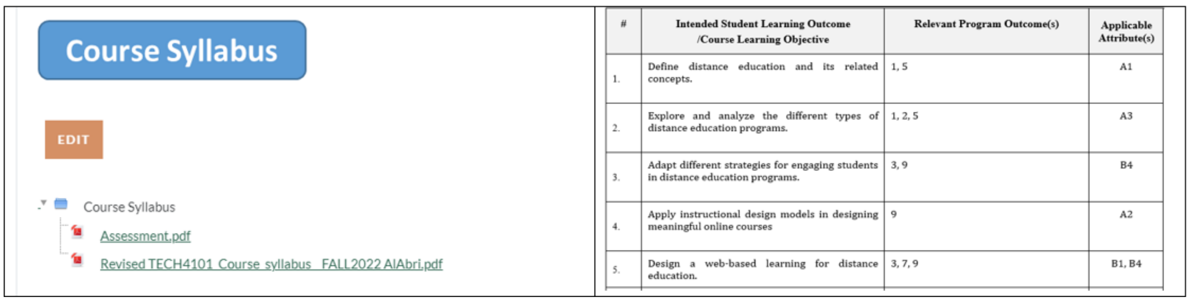
Instructor competencies	This course component was not analyzed.	Not applied

Course Overview and Objectives

Figure 1 shows the evidence from the course regarding the course overview and objectives. Learning objectives and the course description were available in the course syllabus. The syllabus was posted on Moodle under the course overview. A separate page was designed for the course overview including a clear description of the course as well as the syllabus.

Figure 1

Evidence Regarding the Course Overview and Objectives



#	Intended Student Learning Outcome /Course Learning Objective	Relevant Program Outcome(s)	Applicable Attribute(s)
1.	Define distance education and its related concepts.	1, 5	A1
2.	Explore and analyze the different types of distance education programs.	1, 2, 5	A3
3.	Adapt different strategies for engaging students in distance education programs.	3, 9	B4
4.	Apply instructional design models in designing meaningful online courses	9	A2
5.	Design a web-based learning for distance education.	3, 7, 9	B1, B4

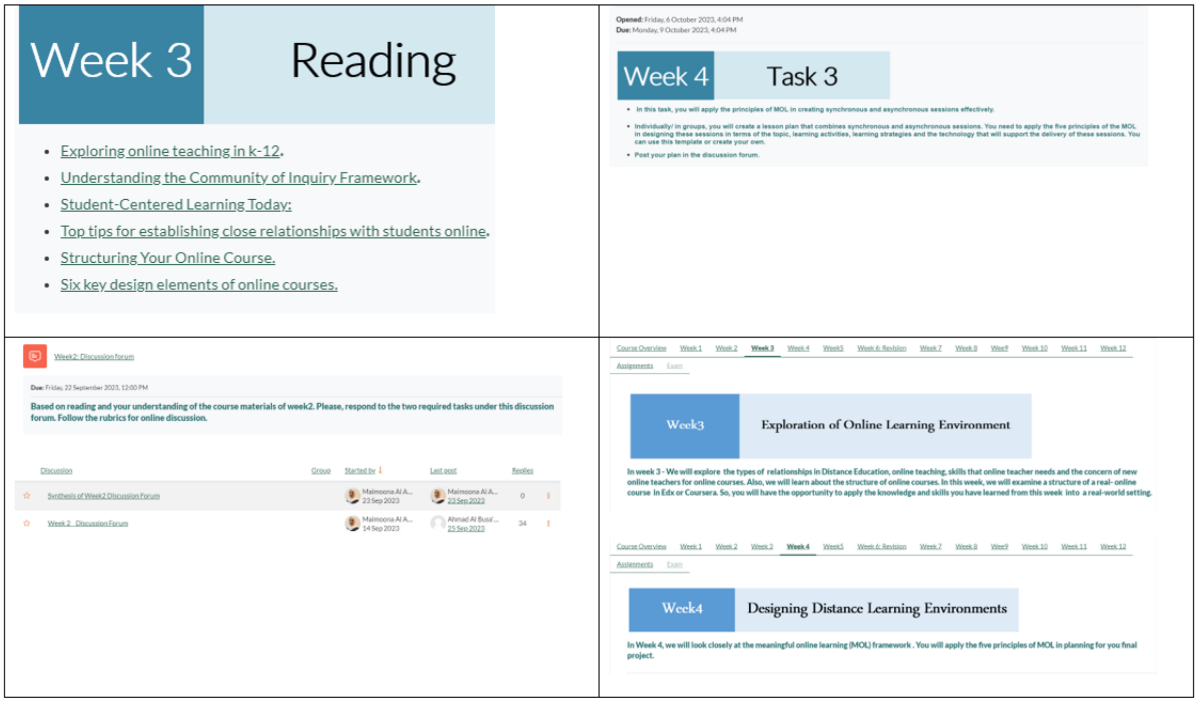
Content and Instruction

Regarding content and instruction, evidence from the course is shown in Figure 2. This course was designed according to a week-by week schedule. A variety of resources were provided for students under each week. In this course, learners were encouraged to apply what they learned by using their new knowledge and skills in projects. Engaging activities were incorporated throughout the course, such as (a) reflection through discussion forums and responding to each other, (b) working in groups on projects, (c) facilitating online courses with a targeted audience, and (d) participating in large discussions. All these learning activities were designed to accommodate diverse learning styles and needs. However, further improvement is needed.

In addition, different strategies were employed to engage learners effectively in an online learning environment, synchronous and asynchronous, as follows. Discussion forums asked students to reflect on their understanding of the topics being taught in that specific week. Guiding questions and an online discussion forum protocol were provided. In the end, the instructor provided a synthesis of students' understanding of the topic of the discussion. Also, students were assigned to groups to work collaboratively on the main assignments and projects in the course. A table was created to help students form their groups.

Figure 2

Evidence From the Course Regarding Course Content and Instructions



Assessment and Evaluation

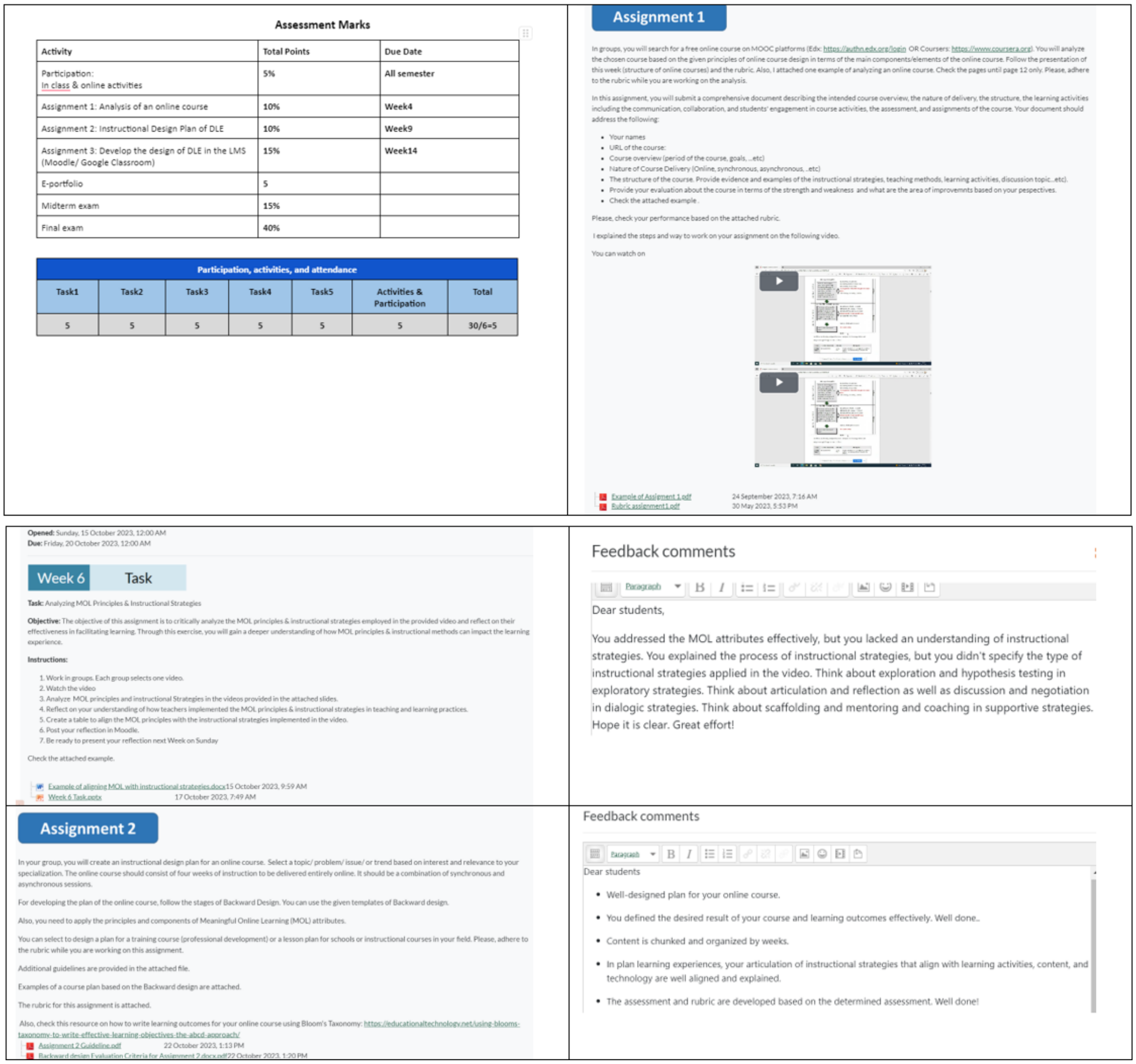
The assessment was included in the syllabus and distributed throughout the semester (see Figure 3). Additionally, the type of assessment and grade distribution were included in the syllabus and posted separately on Moodle. Detailed assignment instructions were provided, including posting examples and rubrics for learners to follow while working on their projects. Furthermore, a recorded video explaining the assignments' requirements was developed and posted under the assignments in Moodle.

A separate tab was created for the course assignments to make it easy for students to navigate. All assessments aligned with the course's learning objectives. Learners applied meaningful online learning concepts, including instructional strategies and assessments, to design a plan for an online course. Learners then used this plan to design and facilitate the online course in the LMS with their target audience.

Regarding providing timely and constructive feedback on the different types of assessments, evidence from this course indicated that constructive feedback was provided on students' responses in discussion forums (e.g., reflecting on a video to extract the principles of meaningful online learning applied in the video). Learners were given feedback on the task in week six, namely to analyze the instructional strategies of meaningful online learning applied in the video. Students were provided with feedback on all their assignments; evaluation was based on rubrics. Feedback was provided immediately after the deadlines for assignment submission.

Figure 3

Evidence From the Course Regarding Assessment and Evaluation



Assessment Marks

Activity	Total Points	Due Date
Participation: In class & online activities	5%	All semester
Assignment 1: Analysis of an online course	10%	Week4
Assignment 2: Instructional Design Plan of DLE	10%	Week9
Assignment 3: Develop the design of DLE in the LMS (Moodle/ Google Classroom)	15%	Week14
E-portfolio	5	
Midterm exam	15%	
Final exam	40%	

Participation, activities, and attendance						
Task1	Task2	Task3	Task4	Task5	Activities & Participation	Total
5	5	5	5	5	5	30/6=5

Assignment 1

In groups, you will search for a free online course on MOOC platforms (Edx: https://authn.edx.org/login OR Coursers: https://www.coursera.org). You will analyze the chosen course based on the given principles of online course design in terms of the main components/elements of the online course. Follow the presentation of this week (structure of online courses) and the rubric. Also, I attached one example of analyzing an online course. Check the pages until page 12 only. Please, adhere to the rubric while you are working on the analysis.

In this assignment, you will submit a comprehensive document describing the intended course overview, the nature of delivery, the structure, the learning activities including the communication, collaboration, and students' engagement in course activities, the assessment, and assignments of the course. Your document should address the following:

- Your names
- URL of the course:
- Course overview (period of the course, goals, ...etc)
- Nature of Course Delivery (Online, synchronous, asynchronous, ..etc)
- The structure of the course. Provide evidence and examples of the instructional strategies, teaching methods, learning activities, discussion topic...etc).
- Provide your evaluation about the course in terms of the strength and weakness and what are the area of improvemnts based on your pespectives.
- Check the attached example .

Please, check your performance based on the attached rubric.

I explained the steps and way to work on your assignment on the following video.

You can watch on

Example of Assigment 1.pdf 24 September 2023, 7:16 AM
Rubric assignment1.pdf 30 May 2023, 5:53 PM

Opened: Sunday, 15 October 2023, 12:00 AM
Due: Friday, 20 October 2023, 12:00 AM

Week 6 Task

Task: Analyzing MOL Principles & Instructional Strategies

Objective: The objective of this assignment is to critically analyze the MOL principles & instructional strategies employed in the provided video and reflect on their effectiveness in facilitating learning. Through this exercise, you will gain a deeper understanding of how MOL principles & instructional methods can impact the learning experience.

Instructions:

1. Work in groups. Each group selects one video.
2. Watch the video
3. Analyze MOL principles and instructional Strategies in the videos provided in the attached slides.
4. Reflect on your understanding of how teachers implemented the MOL principles & instructional strategies in teaching and learning practices.
5. Create a table to align the MOL principles with the instructional strategies implemented in the video.
6. Post your reflection in Moodle.
7. Be ready to present your reflection next Week on Sunday

Check the attached example.

Example of aligning MOL with instructional strategies.docx 15 October 2023, 9:59 AM
Week 6 Task.pptx 17 October 2023, 7:49 AM

Feedback comments

Dear students,

You addressed the MOL attributes effectively, but you lacked an understanding of instructional strategies. You explained the process of instructional strategies, but you didn't specify the type of instructional strategies applied in the video. Think about exploration and hypothesis testing in exploratory strategies. Think about articulation and reflection as well as discussion and negotiation in dialogic strategies. Think about scaffolding and mentoring and coaching in supportive strategies. Hope it is clear. Great effort!

Assignment 2

In your group, you will create an instructional design plan for an online course. Select a topic/ problem/ issue/ or trend based on interest and relevance to your specialization. The online course should consist of four weeks of instruction to be delivered entirely online. It should be a combination of synchronous and asynchronous sessions.

For developing the plan of the online course, follow the stages of Backward Design. You can use the given templates of Backward design.

Also, you need to apply the principles and components of Meaningful Online Learning (MOL) attributes.

You can select to design a plan for a training course (professional development) or a lesson plan for schools or instructional courses in your field. Please, adhere to the rubric while you are working on this assignment.

Additional guidelines are provided in the attached file.

Examples of a course plan based on the Backward design are attached.

The rubric for this assignment is attached.

Also, check this resource on how to write learning outcomes for your online course using Bloom's Taxonomy: https://educationaltechnology.net/using-blooms-taxonomy-to-write-effective-learning-objectives-the-abcd-approach/

Assignment 2 Guideline.pdf 22 October 2023, 1:13 PM
Backward design Evaluation Criteria for Assignment 2.docx.pdf 22 October 2023, 1:20 PM

Feedback comments

Dear students

- Well-designed plan for your online course.
- You defined the desired result of your course and learning outcomes effectively. Well done..
- Content is chunked and organized by weeks.
- In plan learning experiences, your articulation of instructional strategies that align with learning activities, content, and technology are well aligned and explained.
- The assessment and rubric are developed based on the determined assessment. Well done!

Technology and Resources

Regarding technology integration and supporting resources, the university used the Moodle LMS. Since it was used in all courses, students are familiar with using it. The course was accessible to all students who were enrolled. Other technologies used for assignments and projects were open source and accessible such as the edX platform, where learners were advised to search for a free online course from which to perform an assignment related to the course. Learners also used Canva and Google applications, which were accessible to all students. Evidence from the course is presented in Figure 4.

The course was designed based on standard principles without considering accommodation for those learners with a disability. The videos were screen recordings developed without captions. The text did not offer features such as zoom in and zoom out. Sign language was not provided or accommodated. Our analysis indicated that the course needed to be rebuilt to be compatible with universal design for learning, making it accessible for all learners, including those with disabilities.

Figure 4

Evidence From the Course Regarding Technology and Resources

Course Management and Administration

Illustrates that the syllabus was accessible to all learners through Moodle. Information about university policies, the course schedule, assignment deadlines, and instructors' contact details, including office hours, office location, phone extension, and communication channels, were all provided.

The course was designed on a week-by-week basis, making it easy to navigate. However, a study should be carried out to examine the effectiveness of the course from learners' perspectives, including the online course's ease of use.

Figure 5

Evidence From the Course Regarding Course Management and Administration

SULTAN QABOOS UNIVERSITY
COURSE OUTLINE

PROGRAM: BEd

1. Course Code	TECH4101	
2. Course Title	DISTANCE EDUCATION AND USE OF INTERNET	
3. Credits	3	
4. Pre-requisite Course(s)		
5. Co-requisite Course(s)		
6. Equivalent Course(s)		
7. Incompatible Course(s)		
8. Course Category	☐ University Requirement	☐ University Elective

Instructor Competencies

The instructor competencies were not examined or analyzed. Peer evaluation should be conducted to assess the instructor's competencies in terms of their knowledge, skills and other experiences.

Guidelines for Educators Transitioning Courses to Online

Collectively, based on the principles, guidelines, and rubrics that have been developed by several institutions, the following tips and guidelines were extracted through this study.

Table 3

Recommended Guidelines for Designing Online Courses

Course component	Guideline
Fundamental principles	Course design should be based on instructional design principles.
Overview and objectives	Provide a clear and concise description of the course.
	Identify desired objectives of the course (to highlight required knowledge and skills)
	Define learning objectives for each module
Content and instructional strategies	Design a course blueprint or course map.

	Organize the course with a logical structure using modules and clear formatting.
	Select relevant and current content.
	Align content,instructional strategies, engaging learning activities, resources, and technology with learning objectives.
Assessment and evaluation	Design varied assessment methods that are authentic and intentional.
	Provide detailed instructions for assignments and activities, including examples and rubrics.
	Offer timely and constructive feedback to help students understand and improve their performance.
Collaboration and communication	Foster interaction and collaboration among learners through discussion forums, group projects, and hands-on activities.
Technology and resources	Select appropriate technology and resources that align with the learning activities.
	Choose user-friendly and accessible technology and resources that seamlessly integrate with course content.
Accessibility	Ensure inclusivity by making the course resources accessible to all students, including those with disabilities.

Conclusion

This study has presented a comprehensive approach to designing quality online courses. The findings of this study were derived from a theoretical perspective and by analyzing an existing online course. This data provided a deep understanding of the key elements and guidelines for effective online course design. Incorporating instructional design principles such as constructivism and leveraging design models such as backward design will create a solid foundation for creating engaging and meaningful online learning experiences. The importance of robust and comprehensive course components has been emphasized, including course learning objectives and the careful organization of materials, interactive elements, clear instructions, assessments and evaluation, and the careful selection of technologies. A well-structured course with logical organization and clear navigation supports students' engagement with the material. Finally, this study has provided practical tips and guidelines for educators who are transitioning their courses to an online format. It can serve as a valuable resource for improving instructional design skills and creating engaging online learning environments.

The data derived from the analysis of the online course showed that there were areas for improvement. Accessibility features were not functioning well enough for the course to accommodate everybody, particularly students with disabilities. Also, the instructor's competencies in terms of their level of knowledge, skills, and ability to create engaging learning experiences for students were not examined. Future research is recommended to investigate these competencies by conducting peer evaluation and focus groups with students. Finally, the usability and usefulness of the course needs to be assessed from students' perspectives. By incorporating these essential components and guidelines into the design process, educators can create high-quality online courses that effectively engage learners and promote learning success. As online education continues to grow, designing effective and meaningful online courses will become increasingly important in delivering quality.

Limitation of the Study

The study's limitation is rooted in its methodology, relying on literature review and course analysis. To gather comprehensive data from various perspectives, including instructors and students, empirical research is necessary. Furthermore, the study was confined to the analysis of a single course. It is crucial to extend the scope by selecting additional online courses for examination against the guidelines derived from this study.

Recommendations

The study's main recommendation is to extend the scope of this study to examine the derived guidelines against number of online courses in the university to validate these guidelines. Also, analysis of the online course revealed areas for improvement, including accessibility issues for students with disabilities as well as enhancing some key components of the course. In addition, instructor competencies and student perspectives on usability and usefulness of the course warrant further investigation.

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Critiquing the Role of Field Facilitation in Open and Distance Learning Within a Resource-Constrained Environment in the Global South

Robert Kalima[1], Carolyn Grant[2], Sherran Clarence[3], and Sioux McKenna[2]
[1]Mzuzu University, Luwinga, Malawi; [2]Rhodes University, Makhanda, South Africa; [3]Nottingham Trent University, Nottingham, United Kingdom and Rhodes University, Makhanda, South Africa

Abstract

Field facilitation is a crucial pedagogical intervention aimed at supporting student learning in resource-constrained open and distance learning environments, particularly in the Global South. This study used second generation activity theory to analyse a field facilitation intervention in an education faculty at a Malawian university, particularly the ways in which student learning and understanding was enabled or undermined while implementing field facilitation. The findings showed that many of the benefits of field facilitation were constrained for a number of reasons related to recruitment and training, pedagogies and understanding of student needs, and the materials and approaches used in field facilitation. For the field facilitation intervention to be fully effective as a means to deepen student learning, it needs to be embedded in the curriculum rather than implemented as an add-on activity, field facilitators need to be fully supported in their role, and the tools and materials available for teaching and tutoring need to be carefully designed within the resource constraints of the learning environment. These findings may inform reflection and further action in similarly resource-constrained contexts that are working to improve the success of open and distance learning.

Keywords: activity theory, epistemological access, African higher education, open and distance learning, peer tutoring, field facilitation

Introduction

Open and distance learning (ODL) requires students to engage either asynchronously or synchronously with a range of learning resources, which could be available online or via paper textbooks and physical learning packs (Bozkurt, 2019). This means that although in many ODL programmes there are in-person blocks of teaching and/or opportunities to be tutored in peer groups at satellite learning centres, the main mode of engagement is asynchronous and self-directed (Bozkurt, 2019; Lumadi, 2021), and that this form of education has a "learner-centred philosophy" (Santhi et al., 2014, p. 417). This sets ODL providers the challenging task of engaging students in their learning consistently, and providing necessary support, especially at the first-year level (Mittelmeier et al., 2019). This challenge is exacerbated by limited institutional capacity in universities in the Global South, where ODL higher education provision has struggled to make the desired impact in enhancing student learning, success, and throughput (Bozkurt, et.al, 2020). ODL provision has struggled with high dropout rates (low retention) and delayed or late completion of qualifications, meaning students stay in the system for longer than planned (Musingafi et al., 2015). This situation is obviously worrying, especially given the demand for university-level qualifications from industry as well as the public and private sectors, pushing many more students, both early and mid-career, into higher education. This situation is especially concerning in the developing countries of the Global South, such as Malawi where this study was done, and where large numbers of students are enrolling in ODL programmes (Mittelmeier et al., 2019).

To address the need for some in-person teaching and learning to supplement self-directed learning, the universities such as University of South Africa (UNISA) and Zambia Open University (ZOU), that offer ODL, have set up satellite learning centres to which students can come during the semester for structured tuition in a group setting (UNISA, 2023; Mpolomoka et al., 2022). Mzuzu University in Malawi, the focus of this paper, makes similar provision. This form of ODL tuition in resource-constrained contexts is critical for ensuring accessibility, flexibility, equity, and inclusion (Lumanta & Garcia, 2020; Pearson & Koppi, 2002). This is, in part, because of forms of digital poverty experienced in the Global South, such as poor Internet connection, limited access to personal computers or laptops at home, and limited skills in using information and communication technologies and tools effectively for learning (Lumadi, 2021). This makes using online technologies for delivering course materials and learning a significant challenge (Azionya & Nhedzi, 2021), thus necessitating supplementary tutoring to ensure students are learning effectively and feel supported throughout their degree. It is hoped that increased engagement in field facilitation—the form of supplemental tutoring used at Mzuzu University—will decrease attrition and improve completion rates, too.

To explore the extent to which supplemental tutoring is achieving these aims, this study analysed a field facilitation intervention implemented in the Bachelor of Education (BEd) (Science) programme offered through an ODL mode of delivery at Mzuzu University in Malawi. The ODL provision was introduced in the BEd (Science) programme in the Faculty of Education in 2014 to meet the increased demand for qualified mathematics and science teachers in secondary schools in Malawi. Field facilitation was introduced as part of the broader ODL offer to improve student retention and success, through providing more in-person opportunities for tutoring and peer engagement (Kalima, 2023). Using second generation activity theory to deeply explore the context of field facilitation practices and perceptions, this study found both affordances as well as constraints in the field facilitation intervention which are presented in the sections that follow.

Field Facilitation in Open and Distance Learning

Field facilitation is synonymous with tutoring (McCaughan, 2013; Mosely et al., 2018), which is an additional academic support strategy aimed at enhancing student learning and engagement or interaction, with study materials and tasks and with peers. In this study, the term field facilitation has been used rather than tutoring for two main reasons. The first is that Mzuzu University adopted the term field facilitation to distinguish the additional student-centred academic support strategies for BEd students, led by facilitators, from the formal lectures led by subject lecturers. The second reason is that learning support has not been provided at the main university campus; it has been provided remotely in the satellite learning centres located in the regional areas in which students are based, in other words, in the field.

The word facilitation means helping someone achieve something which would be a challenge to achieve without that help. In an educational context, a facilitator is someone who helps a student learn or study. Though the word facilitator is often used synonymously with the word tutor, there is a slight difference. A tutor plays a limited role in the learner's learning process and experience, while a facilitator is accorded more authority and a more formal role (Le Ha, 2014). In the case of this study, the facilitator supported the course lecturer. As Karachristos et al. (2020) argue, facilitation aims to motivate, engage, and support the learners, to enhance their communication and collaboration throughout the course, but might not provide expertise in the subject of the course. However, field facilitators have the autonomy to structure and design field facilitation sessions based on their pedagogical knowledge and skills unlike tutors who tend to receive instructions from course lecturers each time they engage students (Reeve, 2006). Drawing on this more sociocultural understanding of facilitation means that just assembling field facilitators and science and mathematics students in one room is no guarantee that learning will take place; the field facilitators need support from the lecturers and subject experts as well as relevant pedagogical knowledge and support.

There are many types of field facilitation models which reflect economic and infrastructural developments of a region or country. Malawi, a developing country in the Global South, has faced its own challenges, reflected in the educational practice in general, and in ODL practices in particular. One challenge has been the large student-to-lecturer ratio (Chibambo & Jere, 2018) which has complicated quality distance education delivery (Tembo & Mwale, 2019). A related challenge has been the support lecturers are able to offer field facilitators, to ensure that they are working together as a united team. This study used second generation activity theory as a theoretical as well as methodological tool to analyse and understand the extent to which field facilitation at Mzuzu University has been effective in promoting student learning and retention thus far (Kalima, 2023). It is important to underscore that this study took place in a resource-constrained context, in which many students did not have reliable Internet access or sufficient support away from university campuses, and therefore greatly relied on field facilitation to support their learning.

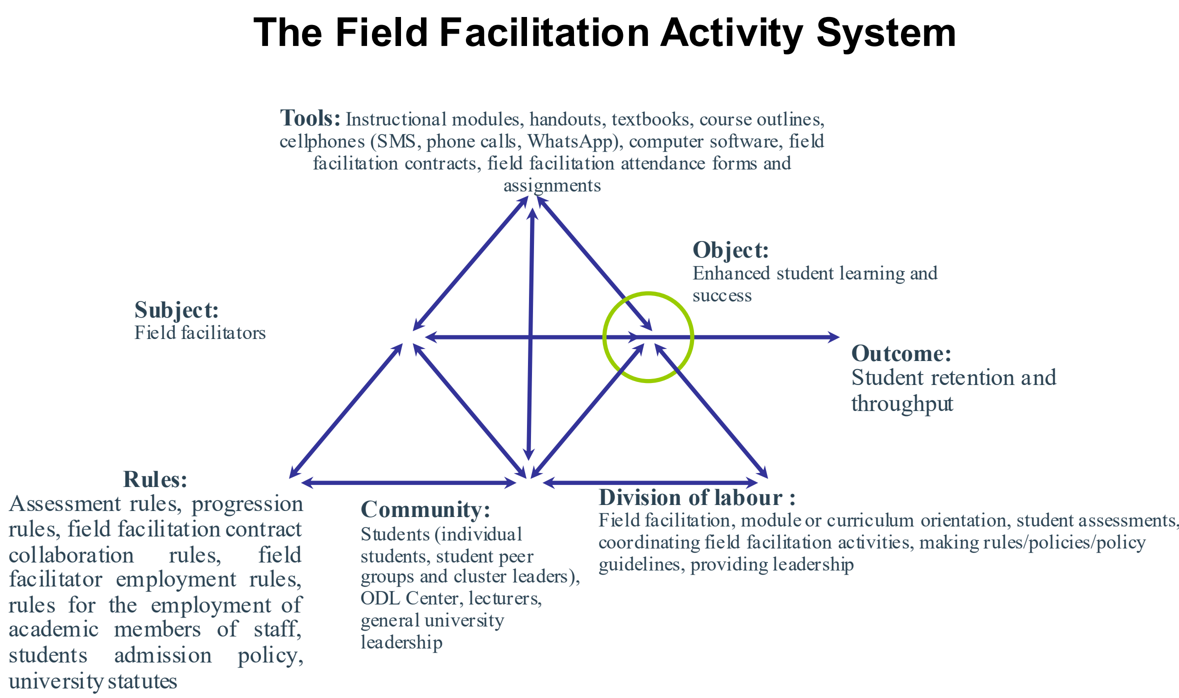
Activity Theory as a Framework for Analysis

Activity theory (AT) conceives of practices as occurring within an activity system with well linked and coordinated elements. These are understood as comprising different role players and parts, namely the *subject*, an *object* mediated by the tools, *rules* or regulations, a *community* engaged in and surrounding the activity, and a certain *division of labour* aimed at achieving a particular shared *outcome* (Engeström, 1987). We have used what is termed second generation activity theory (Engeström, 1987) to make sense of the field facilitation activity system at Mzuzu University. This framework enabled us to illustrate often invisible tensions between what was intended for student learning and engagement and what was happening in practice at the time the study was conducted. Figure 1 depicts the specific activity system at Mzuzu University.

An example of such a tension might be that between the intentions and plans of the lecturer and the understanding of these by the field facilitator, such that the lecturer's intentions are not effectively realized. An AT analysis might find that this tension arose because of a lack of clarity in the rules, for example, or poor communication about the division of labour and the intended outcome. Understanding these gaps and tensions may then motivate positive and necessary change. Although this kind of analysis is relatively new in studies on ODL teaching and learning, we would argue that this is a useful, practice-oriented way of exploring open and distance learning set-ups, like the one at Mzuzu and the focus of this study.

Figure 1

Field Facilitation Activity System at Mzuzu University



Note. Adapted from *Field facilitation in open and distance learning in resource constrained environments, a case of Mzuzu University in Malawi* (p.112), by R. Kalima, 2023, Rhodes University. CC BY-NC-SA.

Research Design and Methodology

This study employed a research design and methodology derived from activity theory, specifically contextual profiling and interviews to generate what is known as mirror data, and online change laboratory workshops (Virkkunen & Newnham, 2013). Mirror data is data generated to find out what is happening in the activity system (in this case the field facilitation activity system) from the perspective of the subject(s) of that system and members of the community involved in the labour being done to achieve the shared outcome. These data were collated and then shared with those in key roles—in this case lecturers, field facilitators, and students—to bring to the surface and discuss tensions, or points of challenge or difficulty, and find shared and mutually beneficial ways to improve the activity system's functioning. This was done through virtual change laboratory workshops, where participants saw the data, discussed it, and shared their views and perspectives with one another and the facilitator (the first author of this paper). Change laboratory workshops are not typically conducted online, but with the university closed due to the COVID-19 pandemic, the only way to meet with lecturers, students, and field facilitators to share the mirror data and get their impressions and thoughts was on WhatsApp, in dedicated groups. Although this part of the research was limited due to the nature of WhatsApp and the general stressors created by the pandemic, the findings pointed to important tensions and challenges that needed to be understood before relevant solutions could be created. These are discussed in the next section of the paper.

Data in the first phase were collected from students in the BEd courses through surveys and focus group discussions; semi-structured individual interviews were used to collect data from field facilitators and lecturers. The field facilitators were science and mathematics teachers teaching in secondary schools close to the field facilitation venues (i.e., satellite learning centres). The lecturers were the science and mathematics teachers based at the main campus of Mzuzu University. Research participants were purposively and conveniently sampled for the research project; they had knowledge and experience of the field facilitation work in the BEd programme for pre-service mathematics and science teachers. Document analysis was also used to substantiate the data from students, field facilitators, and lecturers; specifically, university ODL policy documents, course handouts, and student modules. The analysis of the data in this first phase provided the mirror data which served as a stimulus for the change laboratory process.

The analysis in the second phase of the study was guided by the points of tension that became apparent from the WhatsApp posts shared by lecturers, field facilitators, and students as they responded to the mirror data. For example, we examined change laboratory conversations in WhatsApp to hear what lecturers believed the role of field facilitators was or should be and then hear how field facilitators responded to either agree or challenge the lecturers' views. Pulling out possible tensions then led to consulting relevant documents and the comments made in the surveys and interviews to dig deeper into understanding why the tensions may have manifested as they did, and what may have led to them (e.g., lack of clarity in policy, or communication lines being unclear). To present the multiple forms of data clearly in the analysis, codes were created to point to the site at which the speaker, namely students (S) and field facilitators (FF) were based: Mulanje (MJ), Balaka (BLK), Lilongwe (LL), Mzuzu (MZ), and Karonga (KA). FGI indicates comments from focus group interviews with students and FF simply indicates comments made by field facilitators in the WhatsApp conversations and in the interviews. Lecturers' (L) excerpts were presented using course codes such as P for physics, C for chemistry, M for mathematics, and B for biology. Hence, an interview/WhatsApp comment from a field facilitator based at the Lilongwe satellite learning centre would be FF-LL, and a Physics lecturer's comment would be LP. The next section discusses the insights gained from the combined analysis of the mirror data and the change laboratory conversations with the participants.

Findings and Discussion

The shared object of the activity system analyzed in this study was facilitating student learning to enhance students' success in the BEd (Science) programme, offered through ODL at Mzuzu University. However, although this object was shared, there were tensions between the different role players' understanding of how to achieve this object, and how the system itself should and did work. If the object was to facilitate better learning, there would need to be a close alignment among what was happening during field facilitation sessions at the learning centres; the teaching and assessment processes and practices designed by the lecturers (both part of the division of labour, and implying rules and regulations being enacted, such as policy); the expectations of the schools the teachers will end up in (part of the community, and reflected in the curriculum and assessment), and an understanding of who the students were and their learning needs. Furthermore, field facilitation as a practice would need to be supported and quality assured by the university (community) to enable it to achieve this object and thereby support the outcome of enhancing retention and throughput (rules and regulations).

There was ample evidence that a clear understanding of the object of the activity system was not shared by all parties, and that this restricted the full potential of field facilitation. As we will illustrate, this was evident in the way in which the field facilitators were appointed, trained, and rewarded in the undertaking of their activities (affecting their *role and credibility*); the *pedagogies* of the field facilitators, including in the division of labour between the field facilitators and the lecturers; lecturers' and field facilitators' understandings and *students' learning needs*; and the *tools* available for field facilitation. The rest of this section thematically explores the affordances and constraints of field facilitation using these four sets of tensions to structure the analysis of the data.

Credibility, Identity and Roles of Field Facilitators

Credibility in this study was directly related to how field facilitators were recruited and prepared for their facilitation roles. In this ODL programme, at the time the study was undertaken, students initiated the recruitment process of field facilitators by identifying individuals to be considered for these posts. Although the aim may have been to include student voices in this process, the way it unfolded raised questions for students about the quality of the field facilitation, as their understanding was that the lecturers or heads of department should be responsible for the recruitment of field facilitators, whose work was similar to that of adjunct lecturers. The students' comments pointed to a mismatch in expectations regarding the implementation of the rules in this activity system (i.e., hiring policies) and the division of labour, namely whose responsibility it is to hire staff and assure quality.

> The university should lead with the identification of field facilitators which means the university will look for good quality facilitators who can do the job well. (FGI-BLK)

> The practice of leaving the identification of field facilitators to students may lead to identifying individuals who might not be capable hence huge compromise on quality of field facilitation. (FGI-MJ)

The practice of giving students the power to identify the field facilitators also raised concerns among field facilitators and lecturers. The greatest concern for lecturers was a quality concern. The lecturers doubted if students were in the best position to choose good quality field facilitators who would really support them in the learning process.

> I think we should not compromise on quality. I wonder how we think students would be able to identify someone who has the quality that the university would take. As an institution we technically say we would want someone who has a minimum of master's degree to be a lecturer, now we are asking students to pick on a bachelor's degree and I don't understand how they have done it, how transparent it has been. (LP)

Although leaving the responsibility of identifying field facilitators in the hands of students could have been seen as democratic and empowering students in making decisions in matters affecting their learning, this practice did not necessarily reassure students or lecturers that the right people were being recruited, which meant less trust in the field facilitators and undermined their credibility. One lecturer pointed to a possible resolution to this tension through involving ODL staff with expertise in facilitation of distance learning.

> Let the heads of departments help the ODL Centre in identifying those people [field facilitators] just like they do with the adjuncts [part-time lecturers]. Because at the end of the day they are the custodians of the academic issues anyway . . . so they need to be sure that the students are being supported as we would want at the departmental level. (LM)

While the data indicated strong support in principle by the university for the field facilitation intervention, it was evident that too little time and money was invested in ensuring that the field facilitators were suitably selected, trained, and supported. Concerns about the recruitment and training of field facilitators suggested that the potential for field facilitation to address the shared outcome of increasing student retention and throughput was constrained, as this arrangement was ultimately disempowering (Rothengatter & Hil, 2013). Further, this tension raised by students, lecturers, and field facilitators, and commented on in the change laboratory conversations as being a significant obstacle to achieving the shared outcome, pointed to a poor understanding of students' learning needs.

Understanding Students' Learning Needs

In providing student support, universities should focus on what the student needs, not on what the universities want to or are able to supply. Universities are better able to identify real needs if they know their students (Hughes, 2004). In this study, there were gaps in the field facilitators' knowledge and understanding of the students' learning needs. These gaps further revealed a gap raised by lecturers and field facilitators, between what they believe students should be able to do, and what students need help doing. A key issue here was independence: participants indicated that the students were supposed to be able to work and learn independently, given the ODL context, yet were lacking in this regard. It was evident that members of this community (students, field facilitators, and lecturers) had varying and conflicting understandings of open and distance learning and teaching. One lecturer commented that "an ODL student should be fairly independent so when they feel that 'I am not making headway' [and] they have tried all they can to go through modules then they are free to contact the lecturers here [on campus]". (LC)

Several of the lecturers and field facilitators expressed frustration in the WhatsApp groups about what they perceived as students not doing what they were supposed to, meaning being too dependent or reliant on the field facilitators to re-teach the content of the lectures, rather than facilitating the process of working through the modules, assessment tasks, and so on (i.e., the tools). The Lilongwe field facilitator added that "the students selected are challenged in terms of content. Their overall grades could be okay but quality in science subjects on selection should be considered" (FF-LL).

Here, it is important to understand the wider environment of which this activity system is a part. The ODL students at Mzuzu University come from all over Malawi. According to the National Statistics Survey by the Malawi Government in 2018, Malawi's urban population was 15.3% of the total population. This means most of the Malawian population (84.7%) reside in rural areas. It is a challenge to access the Internet in rural areas of Malawi (Malawi National Statistics Office, 2018), and rural students are required to travel long distances to urban centres to access reliable Internet services. In this study, most students came from rural areas; 40 out of 50 respondents indicated that they came from rural areas, and most of these indicated inconsistent access to the online learning materials provided by the lecturers (Kalima, 2023). This makes the pedagogical choices in field facilitation, and solid understanding of students' contexts and learning needs, even more important to the successful achievement of the object, namely greater student success.

The time allocated to field facilitation was also an issue related to understanding students' learning needs. The field facilitators were paid for a maximum of 16 hours of work with students in the satellite learning centres per semester. The decision to allocate 16 hours to field facilitation activities was not underpinned by pedagogical considerations nor was it decided in deliberation with the lecturers regarding which curriculum aspects should be focused on within the allocated time. Considering the object of enhanced student learning and success, students needed sufficient time with the field facilitators and peers so that different forms of pedagogical tools could be used to meet the diverse student learning needs. This tension between the object and the time allocated to field facilitation (i.e., rules) impacted the pedagogical choices field facilitators made, which did not necessarily meet students' needs.

> I resorted to teaching because of lack of adequate time to do facilitation. (FF-BLK)
>
> Time was inadequate because we [field facilitators] meet students face-to-face. To make sure that students have enough time on content learning, we [field facilitators] should give homework or assignments to students in preparation for subsequent field facilitation sessions. (FF-LL)

There was some flexibility in how the field facilitators divided up the allocated hours, which, as Chibambo (2016) and Heydenrych and Prinsloo (2010) assert, is an important features of distance learning as an enabler of student learning. But these hours often had to be allocated according to the work schedules of the facilitator and the students, as both groups were working alongside studying and tutoring, respectively (Kalima, 2023). Several field facilitators worked more than their allocated and remunerated 16 hours, engaging with students one-on-one and in groups on WhatsApp during field facilitation sessions. Thus, the benefits of flexibility need to be considered alongside the extent to which the allocation of the 16 hours were sufficient to address the object (and ultimately the outcome) of the activity system and support the subjects of the activity system as they worked to contribute to the object effectively.

These findings raise questions about appropriate pedagogies for field facilitation in a resource-constrained distance learning context.

Pedagogical Choices

Student-centredness was often cited in the data as guiding the approach to teaching and learning in the field facilitation intervention, which was recognized by student participants.

> There [at satellite learning centre] it was so helpful. The field facilitators gave us a lot of activities unlike here [on campus], lecturers simply took us through the modules. They did not care whether we were following or not . . . but there, they involved us most of the time. . . . Sometimes we were given chance to identify areas where we had problems. We could give him a problem. He would then assist. (FGI-LL)

There was evidence that the focus in many field facilitation sessions was on identifying the students' learning needs and working on aspects of their studies that they had identified as problematic. Students indicated that they were invited to participate in this process.

> We . . . decided as a group where we needed support. (FGI-LL)

> On key field facilitation agenda [sic], students agree as a group on what to be covered depending on what was covered or done during module orientation on campus. Students prioritise what is not covered on campus. (FGI-MJ)

Jere (2012) argued that guided collaborative learning in academic activities can result in greater confidence and participation in class, building supportive social networks and reducing student isolation. Field facilitation offered these opportunities where lecturing appeared unable to do so. As one student focus group revealed

> We actually asked them [field facilitators] to pause, repeat statements with field facilitators . . . things that we cannot do here [on campus] with lecturers. It looked awkward to ask a lot of questions in class and even lecturers were not happy with it. It seemed as a time waster. (FGI-BLK)

It was evident that the pedagogy of the field facilitation was often collaborative and that the students were encouraged to actively engage with each other and the field facilitators to bridge or close their learning gaps.

The data also suggested that smaller size groups was a key affordance for engaged participation in field facilitation and was a key pedagogical choice for tutoring (McCaughan, 2013). Class sizes at the satellite learning centres was repeatedly noted as one of the factors that contributed to successful student learning; students noted that this enabled more student-to-student and student-to-field facilitator engagement.

> Since we were fewer than we were in the class here on campus . . . there [at satellite learning centres], we were able to interact with the field facilitators. (FGI-MZ)

> Because we were fewer the field facilitator assisted us individually and we were also free to ask questions. (FGI-LL)

The data suggested that small class sizes coupled with field facilitator creativity and resourcefulness generally contributed to a relaxed, engaging, and overall developmentally appropriate environment. This pointed to an alignment, in this activity system, between the aims of the subject (i.e., field facilitators) to attain the object (i.e., facilitating successful student learning) in order to ultimately achieve the shared outcome of greater retention and throughput.

Despite this positive picture of a student-centred pedagogy, concerns were raised in the data that pointed to a possible tension between facilitation and teaching in the learning centres. In some cases, as indicated in the previous section, time constraints and students' knowledge gaps meant that field facilitators felt pushed to resort to so-called transmission modes of pedagogy, thereby re-teaching or lecturing the content of the curriculum to the students. This was indicated by one of the field facilitators, who noted that they "use the very same lecture method as used by lecturers" (FGI-LL).

Field facilitation was characterised by some students as more of the same, in which content was taught in the satellite learning centres rather than supplementing the lectures attended during the on-campus teaching blocks.

> When we are here [on campus] sometimes we just cover little content and when we go there [satellite learning centres], we have at least chance to cover some other topics that we didn't cover here. While we go there, they [field facilitators] teach. (FGI-MJ)

It is important to note that the field facilitators themselves seemed unclear as to whether their role was remedial or to address gaps in students' knowledge. As pointed out earlier, the object of this activity system was not necessarily understood in the same way by all in the community. The field facilitators noted challenges in managing the wide differentiation in students' preparedness and the various learning needs within the diverse student body. There was a real tension in the division of labour between what field facilitation was expected to be (e.g., not lecturing) and what it tended to be, namely too much lecturing, complicated by limited time available to this activity.

The data further suggested limited communication or collaboration between the lecturers and the field facilitators, indicated by the lecturers.

> There was need for some sort of linkage or collaboration between the field facilitator and the lecturer. (LP)

> Field facilitator induction, periodic reports of what they are doing would be helpful so that the lecturer can follow up with them, at least some sort of system of supervising these people. Because otherwise they may not approach the content the way intended by the university. (LB)

This was an indication that lecturers themselves had expectations that the field facilitators needed to meet concerning enhancement of student learning, underscoring this tension. This lack of communication was especially problematic when the field facilitators were not fully informed of the progression rules and assessment processes (i.e., rules). This added another layer of complexity to the instrumentalist approach sometimes used to complete the course curriculum and prepare for assessments. In addition to better and more consistent communication, the WhatsApp change laboratory conversations with the lecturers and the field facilitators revealed a general consensus that field facilitators should be trained in their roles if they are to work with lecturers and students to successfully achieve the object of the activity system.

Such training and support for field facilitators could enable a greater range of pedagogical choices and confidence in making them, in response to students' learning needs, which is important considering the diversity in the student cohort and the self-directed, asynchronous nature of most of the students' learning activities. ODL has historically been seen as most suitable for students who cannot access on-campus education, meaning they spend most of their time managing their own learning at home (Santhi et al., 2014). Yet, these same students come to university from structured school learning environments, thus self-directing their learning is a novel way of studying. This presents challenges for field facilitators tasked with enabling their success and shapes their pedagogical choices.

> Students seem not to be ready for self-regulated learning. We do it page by page as most students are not able to identify what they can do on their own and what requires our [field facilitator] assistance. Students always say field facilitators need to teach everything because they did not understand during module orientation sessions on campus. (LL-FF)

This finding pointed to a need to consider, finally, the tools used to facilitate and enhance student learning.

The Tools Available for Field Facilitation and ODL

There was ample evidence in the data of innovative use of low bandwidth and low-tech tools such as WhatsApp; in addition, printed materials were the predominant form of instruction in the BEd programme. Besides printed modules, other forms of materials such as handouts, worksheets, and textbooks, usually in print format, were used. The handouts and textbooks were, however, not meant for self-study as they were not packaged or developed for ODL pedagogical purposes. This had an effect on how field facilitators, and by extension students, made use of these materials. This was noted in the WhatsApp group assigned to the field facilitator's online change laboratory workshop.

> There is a need to improve on how the modules are written. Make them simple or interactive for them to be self-explanatory. (FF-LL)

> The . . . curriculum tools are complicated. Not developed logically. Some topics which are meant for higher levels are being presented at lower levels. (FF-MJ)

The content of the ODL materials was quite similar to that of textbooks with few interactive exercises embedded within them. Furthermore, multimodal tools were minimally used for ODL students, though field facilitators noted that these would benefit their tutoring and students' learning. "Increasing meeting time and a variety of resources would be helpful such as using video-recorded resources, video conferencing etc!" (FF-MJ).

Several lecturers and field facilitators commented on the affordances that digital or multimodal tools could offer, enabling students to visualize abstract theoretical concepts in mathematics, chemistry, and physics. However, being a resource-constrained context similar to others in the Global South, Malawi has significant constraints around bandwidth and therefore upload and download speeds. Not all students were able to access videos and large image or infographic files; those with stable Internet access were advantaged over those without. Technology-enhanced, flexible curriculum provision can be accessed by anyone, anytime, from anywhere, but only if resources such as a conducive learning environment, electricity, Internet connectivity, appropriate devices, and digital literacy skills are available (Magunje & Chigona, 2021). The infrastructural challenges in Malawi, where electricity supply and Internet connectivity are erratic, meant that flexible and creative field facilitation (and lecturing) was challenging as they did not benefit from the affordances of online or digital technologies, other than opportunities such as offered by WhatsApp perhaps.

These findings speak to the need for a systemic response to bridging or closing the gaps between intended ODL provision, field facilitation support, and increased student retention and throughput, and what is happening in the BEd programme at Mzuzu University. In any resource-constrained environment, sustainable solutions need a collective, systemic response, so that change is felt throughout the system, and made with equity and accessibility in mind.

Conclusion

Provision of distance learning tuition in resource-constrained environments requires specific context-relevant educational initiatives. Yet, such initiatives will only reach their potential if they are carefully integrated into the university system. Initiatives implemented without sufficient institutionalization, communication, and resources may result in failure, at great cost to the university, as well as to students looking to the university to provide them with access to a higher education and qualification. The initiative explored in this study, field facilitation, was introduced in the BEd programme for pre-service science and mathematics teachers at Mzuzu University, designed to improve student learning and success, and ultimately retention and throughout rates. However, as this paper has demonstrated, being created as an add-on rather than embedded in the BEd curriculum led to gaps between the intentions of field facilitation as a learning enhancement initiative and what it has been able to realize thus far.

The findings of this study point to a need for lecturers to be involved in the recruitment, orientation, and ongoing training and support of field facilitators so they work as teams, rather than separately. This could continue to be done in consultation with students, so that their learning needs and their views are fully considered, but with clarification around the rules, the appropriate division of labour, and the object of the activity system. Further, for this strategy to have the desired impact on students' learning and success, the university needs to make a fuller investment in field facilitation. This means, in addition to improving recruitment and training, paying field facilitators fairly and increasing the number of hours they have available in a semester to support and tutor students, both virtually via WhatsApp groups and in person at satellite learning centres. As well, their contracts need to clearly set out their role and responsibilities, so that they know what they are meant to be doing as part of a collective effort to improve student learning outcomes. Finally, the findings point to a need for the university to consider the constraints of ODL provision more fully, and work with lecturers, students, and field facilitators, as well as ODL administrators, to create embedded, contextualised materials, teaching and tutoring approaches, and peer learning opportunities. Together these will help create a more cohesive approach to successful ODL provision.

While there are gaps between intentions and realization in most education systems, we argue that understanding and critiquing these in open and distance learning is especially important given the recent growth in student numbers in open universities and universities with ODL provision. Thus, universities that create ODL provision for students, and that have some form of on-site tutoring or field facilitation amidst resource constraints, need to think carefully about how to embed tutoring within the curriculum as a whole, and support tutors and students adequately in the field so as to ensure that goals of such initiatives can be fully realized.

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Book Review: *AI for Teachers: An Open Textbook—Artificial Intelligence for and by Teachers* (2nd edition)

Authors: Colin de la Higuera and Jotsna Iyer (Erasmus+, 2024, 250 pages, https://www.ai4t.eu/textbook/)
Reviewed by: Dendy Siti Kamilah, *Universitas Pendidikan Indonesia, Bandung, Indonesia*

AI for Teachers: An Open Textbook adopts an accessible approach, providing educators with foundational knowledge about artificial intelligence (AI) and its applications in education without delving into overly technical details, making it suitable for teachers seeking to integrate AI into their classrooms. The textbook positions itself at the crossroads of theoretical understanding and practical implementation, addressing AI's benefits and challenges in education. The authors, Colin de la Higuera and Jotsna Iyer, bring significant expertise to the topic. At the time of publishing, de la Higuera had been serving as Chief Equality Advocate at UNESCO's International Research Center on Artificial Intelligence (IRCAI) since 2020, while also holding the Academic Chair on Open Education and AI at the University of Nantes (https://ircai.org/project/ai-and-education). Likewise, Iyer had been actively involved with the Erasmus+ Artificial Intelligence for Teachers project (https://chaireunescorelia.univ-nantes.fr/2022/08/11/entretien-avec-jotsna-iyer/). Collaborating with eleven guest contributors, they have aimed to help teachers use AI "to work in the classroom, and not the inverse" (p. 8). The book acknowledges the contributions of an impressive array of international partnering organizations, including UNESCO, alongside numerous educational, governmental, and research institutions from France, Italy, Ireland, Slovenia, and Luxembourg.

The textbook is an open educational resource designed to be freely accessible to educators, allowing them to download and use the material in various formats. The available formats include digital PDF, print PDF, Pressbooks XML, and EPUB (https://www.ai4t.eu/textbook/). The digital PDF is interactive using the Internet, while the print PDF is offline-friendly but lacks interactivity. Pressbooks XML formats are ideal for platform integration, and EPUB is flexible for e-readers. This textbook is available in English, German, Slovenian, Italian, and French.

Chapter 1 opens with a series of questions setting the tone of the textbook firmly on helping teachers who have wondered how AI could be put to good use in their classroom. The textbook targets educators from K–12 to higher education interested in integrating AI into teaching practices. It is also relevant for policymakers, educational technologists, and teacher trainers in developing and implementing AI-driven educational tools and strategies. Even for those who have read the first edition, the numerous improvements in the second edition make it essential to explore this latest version. This edition expands from the original six to eight parts, adding new parts on generative AI and additional content. Part III: Managing Learning includes a more comprehensive discussion of personal identity, bias, and fairness in data. Part IV: Personalising Learning introduces a new sub-part discussing the flip side of adaptive learning systems. The textbook also features new illustrations and 15 new short videos to enhance understanding.

The book starts with foundational concepts of AI, and then moves into the implications within education, specific AI technologies for educators, reflections on AI's future in education, and additional resources. In each part, the authors discuss AI's pedagogical, ethical, and societal impacts, particularly how AI-driven systems can perpetuate biases, influence human agency, and shape educational practices. This comprehensive approach lends credibility to the text, making the recommendations realistic and actionable. The information is reflecting the educational impact of generative AI (e.g., ChatGPT) and using references to contemporary AI and education research.

I agree with the authors' view that AI is a powerful tool and appreciate that ethics and social impacts are discussed throughout the book. This may resonate with educators who feel overwhelmed by considering using new technologies. The authors present a balanced approach to using AI. For example, cheating is discussed in terms of addressing it when it happens and then an external link presents a range of teacher responses and issues of detecting AI related cheating. The authors briefly note ways teachers are designing assignments that could not be helped by using AI, referencing on page 201 an article by Arvind Narayanan as their source, but mistakenly forgetting to cite it. Perhaps the article they meant to cite is titled "Students are Acing Their Homework by Turning in Machine-Generated Essays. Good." It is published at Narayanan's website *AI Snake Oil* (https://www.aisnakeoil.com/p/students-are-acing-their-homework). This oversight notwithstanding, the extensive number of externally linked resources enriches the textbook.

The textbook offers valuable insights into how a Smart Learning Management System (SLMS) that is powered by AI can enhance e-learning by personalizing educational experiences for students, reduce administrative burdens for educators, and provide learning analytics. I was particularly struck by how useful this technology can be, especially in remedial teaching, an additional instruction to support students who are behind or struggling to meet learning standards. Based on my experience, one of the biggest challenges in remediation is efficiently analyzing diagnostic test results and designing personalized learning paths based on each student's needs. It also can be a viable solution for teachers who lack the time for classroom-based remediation. Using plain language, the textbook effectively introduces readers to the lexicon of computer science, skillfully explaining and differentiating key concepts such as machine learning (Chapter 9), deep neural networks (Chapter 29), and search engines (Chapters 7, 8, 10, and 11) to help readers better understand how AI works.

The book's primary shortcoming lies in the roughness of its copy editing, which detracts from the overall reading experience. Additionally, given the rapid pace of change in AI technology, the preface openly acknowledges the potential for any published information about AI to quickly become outdated. While these concerns do not overshadow the book's valuable insights, they highlight the challenges of writing about such a dynamic field. In light of this rapidly evolving landscape, the book avoids specific software recommendations due to the fast-paced evolution of AI tools. Overall, the textbook stands out for its practical guidance on integrating AI into education, particularly through its clear ethical guidelines that help teachers navigate the responsible use of AI. Incorporating interactive elements into the digital format, including embedded videos and clickable links to external resources, is a strong feature. The authors effectively combine diverse perspectives and practical examples, enhancing the book's arguments and making it accessible to educators without a technical background in AI. I highly recommend this book for any educator looking to embrace AI while maintaining ethical standards in the classroom.

Acknowledgement

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Book Review: *Methods for Facilitating Adult Learning: Strategies for Enhancing Instruction and Instructor Effectiveness*

Editors: Joellen E. Coryell, Lisa M. Baumgartner, and Jeremy W. Bohonos (Routledge, 2024, 404 pages) ISBNs: 978-1-642-67496-5 (hardcover), 978-1-642-67497-2 (paperback), 978-1-003-44601-9 (eBook),
https://www.doi.org/10.4324/9781003446019

Reviewed by: Permata Chitra Haelda Manik, *Universitas Pendidikan Indonesia*

Introduction

In a rapidly transforming educational landscape characterized by technological advancements and the shifting needs of adult learners, the book titled *Methods for Facilitating Adult Learning: Strategies for Enhancing Instruction and Instructor Effectiveness* stands out as an invaluable contribution. Edited by Joellen E. Coryell, Lisa M. Baumgartner, and Jeremy W. Bohonos, this book bridges foundational theories with contemporary trends, making it a vital resource for educators navigating face-to-face, hybrid, and open and distance learning (ODL) environments. It gives considered discussion on a wide range of topics affecting adult learning education. Some topics are well established in the canon of education research and practice. Some have a shorter but still rich history of research, such as arts-based learning, e-portfolios, MOOCs, and gamification. Some topics are in response to the ever-changing plethora of digital social media platforms over the past two decades, including their effect on critical thinking skills and the blurring of lines between fact and opinion.

The book addresses critical challenges in adult education, such as inclusivity, learner engagement, and technology integration. Its thoughtful blend of theoretical depth and practical insights offers a roadmap for creating effective and transformative learning experiences in diverse contexts. This is in line with what the editors say in the book's preface, which is that the purpose of this book is to provide practitioners/teachers with practical and relevant teaching methods for today's learners in a variety of contexts.

The writing is bright, and the approach is fresh, adeptly presenting these topics in this solid 404-page book. The editors pay homage to important books on adult learning that have been published since 2002 and then state that their book was designed "to have additional methodological breadth and depth, links to adult learning theory, and contemporary instructional approaches." Not all of the topics covered in this book will be mentioned in this review. Here are three of the 22-chapter topics that exemplify the breadth: bell hooks, critical reflection, and diversity; prior experiences informing adult learning; and the opportunity of educational settings to create community. The chapter authors ground their explorations of topics in relevant theories and distill their main ideas into practical guidelines without being prescriptive. Because of this approach, the book may appeal to both experienced and inexperienced instructors.

Overview of Content

The book is divided into five distinct parts, each tackling essential aspects of adult education. From theoretical foundations to emerging pedagogical trends, the book's structure reflects a deliberate effort to balance breadth with depth. "Part I: Fundamentals of Adult Teaching and Learning," sets a strong foundation by addressing the core principles of adult learning. The content is structured around a comprehensive exploration of the andragogical model, emphasizing the differences between adult and child learning. Strategies for creating a learner-centered environment are highlighted, focusing on fostering engagement and motivation. It stresses the importance of creating a supportive, respectful atmosphere where learners feel their experiences are valued. This approach is critical for adult education, as it empowers learners to take ownership of their learning journey. The book's discussion of an instructor's role emphasizes the need for flexibility, adaptability, and continuous self-reflection. It encourages instructors to develop skills such as active listening and empathy.

In "Part II: Collaborative Methods in Teaching and Learning," the focus shifts to practical strategies for implementing the theories discussed in Part I. This part provides actionable techniques for educators to improve their instructional methods. It highlights the importance of active learning techniques, such as collaborative learning, problem-solving, and case-based learning, which are particularly effective for adult learners who bring a wealth of life experience to the classroom. By incorporating these methods, educators can create dynamic, learner-centered environments that foster critical thinking and skill development.

This part also explores the role of technology in adult education, providing insights into how digital tools and online platforms can enhance learning experiences. This is particularly relevant in today's increasingly digital world, where adult learners often engage in blended or fully online learning environments. It does not discuss technology just in abstract terms but offers concrete examples of tools that can support adult learning, from learning management systems (LMS) to social media groups that facilitate peer learning and communication.

One of the standout features of "Part III: Methods for Facilitating Autonomous Learning" is its detailed exploration of transformative learning theory. This part provides a comprehensive analysis of how transformative learning can shift adult learners' perspectives and encourage critical thinking. It discusses how instructors can facilitate learning experiences that challenge learners' assumptions, broaden their understanding, and encourage self-reflection.

By focusing on hands-on, real-world learning, this part highlights how adult learners benefit from direct engagement with content that relates to their personal or professional lives. It outlines various experiential learning strategies, such as internships, simulations, role-playing, and service learning, that can deepen the learning process and increase motivation. Part III also explores the importance of fostering emotional intelligence in adult learners.

A significant strength of "Part IV: Community-Based Teaching and Learning Methods" is its exploration of how educational institutions and organizations can align their policies and structures with the needs of adult learners. It highlights the importance of designing flexible, accessible learning environments that consider the diverse responsibilities adult learners often juggle, such as work, family, learning, and other personal commitments. Suggestions include offering hybrid learning options, scheduling flexibility, and tailored support services. This part also explores how educational leaders can advocate for resources and create professional development opportunities to promote learner-centered approaches within their organizations.

The final part, "Technology-Enhanced Teaching and Learning Methods," covers innovative methods for leveraging digital tools for immersive learning experiences such as simulation-based and serious gaming adult learning experiences. For instance, the authors note, "The serious gaming approach using techno-devices melded into an educational learning event can be a very formative and memorable experience for the participating learners" (p. 355). This speaks to the book's practical, forward-thinking approach to integrating technology in adult education.

Conclusion

Methods for Facilitating Adult Learning: Strategies for Enhancing Instruction and Instructor Effectiveness is an invaluable resource that helps adult learning instructors to empower their learners to succeed. It provides a well-rounded approach, combining theoretical foundations with practical strategies, and addressing the evolving needs of adult learners in a rapidly changing world. The book's clear structure, insightful content, and focus on actionable techniques make it an essential read for anyone looking to enhance their practice and improve learning outcomes. This book bridges the gap between long-standing educational theories and the current challenges of digital-age learning, making it a valuable resource for educators looking to adapt to a world where technology plays an ever-increasing role in education.

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Book Review: *Learning in a Time of Abundance: The Community is the Curriculum*

Author: Dave Cormier (Johns Hopkins University Press, 2024, 179 pages) ISBN: 978-1-4214-4779-7 (hardcover); 978-1-4214-4780-3 (e-book)

Review by: Terry Anderson, *Professor Emeritus, Athabasca University, Canada*

In this easy-to-read text, Dave Cormier romps through a spectrum of ideas, behaviours, and customs that are changing as we transition from a world of information scarcity to one of information abundance. What makes the book shine and distinguishes it from more serious academic texts is Cormier's personality. His quirky insights come in sidelines and examples that make even a serious and sometimes grumpy book reviewer smile. For example, using a marketing campaign for an imaginary Internet-based cupcake company, he states that people under the age of 45 are most likely to buy cupcakes online—he then qualifies this assertion by noting that he has "no idea if this is true, but you probably don't know either" (p. 82).

Rather than beginning with the conventional idea that education creates or at least generates learning, Cormier argues that formal education has attempted to fundamentally define what learning is and how it is to be measured. This is true, even as most of us (teachers included) have many different ideas what learning is. Is it about attitudes, facts remembered, procedures memorised, tricks mastered, knowing what to avoid, the ability to get along or lead others, or more? For the last two centuries formal education has had a monopoly on learning and has built structured systems to assess and reward certain types of learning. But all of these systems were built during an era of information scarcity and one devoid of AI-derived answers. "That time has come" (p. 21). Cormier argues that education, as a social system, evolved in an era of information scarcity—and those days are long gone.

This is not an academic tome—at one point he decries as a form of backward thinking the necessity to show that all claims in the book are cited—as if citing previous work offers only a guarantee of unoriginality. This is just one example where Cormier picks at a contradiction in our fractured information context, but ironically his comment seems contradicted when he later talks about the need for developing trusted sources of information. But this is not a fatal error; his provocative examples serve to reinforce the notion that information abundance rarely delivers certainty and that living with a healthy level of uncertainty and doubt is perhaps the most important literacy for the 21st century.

The work covers viruses, intentional distortions, ghosting, the propensity we all see for disparaging and sarcastic comments, and a host of other concerns that arise when we put a printing press, with global distribution potential, in the hands of everyone. The world of abundance is not just a wealth of content to help us learn almost any conceivable topic but also an abundance of opinion, conspiracy theories, distortions, and untruths. Cormier shows with examples that we need new skills and theories to help us discern the relevant, make sense of the worthy, and disregard the senseless.

Cormier notes how, in many ways, social customs and practices have undergone massive change in networked times—we do not share a movie on the plane any more, we are too busy with our screens to receive the creative benefits of boredom, we text before calling, we know to never put down our friends but to lash out at strangers, that private (photos or comments) wittingly or unwittingly becoming public—and all of this before the looming intrusion from artificial intelligence. The single voice of truth we used to take comfort from in textbooks and CBC newscasts is now drowned, or at least struggling to stay afloat in a sea of misinformation, "fake news" satire, gossip, and diversion. Sure, we have to make room for other voices previously ignored, but do we elevate them to or even dare assess them on any agreed upon category of correctness? All of this without even talking about practical implications—such as the topical interest in banning smart phone usage in classrooms.

When I saw this book published, I reflected on my personal and professional acquaintances with Cormier. I know Cormier from MOOCs, from his blogs, from rare face-to-face visits at conferences, and from his social media posts. I also know Dave as an able university administrator, as an outspoken expert of a variety of emerging digital technologies, as an amateur carpenter, as a university teacher, and as a family man. All of his many digital traces attest to these skills and are marked with great off-the-cuff and reliably ironical humour. But when I saw the book was subtitled "The Community Is the Curriculum," I thought I would find the type of book that Tony Bates or even myself might have written on the latest adaption of technology to the curriculum for online courses. I was surprised by the content, and not unpleasantly.

Cormier does not shy away from culturally relevant and sensitive issues—commenting on pronouns, Syrian refugees, Truth and Reconciliation, climate change, and more. In short, this is a book about learning to both serve and survive in a context that is stuffed with information but starved of both certainty and wisdom. It provides a host of good advice, warnings, and some quirky personal revelations that will both inform, educate, and amuse most of us—teachers included.

The book focuses on the myriads of ways that the networked enabled information abundance alters our social, political, family, and professional lives—even of those who are not teachers. That is not to say that this book has nothing to say to teachers in formal education. Cormier argues that, too often, formal education has focused on content and has derived questions that have answers; though these answers may be convoluted and hard to determine, there are both correct and incorrect answers to these questions. Today, students and teachers are forced to struggle with messy problems—were vaccination and lockdowns justified? Is the two-state solution for the Middle East the best way forward? Should indigenous science be taught as comparable to traditional notions of science? Should we continue to burn natural gas and supposedly use the profits to transition to nuclear or renewables? For these questions there is neither information scarcity nor an undisputable correct answer, despite the legion of social media adherents aggressively arguing for their answers. Even "common sense" solutions often prove inadequate. Thus, the book outlines the need for three illusive but necessary 21st century literacies. The first is surprising: It is a requirement for humility. There is uncertainty hiding at some level in almost all of our decisions and elephant-sized uncertainty in many of the most important decisions we have to make. We will make mistakes and get it wrong—often. The second literacy is the need to cultivate sources of informed trust. No source, guru, or teaching is always correct for all time, but many sources have miniscule bits of worthy information to share. The final literacy is to always think about the values that we hold and share that are always at play in our thinking and discourse. We all come from upbringings and experiences that have taught us to look at the novel and new through the lens of our past experience. Thus, we are personally filtering information, and this is often a filter of values. We often conclude that this information must be true because it resonates with our personal beliefs or those of our parents, church, or best friends. But these are not sources of truth; they are merely biased conclusions, hopefully informed by experience. The need to be aware of these biases is to be literate.

Cormier concludes and summarises the book with seven recommended practices. The first highlights the need for constant fact-checking of the information that is sought or which seems to arise from context. He shows us the need to be especially leery when we feel a strong affective connection to something we read or view. Our feelings may be impairing our own powers of discernment, and that is time for deep fact-checking. The second practice ironically tends to refute his earlier discussion of the value(lessness) of formally citing reference in academia. This second recommended practice is to leave traces of our sources so that others can fact-check and perhaps dig even deeper into the information that we are sharing. The third practice strikes at the heart of formal schooling as evident by the use of tools such as Turnitin and the salient apprehension of many teachers as they realise how AI tools make a mockery of their learning assessment practices. This third practice is to cheat—to collaborate with friends and to use sophisticated tools to complete educational tasks. By doing so, we will not be cheating but will rather be learning more effectively. I will leave the final four practices to your curiosity, which will hopefully inspire an impulse to order the book. In the spirit of sharing of abundance, I also suggest you make a recommendation to your local library to purchase this book and, of course, to pass the book along to a friend or a Little Free Library when you are done with it.

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Distributing Knowledge Creation to Include Underrepresented Populations

Richard F. Heller[1,*] and Stephen R. Leeder[2]
*[1]University of Newcastle, Australia; [2]University of Sydney, Australia; *Corresponding author*

Abstract

This paper documents biases in the creation of knowledge through underrepresentation of diverse populations and population groups in the way research is conducted and published, and subsequently, in the way educational resources are developed and delivered. Research that incorporates the experience of distributed population groups will have greater local applicability, and knowledge published and disseminated in ways that make it available to distributed populations will increase likelihood that the research findings will be incorporated into policy and action across the population. The incorporation of knowledge gained from distributed population groups into the educational experience will enrich it and, like the knowledge, make it more relevant to the whole population. We explore the potential for distributing knowledge creation to contribute in these ways and what changes are required in the way that higher education is organised to maximise distributed knowledge creation, including collaborative co-creation of knowledge and a collaborative capacity-building programme to ensure its sustainability. We propose that the principles described for a distributed university, where education is disseminated largely online through regional hubs to correct local and global inequalities in access, would be suitable to support the development of structures for distributing knowledge creation. Appropriate governance structures should be developed, of which co-creation of knowledge would be an essential component.

Keywords: distributed knowledge creation, knowledge dissemination, co-creation of knowledge, collaboration, open educational resources

Background

While the *dissemination of knowledge* through distributed and online education is well established in today's academic scene, *distributed knowledge creation* is not. Despite this, research that incorporates the experience of distributed population groups will have greater local applicability. Also, knowledge published and disseminated in ways that make it available to distributed populations will increase the likelihood that research findings will be incorporated into policy and action across the population. The incorporation of knowledge gained from distributed population groups into the educational experience will enrich it and, like the knowledge, make it more relevant to the whole population.

The way that knowledge is created through research has evolved in three modes. Mode 1 knowledge creation is the traditional linear style with description or hypothesis-testing within controlled (often laboratory) contexts. Mode 2 knowledge is produced more broadly across disciplines and is set in the context of its application (Gibbons, 2013). Mode 3 knowledge production incorporates both modes 1 and 2, operates in the context of current problems, and is collaborative with both a local and global reach (Carayannis et al., 2016). Mode 3 knowledge creation mirrors the role that many universities have taken, with serious attention to the context and the social and practical applications of the research. We explore the idea of distributing knowledge creation, as a corollary to the dissemination of knowledge through education by distributed means.

Universities play the major role in knowledge creation for society through research, and also in the dissemination of knowledge through education. There is a rich history of distributing education through open and distance learning (ODL), which started before but has been heavily influenced by open universities (Chawinga & Zozie, 2016). Increasing access to education has been the key to the value of ODL, and there are a number of delivery models. Distinct from universities offering some of their courses online, and the open university model where most of the education is delivered online at a distance to individuals from large centralised campuses, a distributed university model has been described (Heller, 2022). This model comprises small, centralised administrative and support functions while education is delivered through local hubs which may be virtual or physical. Distributed learning ecosystems have also been described, which establish "a link between decentralised learning ecosystems (consisting of content repositories and educational resources) ... [which] ... serve as an integrated approach that enables learners to access and use learning content and share resources" (Otto & Keres, 2023, p. 13).

Three Issues Demonstrating the Need for Distributing Knowledge Creation

Research Underrepresents Diverse Populations

Research on many topics can be enriched by the perspectives that come with the distribution of talent and representation of voices. Current research studies frequently exclude women, certain geographical areas (especially those in the Global South), and marginalised groups. For example, the lack of female and racial representation in the conducting of clinical trials in medicine diminishes the application of the research findings (Tysinger & Hlávka, 2022). Research in psychology and human behaviour has been criticised for focusing on western, educated, industrialised, rich, and democratic (WEIRD) societies (Henrich et al., 2010). Oxford historian Peter Frankopan, in his wide-ranging *The Earth Transformed: An Untold History* (2023), wrote:

> Study of the past has been dominated by the attention paid to the "global north" ... with the history of other regions often relegated to secondary significance or ignored entirely. That same pattern applies to climate science and research into climate history, where there are vast regions, periods and peoples that receive little attention, investment, and investigation .... Much of history has been written by people living in cities, for people living in cities, and has focused on the lives of those who lived in cities. (pp. 77-78)

Hungarian social researcher Márton Demeter wrote:

> the accumulation of academic capital is radically uneven with very high concentrations in a few core countries .... the world of science can be separated for a few "winner" or core and many more "loser" or peripheral countries .... loser-country scientists were cited less frequently than winner-country scientists, even in cases where they had been published in the very same journal (Demeter, 2019, p. 121)

The philosophical concept of standpoint epistemology (or standpoint theory of knowledge) is relevant and nicely boiled down by Georgetown University philosopher Olúfẹ́mi O. Táíwò (2021) as: (a) knowledge is socially situated; (b) marginalized people have some positional advantages in gaining some forms of knowledge; and, (c) research programs ought to reflect these facts. Amy Allen (2017), a liberal arts research professor of philosophy and women's, gender, and sexuality studies at The Pennsylvania State University, stated: "Feminist standpoint theory has expanded beyond gender to encompass categories such as race and social class. Recent scholarship calls for studying standpoints of Third World groups in Western societies and marginalized groups in international contexts" (Abstract section, para 1).

Underrepresentation of Indigenous Peoples in research is now widely recognised. An example comes from Arctic Peoples:

> Indigenous Peoples' knowledge systems hold methodologies and assessment processes that provide pathways for knowing and understanding the Arctic, which address all aspects of life, including the spiritual, cultural, and ecological, all in interlinked and supporting ways. For too long, Indigenous Peoples of the Arctic and their knowledges have not been equitably included in many research activities. (Yua et al., 2022, Abstract section, para 1)

The authors proposed a framework for co-production of knowledge—a matter to which we return later in this paper.

During the seminar *Decolonizing Knowledge Production. Perspectives From the Global South* (Maria Sibylla Merian Center for Advanced Latin American Studies in the Humanities and Social Sciences, 2020), representatives of the five Maria Sibylla Merian Centers (India, Mexico, Brazil, Ghana, and Tunisia) discussed the distribution of knowledge production.

> The production of knowledge in the global academic field is still highly unevenly distributed. Western knowledge, which originated in Western Europe and was deepened in the transatlantic exchange with North America, is still considered an often unquestioned reference in many academic disciplines. Thus, this specific, regional form of knowledge production has become universalized. (para 1)

In a supplementary issue of the *Journal of the British Academy*, titled "Repositioning of Africa in Knowledge Production: Shaking off Historical Stigmas," Crawford et al. (2021) summarised:

> Contemporary debates on decolonising knowledge production, inclusive of research on Africa, are crucial and challenge researchers to reflect on the legacies of colonial power relations that continue to permeate the production of knowledge about the continent, its peoples, and societies. (Abstract section, para 1)

A prestigious medical journal, following this theme in *The Lancet*, said:

> Institutions for knowledge production and dissemination, including academic journals, were central to supporting colonialism and its contemporary legacies .... Around the turn of the 20th century, *The Lancet* helped legitimise the field of tropical medicine, which was designed to facilitate exploitation of colonised places and people by colonisers .... *The Lancet* must recognise and engage more with different methodologies of knowledge production, beyond the ways of knowing and the types of knowledge that it currently publishes .... *The Lancet* must divest from the power of its centrality that makes it perpetuate various forms of colonialism. (Khan et al., 2024, pp. 1304-1307)

Abimbola and colleagues (2024), from the universities of Sydney and Utrecht, identified unfair knowledge practices, enacted by those in the centre on behalf of those in the periphery which have affected the ability to achieve global health equity between and within countries.

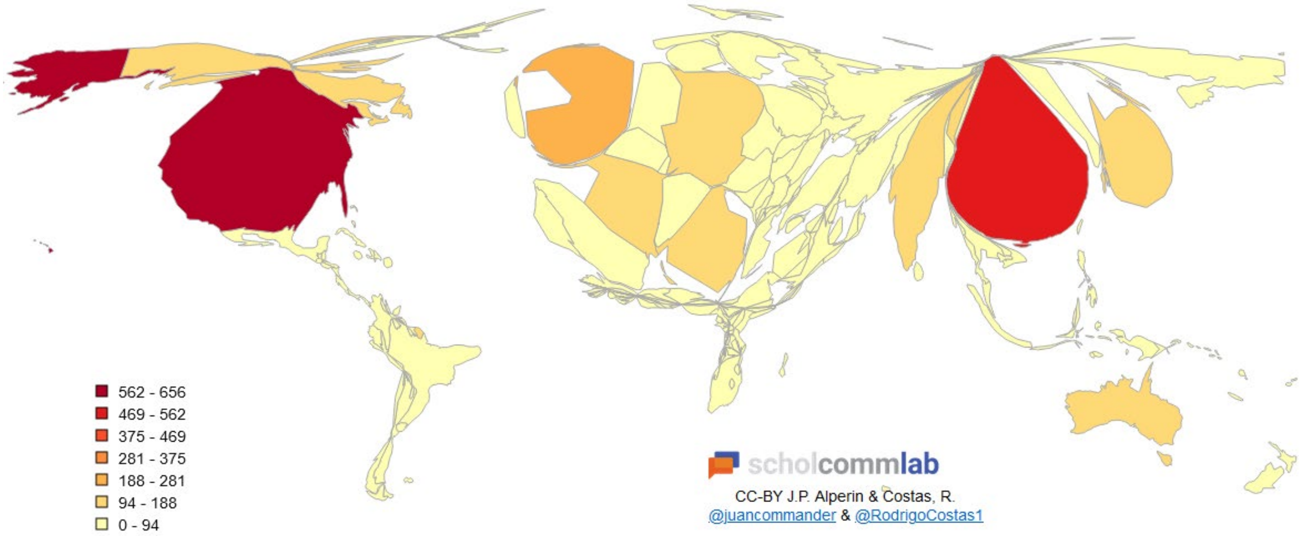
Research Publications are Biased Towards the Global North

This bias is due both to lack of research capacity and biases in the publication system. Even when research is undertaken with or on these populations, it may not be accessible to those who might apply the results. The relative lack of scientific publications by authors in the Global South has been widely discussed. Political scientists Medie and Kang (2018) reported that fewer than 3% of articles in four gender and politics journals published in the Global North were written by authors from the Global South. Boyes (2018) had an interesting overview of this issue from a knowledge management perspective, while a geographical perspective on sub-Saharan Africa found that digital content was more evenly geographically distributed than academic articles (Ojanperä et al., 2017).

Three world maps scale the apparent size of each country according to the authorship of documents cited on the Web of Science platform (Alperin & Costas, n.d.). When the raw numbers are examined by country, there are gross global differences (Figure 1). These differences are attenuated when the numbers are adjusted for the population size of each country (Figure 2). However, it is not until the figures are adjusted for GDP (Figure 3) that African countries at last become visible on the map.

Figure 1

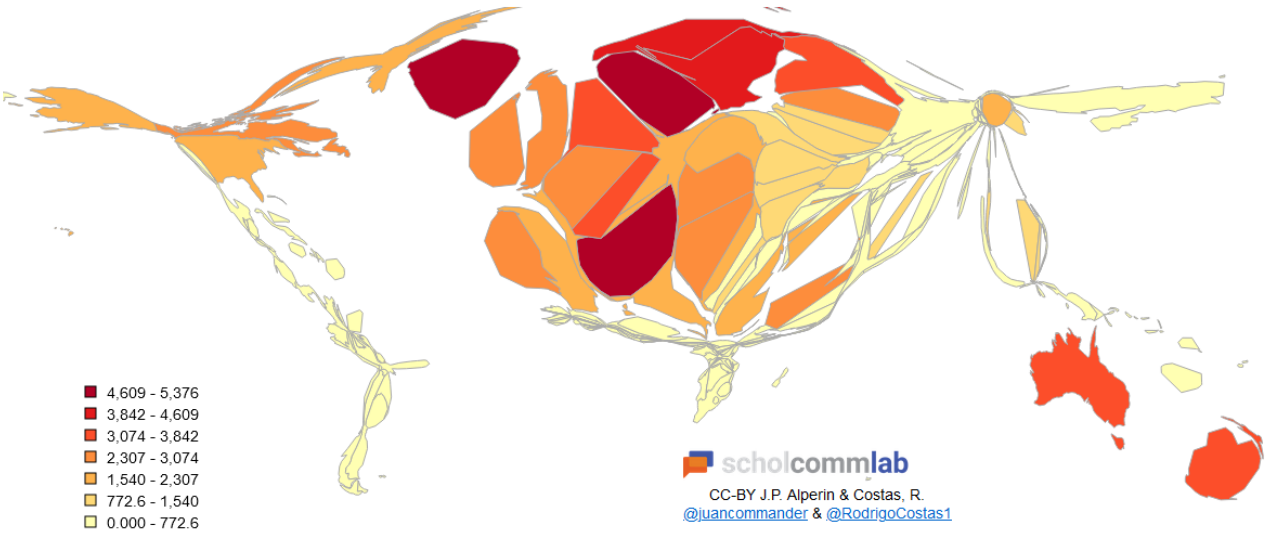
World Scaled by Number of Documents Cited in the Web of Science in 2017



Note. From World Scaled by Number of Documents Published in 2017 With Authors From Each Country (Publications Counted Once per Country), by J. P. Alperin and R. Costas, n.d., ScholCommLab (https://scholcommlab.ca/cartogram/). CC BY.

Figure 2

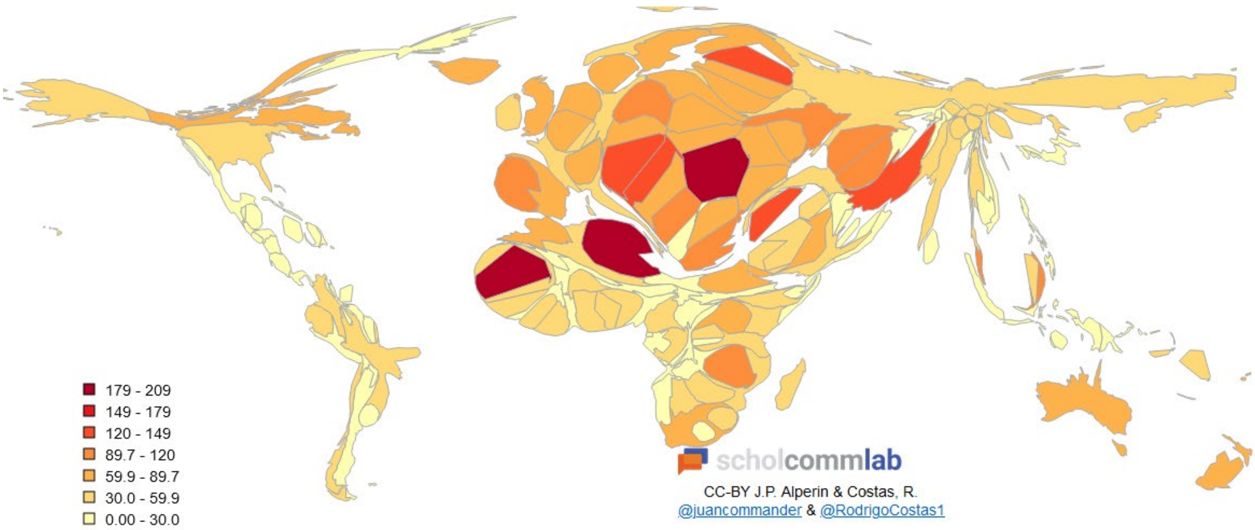
World Scaled by Number of Documents Cited in the Web of Science in 2017 as a Proportion of the Population



Note. From World Scaled by Number of Documents Published in 2017 With Authors From Each Country as a Proportion of the Population in 2017, by J. P. Alperin & R. Costas, n.d., ScholCommLab (https://scholcommlab.ca/cartogram/). CC BY.

Figure 3

World Scaled by Number of Documents Cited in the Web of Science in 2017 as a Proportion of Gross Domestic Product



Note. From *World Scaled by Number of Documents Published in 2017 With Authors From Each Country as a Proportion of the GDP in 2017*, by J. P. Alperin & R. Costas, n.d., ScholCommLab (https://scholcommlab.ca/cartogram/). CC BY.

The patterns may underestimate the geographical disparities as the Web of Science has been criticised for being "structurally biased against research produced in non-Western countries, non-English language research, and research from the arts, humanities, and social sciences" (Tennant, 2020, Abstract section, para 1). Our research on health journals published in 13 African countries found that most journals were not indexed (Agyei et al., 2023). Other valuable research may not appear in journals biased against non-Global North sources. Article processing charges levied on the authors or their institutions are further barriers to publication.

A Global Knowledge Index, developed to guide development programmes, includes areas such as education, ICT, research, development, and economy, and individual country indices (https://www.knowledge4all.com/gki).

Educational Resources Are Biased in the Same Way

If population groups and geographical regions are relatively underrepresented in the research literature, educational examples from these populations are unlikely to find their way into the curriculum. This may be compounded by similar underrepresentation among the academic staff of educational institutions. Postian (2023), an Armenian American writer and a current student at Villanova University in the USA, reviewed the literature and confirmed demographic disparity of authors. She reviewed the courses at Villanova University and found that of the authors represented in undergraduate introductory courses, 70% were men, 90% worked in or originated from the Global North, and 7% were Black academic authors.

Ghai and colleagues (2023), who represent an ethnically diverse group of students and faculty in the Department of Psychology in the University of Cambridge, UK, audited recommended reading materials in the undergraduate curriculum for the psychological and behavioural sciences bachelor's degree in their institution. They wrote:

> All first authors of primary research papers were affiliated with a university in a high-income country—60% were from the United States, with 20% from the United Kingdom, 17% from Europe, and 3% from Oceania. No author was affiliated with an institution based in Africa, Asia, or Latin America .... most of the research studies taught to undergraduates were also based on groups that were predominantly (67%) from the global north. Only 12% of articles included research participants from both the global north and the global south; no study in our reading lists focused on a group solely from the global south. Our syllabus lacked diversity even within the studies: less than 20% of articles reported diversity markers such as income or race, and only 3% mentioned participants' urban or rural location. (Western bias section, paras 1-2)

Others have reported similar findings. Tamimi et al. (2023) from the Department of Global Health and Social Medicine at King's College London identified a curriculum biased towards white, male scholars and research from the Global North and set this in the context of an exploration of decolonising their curriculum.

Schucan Bird and Pitman (2019) examined reading lists in an undergraduate science module on genetics methodology and a postgraduate social science module on research methods at University College London. The lists were dominated by white, male, and Eurocentric authors, although on the social science reading list, equal proportions of the authors were male and female, and almost a third of authors on the science list identified as Asian. They discussed implications for the growing interest in decolonising curricula across disciplines and institutions. Interest in this area comes from a wide range of disciplines, including the biomedical sciences (Burton & McKinnon, 2013).

Within Africa, attention is being paid to decolonising education. Ifejola Adebisi (2021), a law academic at Bristol University, has provided a thoughtful review:

> Essentially, people in Africa have inadequate knowledge of Africa because the inherited colonial systems were not designed to enable them to acquire such knowledge. And people who are outside Africa, who determine what amounts to good knowledge, know even less. Decolonial thought requires us to build global structures that allow all knowledges to equally complete our understanding of the world. (Main Conclusions from the Article section, para 3)

This is echoed in the paper "Gender, Knowledge Production, and Transformative Policy in Africa" where N'Dri Thérèse Assié-Lumumba (2020), a professor and director of the Institute for African Development at Cornell University, argued that:

> Contemporary formal African education has been deficient since its inception as it was designed to negate, suppress, and eliminate African culture, promoting inadvertent and deliberate "epistemicide" .... In its philosophy, this received system was also gendered and unequal, with limited access and a less valued curriculum designed for the female population. (Abstract section, para 1)

Zimbabweans Thondhlana and Garwe (2021), in their introduction to the supplementary issue of the *Journal of the British Academy* titled "Repositioning of Africa in Knowledge Production: Shaking off Historical Stigmas," concluded that the high quality of the articles "showcases our conviction that Africa can indeed shake off historical stigmas and reposition itself as a giant in knowledge production" (Abstract section, para 1).

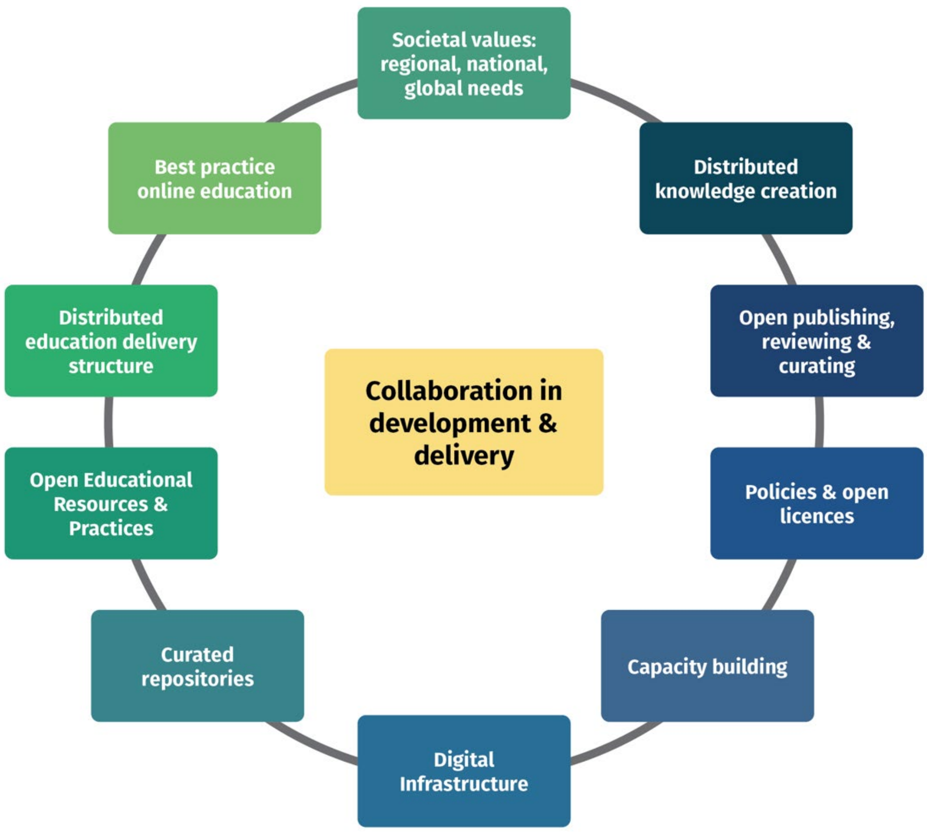
Theoretical Framework

There are many constructs in common between distributing knowledge creation and distributing education, in the broad context of knowledge for equity. The diagram in Figure 4 illustrates a theoretical framework for distributing knowledge for equity into which fits distributed knowledge creation as well as distributed education. This could be considered within the theoretical concept of knowledge equity "a social science concept referring to social change concerning expanding what is valued as knowledge and how communities may have been excluded from this discourse through imbalanced structures of power and privilege" (Knowledge Equity, n.d.). Knowledge equity has been described as one of the foundations of knowledge management (Baskerville & Dulipovici, 2006). Epistemic injustice, as articulated by Bhaumik (2024) is the counterpoint to knowledge equity, and also relevant to our exploration of how the distribution of the creation of knowledge can reduce inequity.

Connectivism is a learning theory for the digital age which "provides insight into learning skills and tasks needed for learners to flourish in a digital era" (Siemens, 2005, Conclusion section, para 2). We have previously described examples of global open online educational programmes as extensions of connectivism (Madhok et al., 2018), and a further extension to include distributed knowledge creation, with its dependence on open digital technologies, would seem appropriate.

Figure 4

Framework for Distributing Knowledge for Equity

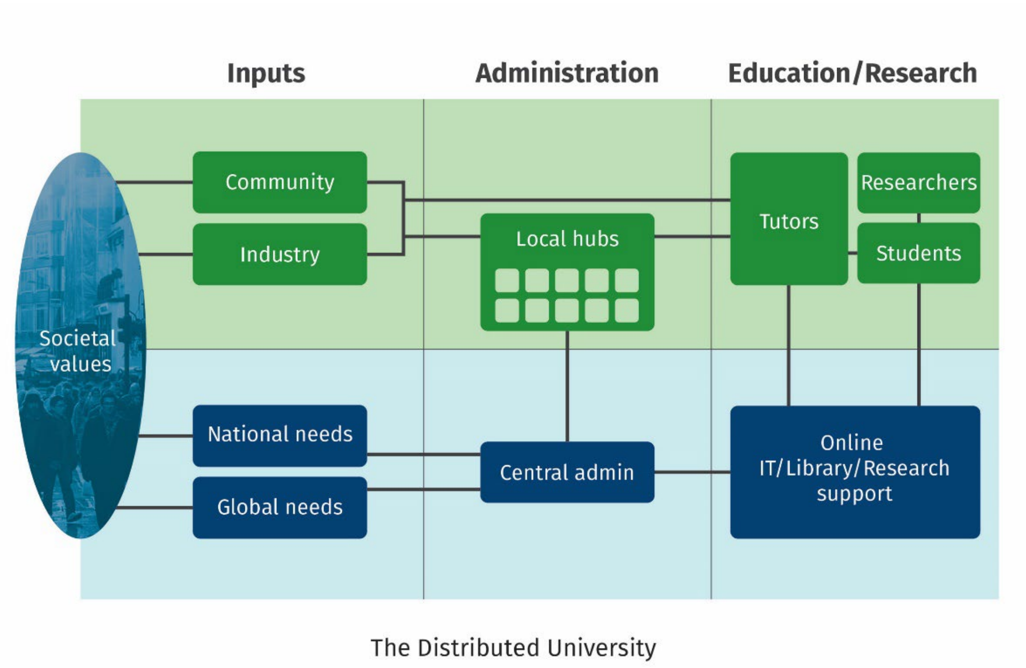


How Will Distributing Knowledge Creation Work?

Figure 5 shows the structure of a proposed distributed university which would provide education largely online "where it is needed, reducing local and global inequalities in access, and emphasising local relevance" (Heller, 2022, About this book section, para 1). It could also be relevant to distributing knowledge creation, as well as knowledge dissemination.

Figure 5

The Structure of a Distributed University



Note. From *The Distributed University for Sustainable Higher Education* (p. 56), by R.F. Heller, 2022, Springer Nature (https://doi.org/10.1007/978-981-16-6506-6). CC BY 4.0.

Following the notion of a focus on online education with infrastructure being distributed away from central inner-city campuses towards regional hubs, a similar structure would encourage knowledge creation among the populations to which the education is distributed. The distributed model would encourage co-creation of knowledge—through collaboration with local communities, industries, minority groups, and geographic regions (local, regional, and international).

Researchers and advocates have identified a number of features that would enable the creation of knowledge through distributed means. Some of these are in common with other proposals, which may involve large-scale system change. For example, Laura Czerniewicz (2015), an educational policy innovator from Cape Town, has focused on the north/south publication inequity. She suggested improvements in funding and technology infrastructure, a broadening of concepts of "science," changing the reward system for publications, and a broadening of the open access movement to participate in knowledge creation. George Richards (2022), from an independent global organisation advancing science, writing for the World Economic Forum, also recommended structural changes, "including access to grants, boosting capital flows, and improving research collaboration" (Summary section, para 3). Dev Nathan (2024), a social scientist from Johannesburg, in a wide-ranging review of knowledge and global inequality, advocated for a new political economy, but suggested some small steps to begin, including attention to intellectual property licencing.

Co-Creation of Knowledge

In a policy paper for the OECD, knowledge co-creation was defined as “the process of the joint production of innovation between industry, research and possibly other stakeholders, notably civil society” (Kreiling & Paunov, 2021, p. 6). The paper identified four factors that are essential for successful co-creation: engagement with stakeholders; effective governance and operational management structures; agreement on ownership and intellectual property; and adjustment for changing environments. Although the report focuses on science, technology, and industry, these concepts are applicable to education. Melanie Zurba (2021) from Dalhousie University makes the point with her colleagues that contextual diversity needs to feature with the context of Indigenous knowledge co-creation—a field where there is much activity (Maclean et al., 2022; Yua et al., 2022). Carina Wyborn, an interdisciplinary social scientist at the Australian National University, and international colleagues from the sustainability sciences, insisted co-creation processes should lead to societal outcomes (2019).

There is a substantial literature about students learning together and co-creating knowledge (Bovill, 2020), and a whole journal is devoted to “students as partners in learning and teaching in higher education” (*International Journal for Students as Partners*, https://mulpress.mcmaster.ca/ijsap/about). Lay involvement in co-production of knowledge also has potential, including citizen science projects (Curtis, 2018; Palumbo et al., 2021).

Publication

We assert that, in the pursuit of greater equity, knowledge creation should be distributed among populations and groups currently underrepresented. However, that does not lead automatically to greater publication of that knowledge. A desirable goal would be that publication of the knowledge produced should be accessible both to the scientific community and potential users. The lines shown in Figure 5 do not have arrows: the flow of knowledge should be two-way, with feedback coming from the community and industry to the knowledge creators, and vice versa. The role of open publishing of research, including preprints and open reviews, has potential to make a contribution (Corker et al., 2024; Ruredzo et al., 2024; Smith et al., 2017). As for research, open access to educational materials is relevant. Open educational resources (OER) and practices are offered by many providers. Proposals have been made for a distributed learning ecosystem for OER (Otto & Kerres, 2023) and for free public access to a broader range of educational materials (Heller, 2023).

Incorporation Into Educational Programmes

There is much activity among universities in decolonising their curricula (Shahjahan et al., 2021). We propose that distributing knowledge creation is a necessary step in this process. However, as for publication, structures will be needed that encourage the incorporation of knowledge generation into these programmes. Open access to educational resource repositories will be important, as will other drivers, as discussed by US educationalists Shahjahan and colleagues, that may flow from increasing the diversity of academic staff. Community open online courses have been developed that demonstrate the benefits of widening the range of who is involved in producing educational programmes (Shukie, 2019).

Governance and Operational Management Structures

As was shown in Figure 5, the distributed university model envisages direct collaboration between both industry and community with teachers and researchers who are mainly based in regional hubs—which can be physical or virtual. As with education, research activities can be performed collaboratively online but others require physical co-location. Wet lab research will need to be carried out in physical hubs, and these may be co-located with industry partners. A taxonomy of the type of research best suited to a distributed mode would clarify a range of possibilities.

Managing the organisation of research among distributed teams can be tackled in several ways. The transdisciplinary scientist from Catalonia, Hidalgo (2019), has described the importance of teamwork and the benefits of agile project management. Management through distributed leadership has been proposed as an alternative to bureaucracy by Lumby (2019), an educationalist from Southampton University. Many distributed research networks are well established, for example, multicentre clinical trials (Marsolo et al., 2020), supported with innovative software (Davies et al., 2016). Many of the same imperatives would apply to distributed education.

Building Capacity

There is a need to build capacity among academics and collaborative partners for distributing knowledge creation. This could be in tandem with increasing capacity for distributing knowledge dissemination, as some of the structures and participants may be the same. One approach might be the collaborative development of a course which, in the process, could help refine the necessary structures and lead to a cadre of advocates. The online course Distributing learning and knowledge creation (Peoples-Praxis, n.d.) is such an example.

Conclusions

We have focused on the underrepresentation of diverse populations and population groups in research studies, research publications, and educational programmes. We propose that the principles described for a distributed university, where education is disseminated largely online through regional hubs to correct local and global inequalities in access, would be suitable to support the development of structures for distributing knowledge creation. Appropriate governance structures should be developed, of which co-creation of knowledge would be an essential component.

This approach should be seen in the context of an overall framework for the equitable distribution of knowledge, of which open education and publishing, as well as distributed knowledge creation, are key components.

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Contextualizing E-Learning Experiences With Indigenous Communities: A Practical, Research-Based Approach

Joseph Levitan[1], Jessica Perez[1], Andrea Velasquez[2], Sulem Bello[3], Juan Loayza[4], Rosa Espinoza[4], Daniel Zuñiga[5], Gerson Cadena[5], Juan Huertas[5], Cesar Cáceres[5], Carlos Torres[5], and Kayla M. Johnson[6]
[1]McGill University; [2]University of Glasgow; [3]Teacher, Cusco, Peru; [4]Quechua Speaking Elder, Cusco, Peru; [5]Collaboraccion, Lima, Peru; [6]University of Kentucky

Abstract

During the COVID-19 pandemic, more than 300,000 students in Peru dropped out of the school system. Most of the students were rural Indigenous students. A lack of infrastructure and connectivity, as well as a lack of contextualized and appropriate educational resources, made it virtually impossible for rural students to engage in formal learning. The pandemic has made clear the need and viability for distributed e-learning in rural communities. However, creating e-learning content that is contextualized to support vulnerable students' learning has been a challenge. Little to no research has discussed how to contextualize e-learning to address both its promises and challenges. In this research note, we discuss an initiative to bring together advances in contextualized learning and e-learning to address problems with access to quality materials and curriculum in rural Peruvian schools. We highlight how interdisciplinary collaborations can support innovations and improve educational access for low-income students from remote regions through distributed learning. While research have found significant promise in contextualized education, the processes of engaging in contextualized digital learning and in low-income communities have proven difficult to implement. We discuss the concepts, research base, processes, and technology required to address these needs, as well as the curricular and pedagogical approach we take in this initiative.

Keywords: digital learning, contextualized learning, e-learning, Indigenous education

Introduction

While distributed e-learning offers many benefits for increasing access to quality education, one of the challenges of this approach is that those who are developing the technology and content are often from cultural backgrounds different from the students engaging with it. This means that the content created for digital learning platforms usually carries cultural assumptions and material very different from the realities and cultures of students from marginalized backgrounds—especially those from Indigenous communities (Castagno & Brayboy, 2008; Levitan, 2018). Educational material based on different realities and/or different epistemologies from those of the students negatively affects their learning, identity development, and well-being (Castagno & Brayboy, 2008; García, 2003, 2005; Ladson-Billings, 1995; Levitan, 2018; Sumida Huaman, 2013). Therefore, content in distributed e-learning that does not respond to students' contexts is problematic. At minimum, it will be limited in its effectiveness.

Educators within the communities themselves are often the best prepared to create contextualized knowledge (Levitan & Johnson, 2020; Sumida Huaman, 2020). Nevertheless, there are limited financial resources, structural supports, and designated times to develop digital content in rural areas. Working to increase access to quality education for students from historically marginalized communities, therefore, requires developing processes between sectors to create spaces so that those from the community can collaboratively develop contextualized e-learning.

In response to this challenge, the authors developed a process to create contextualized, culturally grounded e-learning that includes a variety of participants, such as teachers, students, community members/Elders, digital content developers, and educational specialists. We have implemented this approach with three large rural school districts in Peru—two districts that are home to a majority of Quechua-speaking community members, and one district on the northern coast that has a majority Mestizo population, though a significant minority of students and teachers have a strong pre-Hispanic heritage. In this context, there are also non-Indigenous traditions that are a core component of the culture from various immigrant communities. Because of the diversity of identities within these projects, we define contextualized e-learning as a collaborative process-based approach that weaves together technological solutions and culturally grounded curriculum development (Johnson & Levitan, 2021; Levitan & Johnson, 2020) to support schools with limited resources to co-create contextualized digital learning content.

In this paper we define contextualized education as learning that begins with students' identities, cultures, environment, and realities as the foundation to build knowledge (Tamur et al., 2020). Through content and activities tailored to students' environments and learning goals, students can build competencies and acquire knowledge in most subject areas faster and deeper than with other educational approaches (Haerazi et al., 2019; Suryawati et al., 2010). Contextualized learning also supports the development of students' healthy sense of self and identity, as well as their well-being (Berns & Erickson, 2001). Contextualized e-learning, like its namesake, shares the same orientation but is focused on digital resources that can be distributed. However, there is very little research on how to go about contextualizing e-learning. This paper describes the theoretical basis, process-based knowledge, practical considerations, policy background, and the technological requirements to engage in this promising approach.

Context and Background

Peru remains in the lowest quintile of the OECD PISA education test rankings (2023). Findings from the most recent iteration of PISA have demonstrated that COVID-19 widened the learning gap between students from middle- to high-income families and those from middle- to low-income families (OECD, 2023). One of the reasons for this gap is that students from rural communities had less access to the Internet, educational content, and teachers during COVID-19 lockdowns, so they were essentially left on their own (Johnson & Levitan, 2021). According to Meza (2023), with the outbreak of the COVID-19 pandemic, the enormous digital gap in Peru became even more evident. When virtual education was implemented due to the mass closure of schools to prevent the spread of the virus, only 5.9% of households in rural areas had Internet access by the end of the first quarter of 2020. Because of this and other factors, roughly 300,000 students dropped out of the education system in 2020 (Meza, 2023). While a portion of the students have returned to schools since the end of the stay-at-home measures, only about 1/3 of the students have reenrolled (Rodriguez Paredes et al., 2023).[i] As rural communities in Peru (especially in the Andes and Amazon) have majority Indigenous community populations, this issue disproportionately affected Indigenous students (Johnson & Levitan, 2021; Johnson & Levitan, 2022).[ii]

As part of the transition to virtual learning, the Ministry of Education (MINEDU) developed the Aprendo en Casa e-learning program to provide distance education services during the pandemic (2021). Though an innovative and thoughtful response to an unprecedented emergency situation, it did not yield satisfactory results. On the pedagogical side, there were issues because the content developers were necessarily based in Lima, due to a national travel ban. Lima is the capital and a large international city where MINEDU is based. Because of these travel restrictions, only small crews of workers were able to gather to create materials. So, the content developers were overwhelmingly from upper-middle class urban areas, and the content they created, though well designed, was implicitly created for students in urban realities with cultural assumptions from those areas, even when content creators were trying to create intercultural and bilingual materials (Zavala, 2014). In many ways, there was never a real possibility for ministry content creators in Lima to be able to respond to the wide diversity of contexts, cultures, and languages in Peru during the COVID-19 lockdowns, since there were already so many systemic educational issues that the pandemic exacerbated. Nonetheless, the result was that content did not reflect the realities of students in rural areas, nor did it recognize their cultural knowledge(s) (Johnson & Levitan, 2021). Because there were limited options, this content was sent to students throughout the country, even though two thirds of the population live outside of Lima and over 60% live in rural areas.

On the technical side, approximately 72% of students reported Internet service failures that prevented access to their classes in 2020 (MINEDU, 2021). Many rural students had to walk up mountains to access cell-phone service to receive materials via WhatsApp on their phones (Johnson & Levitan, 2021). Because they could not travel to schools, teachers would send learning materials as PDF documents that were difficult to read on a cell phone. The worksheets teachers sent were difficult if not impossible to fill out (Johnson & Levitan, 2021). This meant that rural students, even when accessing education and staying enrolled in school, had limited opportunities to engage in meaningful e-learning, unlike their more urban peers.

In response to the technical challenges, in 2021, the Ministry of Transportation and Communications approved the Todos Conectados plan, which invested heavily in digital and distance education infrastructures. The program installed satellite Internet in isolated Amazon areas and provided free WiFi in rural Andean areas. The ministry also provided tablets to all students enrolled in schools, as well as laptop computers for all teachers. This was a major infrastructure upgrade, and the intention and investment were well received, though the implementation had major challenges. For example, the delivery of the tablets did not happen concurrently with the Aprendo en Casa program, so the national government spent millions of dollars on developing digital learning infrastructure that failed to arrive in rural communities until classes were moved back to in-person. Furthermore, these solutions were only a partial response to the deeper pedagogical challenges—for example content that was not aligned with students' realities.

At the same time, the investment in digital and distance learning infrastructure also created an opportunity to improve access to novel, culturally grounded learning materials and learning technologies for post-pandemic schooling. The Ministry of Education has publicly supported and has had policy for diversifying and contextualizing materials to be responsive to the cultures and identities of students in every region since 2021, which was achieved after significant scholarship and advocacy from Indigenous community members and allies (MINEDU, 2021). Yet, work to improve education in rural Peru still requires educational authorities to address the major *contextual knowledge content gap*—which we refer to as the gap between the knowledge of content creators from outside of the community and community knowledge that would better support students' learning—for students in rural and Indigenous communities, in particular. This challenge has not yet been tackled, but with the policy window and support from the ministry, collaborative approaches between people from different sectors, school systems can begin to close this gap (Espinal-Meza, 2024).

One of the most promising responses to the enabling constraints of the current educational situation in Peru is contextualized e-learning. Research studies demonstrate contextualized education supports faster and deeper learning and promotes the development of students' identities and well-being (Berns & Erickson, 2001; Haerazi et al., 2019; Levitan & Johnson, 2020; Suryawati et al., 2010; Tamur et al., 2020). Contextualized education draws on students' identities, cultures, values, environment, and realities as the foundation to build knowledge. Through educational experiences tailored to students' realities, students can develop transferable competencies in communication, science, math, and other literacies (O'Sullivan, 2006). Contextualization allows for the appreciation of identities, ancestral cultural knowledge, and communities' traditions, contributing to strengthening students' personal identities and well-being. Teachers who engage in contextualized education find it to be aligned with best learning practices that supports a positive dynamic in the classroom (Castagno & Brayboy, 2008; Hynsjö & Damon, 2016; Ladson-Billings, 1995; Sumida Huaman, 2020). However, limited research has been conducted regarding how to do contextualized education via e-learning.

Creating contextualized e-learning requires collaboration between curriculum specialists, local teachers, students, parents, Elders/community leaders, and digital education specialists (Levitan & Johnson, 2020) and also, ideally, students (Brasof & Levitan, 2022). Nevertheless, these communities do not often interact, so intercultural facilitators and cultural knowledge brokers are also needed (Levitan, 2018). In this project, we have brought together contributors from all of these sectors to develop contextualized e-learning for three large rural school districts in Peru. Before describing the project, the participants, and its process, we discuss a few definitions included in the creation of the collaborative system for contextualized e-learning.

Key Concepts

Contextualized Education

Contextualized education is the adaptation of learning content to the social and environmental contexts of students. Contextualization "is a conception of teaching and learning that helps teachers relate thematic content to real-world situations and motivates students to connect knowledge and its application to their lives as family members, citizens, and workers" (Berns & Erickson, 2001, p. 3). Contextualized education requires that curricular standard policies are competency-based to provide flexibility in the creation of content. Contextualization also operationalizes and responds to calls for culturally relevant/responsive pedagogy (Ladson-Billings, 1995); culturally sustainable education (Paris, 2012); culturally grounded education (Levitan & Johnson, 2020); and Indigenous education (Castano & Brayboy, 2008; Cote-Meek & Moeke-Pickering, 2020; Sumida Huaman, 2020). Contextualized education is a broad term that can be a kind of umbrella for many learning activities. It requires epistemological, axiological, and ontological considerations to carry out adaptation. Contextualization responds to constructivist learning theory (Amineh & Asl, 2015); abductive reasoning and experiential learning theory (Dewey, 1997); as well as social learning theory (Tabibnia & Lieberman, 2007).

In this project, we use the concept of contextualized education, rather than Decolonizing, Indigenous Education, or Culturally Sustaining Education because we do not work only with Indigenous communities in this project, but we see the relevance of this approach as particularly relevant to the struggle for Indigenous communities' self-determination in quality education. The approach has been vetted by Indigenous Elders who are included as authors in this article. Because the focus is on engaging in process-based approaches that are socially just, we do not wish to label the process with particular orientations to the content of learning, but instead to engage in self-determined learning approaches that are also pedagogically and developmentally appropriate. As calls from Indigenous educators and leaders seek to ensure that education is ontologically, epistemologically, axiologically, and teleologically grounded in the community (Sumida Huaman, 2013), operationalizing that necessarily means building procedural knowledge to do so justly (Brasof & Levitan, 2022). Weaving community knowledge with Indigenous knowledge(s) and other knowledge(s) as deemed appropriate by the community through co-construction and community-based participatory action research, can be a way forward.

Researchers have found that contextualized learning fosters a number of positive educational outcomes across subject matters and competencies. For example, a meta-analysis conducted by Tamur et al. (2020) of 21 studies that comprised 1,349 students revealed that contextualized teaching and learning had a significant and positive effect on math learning. Haerazi et al. (2019) found that reading comprehension and learning motivation were significantly improved in a contextualized classroom. Furthermore, Berns and Erickson's (2001) findings revealed that students were more motivated and developed real-life skills in a contextualized classroom. Finally, Suryawati et al. (2010) demonstrated that contextualized teaching has a positive impact on problem-solving skills. These results underscore the need to follow this approach in more schools, especially those negatively affected by the pandemic.

Contextualization can be done at the local, district, regional, or national level. The research base suggests that local contextualization at the school level is the most effective (e.g., Sumida Huaman, 2020; Levitan & Johnson, 2020). Regional contextualization is also possible, as there is usually more information that can be gathered regionally, but it is less effective. Operationalizing contextualized education requires gathering local and regional knowledge to create educational materials and learning activities, as well as aligning that knowledge to the mandated curricular competencies. In this project, that knowledge is then digitalized as hybrid e-learning educational experiences/units to be shared amongst the teachers and classrooms throughout the district via an online/local server Internet/intranet system.

Competency-Based Curriculum

Like in many countries, Peru's national curriculum is one of the core educational policies for primary and secondary education. The curriculum outlines the competency-based learning outcomes required for all sectors of the public education system. It is the guidebook that MINEDU uses for monitoring learning outcomes, developing teacher preparation, administrative requirements, and educational infrastructure (2016). The national curriculum uses a competency- and capacity-based framework. Competencies, as defined by the ministry, are "the ability of a person to combine a set of capacities to achieve a specific purpose in a given situation, acting appropriately and ethically" (MINEDU, 2016, p. 192, translated and paraphrased by the authors). Capacities are resources for acting competently—they integrate knowledge, skills, and attitudes that students use to face a specific situation. Capacities imply minor operations (e.g., addition, subtraction) to achieve more complex operations (e.g., solving mathematical problems; MINEDU, 2016). Organizing a curriculum based on competencies and capacities provides flexibility of content, as long as students work on competency development.

Distributed E-Learning via Intranet/Internet Servers

The investment in computers and tablets for teachers and students, respectively, has resulted in significant new infrastructure but little actual usage. One of the challenges is that the MINEDU learning platform is Internet-based. Despite the investment in Wi-Fi and satellite service in most schools, the connection speeds are quite slow, and connection is inconsistent. This has led to a considerable lag time, causing students and teachers to shift to traditional methods of education which result in poor learning outcomes (Brasof & Levitan, 2022). As the technological problem is inconsistent Internet, to create distributed e-learning opportunities, this project uses Critical-Links (C3) servers and Raspberry Pi mini-servers to create intranet hubs for classrooms, so that only students in the class can access the content, to keep speeds up, as well as creating a localized digital/hybrid learning management system (LMS). In this project, we use open-source LMSs that employ H5P, Moodle, and Kolibri to create contextualized content.

To receive updates and new contextualized digital content, teachers can take servers to an Internet-connected area. Having an intranet/Internet system in rural schools allows content to be distributed to all teachers, without needing to rely on inconsistent or non-existent Internet connections in the schools. On this platform, teachers can also modify digital content to suit their needs and upload it to the cloud server for others to use. The digital contextualized modules are ready for students as soon as they connect to the server, and there are fewer possible distractions because students cannot use Internet applications on the same tablet simultaneously. If there are issues with tablets or cell phones, alternative modalities include using a projector, TV, or smartboard to display the lessons and activities. This mobile "digital learning backpack" allows teachers to update servers with new content, as well as to take it home to provide feedback to students' submitted work, which they can receive on their LMS accounts.

Policy Support: Curriculum Diversification Strategy of MINEDU

In Peru, approvals to do contextualized e-learning are supported by a MINEDU policy, which allows for curricular diversification. According to MINEDU (2021), curriculum diversification is the set of processes that respond to the characteristics, needs, and interests of individuals or groups of students in a specific territory, and their sociocultural, linguistic, economic, ethnic, productive, environmental, geographic, and developmental interaction. As part of this policy (and after significant Indigenous community advocacy), MINEDU (2021) recognized Peru's diversity with a myriad of characteristics in each region and locality given the 26 regions that form Peru and their distinct demands, needs, and potentialities. According to the policy, any content (local or otherwise) can be used, as long as the content is aligned with the competency development framework of the ministry, which means that Indigenous lessons and knowledge(s) have a lot of opportunity to be implemented. In practice, however, each annual plan and each class plan needs to be approved by the school and the district school board, so each region will have more or less freedom to develop content and pedagogy depending upon the leadership. The oversight and pedagogical orientation of the leaders varies greatly according to the district. In the Andes, the general zeitgeist is towards Quechua learning, but procedural knowledge about putting Quechua learning into practice by teachers is still generally nascent in regular basic education (*educacion basica regular*) or the district public schools which many, if not the majority of Indigenous students attend. Other districts have more variation.

This diversification policy allows the articulation and adaptation of different programs in schools, as well as other educational proposals as long as they comply with the competencies established in the national curriculum. The objective of curriculum diversification is to provide guidance to ensure its understanding and implementation in a planned and participatory manner, leading to coordinated processes of educational management.

Contextualized E-Learning Project Methodology

In this project we used the Ministry of Education's competency-based curriculum policies, diversification policies, and culturally grounded learning experiences approach to create a strategy towards developing contextualized e-learning collaboratively with teachers and students. To engage in the process, we formed diverse teams that had different tasks. We describe each team and task after we comment on the positionality of the authors.

Positionality Statement

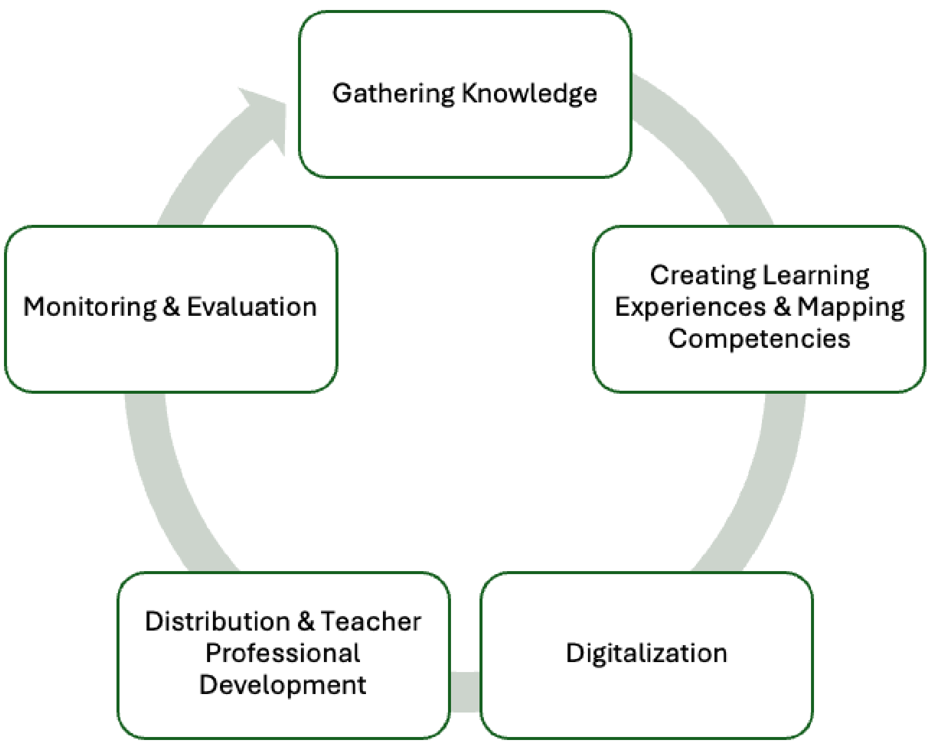
The authors of this article are majority Peruvian Citizens (8), with representation from Indigenous Elders (2), teachers in the region (3), Peruvian International researchers, and collaborators from Canada, Mexico, and the United States. The international collaborators have more than 20 years of collective experience working in Peru with rural and Indigenous populations. The co-authors make up members of the pedagogical team, the digital creation team, and the research team. We have included as many representatives as possible as co-authors because each member of the authorship played an important role in the development of this project. We have not included the more than 400 local teachers who are putting this project into action, nor the various leaders and Elders who are working on their own implementation for two reasons: (a) there are too many people to be feasibly included in the co-authorship of the article; and (b) we focused on the contributors who committed significant time and resources to develop the process in itself, as they are all the co-creators of the process reported here, while other teachers and leaders are implementing the process in their own contexts.

Process

In this process, we created teams of digital experts, local teachers interested in contextualization, and curriculum contextualization experts—including teachers who speak Quechua in the case of the Andes. We also created a validation team that includes Indigenous Elders to ensure that the content, where relevant, aligns with local wisdom. This contextualized e-learning team (CELT), undertakes the general steps shown in Figure 1.

Figure 1

Steps of the Contextualized E-Learning Team



Identifying Local and Regional Realities and Knowledge(s)

To gather local and regional knowledge and understand the specific context and challenges students face, the team engages in a multi-step process. The CELT team identifies local and regional realities by working with local teachers to engage in community-based participatory action research (Brydon-Miller et al., 2020). We have followed traditional approaches, such as *asambleas*, which are decision-making processes implemented in the Quechua community, to understand current realities. This process entails rounds of conversation in a circle in which all community members have a chance to speak and offer ideas, and then a process of consensus is reached. We then engage in an iterative process of community contributions to receive feedback on the information gathered and its interpretations through a process of presenting ideas, collecting contributions, discussing options, and reaching agreements about the knowledge that students require.

Creating Learning Experiences and Mapping Competencies

Using the local knowledge collected, the teachers and curriculum contextualization experts create *learning experiences* (also known as lesson plans) to be digitalized. Part of this process is to identify which competencies students can develop based on local knowledge(s). Learning experiences are a set of activities sequentially developed, in which students solve a complex problem or investigate a complex situation. In a learning experience, activities and competencies from the national curriculum are integrated with local knowledge to create stories, pose problems, and develop learning evaluations. Planning learning activities for a curricular competency area begins with the selection of the competencies. Subsequently, we create the activities considering the validated knowledge identified previously. Afterwards, the purpose of each activity and evaluation criteria are determined, i.e., the capacities, considering the standard of the competency.

Elements of a Learning Experience

The learning experiences within the contextualized competency-based e-learning platform integrate elements that respond to the communities' cultural context. These learning experiences also incorporate the competencies and curricular areas established in the national curriculum. While each element in the learning experience is contextualized, the contextualization will, of course, differ according to the environment, seeking to address its specific characteristics. Nevertheless, contextualization should be intelligible across cultural and epistemological orientations to be usable for teachers, clear for students, and translatable to policy makers. The elements considered for the creation of learning experiences are the following:

- *curricular areas*: established in MINEDU and suggest an organized way to integrate other specific competencies. The curricular areas mostly present in the learning experiences are social-personal development, mathematics, communication, and science and technology.
- *specific competencies*: more specific and attainable goals that, when developed, strengthen a curricular area.

- *learning situation*: constitutes the starting point of a learning experience. It presents a story about students' realities. At the end, this story usually asks a question to explore or reflect upon and/or a problem to solve.

- *challenge*: The question in the learning situation usually leads to a challenge for students to solve throughout the learning experience.

- *purpose*: presents the students expected outcomes after the learning experience is completed and answers the question: What will students learn in this experience?

- *transversal approaches:* are present in the development of competencies in different areas throughout the learning process. They materialize in the student's actions, reflecting values and attitudes outlined in these approaches.

- *product:* constitutes evidence of a student's performance or production, demonstrating the level of development of the competencies achieved.

- *product evaluation criteria:* parameters that measure the level of competencies that students achieve. To define them, each teacher must answer the following: What learning in the curricular area should be evident in the product?

- *competency evaluation criteria:* parameters that measure the level of development of the competencies achieved by the student. These make visible the capacities that make up each competency identified in the learning experience.

- *sequence of activities:* the set of activities that constitute the learning experience, planned in a specific order, allowing the articulation of learning from different curricular areas. It is oriented towards achieving the purpose and developing the final product. This sequence begins with exercises aimed at recalling prior and background knowledge, moving to learning about a specific theme through a text or multimedia. Often, the sequence continues with exercises to verify understanding and moves forward encouraging students with activities to create a product in which the competencies are put into practice.

These elements were developed by the authors, building on content from the Ministry of Education in Peru.

Digitalization

Once the materials have been created in a Word document, the digital experts in the CELT team take the content and make multimedia and interactive learning experiences on the learning platform, with the help of AI software (for example, using Chat GPT to develop images that are contextually relevant), along with H5P, Moodle, and Kolibri to create contextualized learning experiences and interactive digital activities to support student learning.

Once the digitalization process is done, the pedagogical and research teams, including Indigenous Elders, review the materials again. The revision focuses on the coherence of the texts and the accuracy of images and words, depending on the context. Regarding this, it is essential to mention that even though AI can be a time-saving tool, the team is aware of some concerns related to knowledge homogenization or the provision of incorrect information (Cueto et al., 2023; UNESCO, 2023). In this sense, digitalization processes need to be accompanied by an exhaustive revision that guarantees the quality of the content.

Distribution and Teacher Professional Development

The digitalized learning materials are then uploaded onto servers and distributed to teachers, who then work with the pedagogical team to practice the use of the technology and the pedagogical approaches for the learning experiences. The teachers also work with the pedagogical team to make adjustments to the content for their own classrooms prior to the school year, which they can also share among themselves in the cloud.

Teachers' involvement in the initiative is a crucial aspect of the process. As many other studies have shown (Cueto et al., 2023; Haßler et al., 2016), ed-tech interventions require coming to terms with multiple challenges. Teachers' attitudes and skills are the most important component to achieve education outcomes, so efforts should be put into not only the technology itself, but into how initiatives support teachers during the process of learning and teaching. To succeed in this initiative, teachers need to have the necessary skills and resources to use the contextualized materials in a way that can facilitate students' learning. The main challenge is to have teachers to proactively use these materials, not just as mechanical aids. For this, it is important to seek to improve learning outcomes by providing monitoring programs that can foster collaborative teacher professional development.

When beginning teacher professional development, we ask teachers to select four of their lesson plans—two that they are very excited to teach and two that are very challenging. We then show the different possibilities, programs, lessons, and tools of the content, and ask teachers to think about how to integrate these tools with their lessons. We then show teachers culturally grounded content and ask them to think about how to make their lessons culturally grounded. Teachers then speak with Elders and are asked to speak with their students using a few collaboratively designed questions to engage in student voice information gathering (Brasof & Levitan, 2022). They then re-work their lessons to integrate and re-work their current materials. Once they have done this with four lessons and the Elders and the pedagogical team have approved, teachers work as a team to re-configure their lesson plans for the units of the year, with support from Elders and with other consultations. This is then reviewed by the pedagogical team and the school district.

Continuous Monitoring and Evaluation

The pedagogical team meets regularly with teachers and monitors the use of the e-learning platform. The CELT team is available to answer any questions and ensure that technical problems are addressed. The use of the platform as a LMS allows for easier monitoring and evaluation. Additionally, monthly check-ins with teachers support usage and integration.

Some limitations related to the monitoring and evaluation process are related to teachers' lack of time and resources. The lack of incentives from the regional education directorate and MINEDU undermines efforts to continue developing teachers' skills using e-learning educational experiences. Partnerships and strategies for teachers' engagement are indispensable to ensure more stable participation of teachers. In this way, the project is in the process of evaluating and improving a specific teacher training program in education contextualization.

For example, in one of the districts, we have regularly checked in with teachers and asked them to self-report their experiences using the new materials. However, roughly 40% of the teachers are not responding, which we assume to mean that they are not engaging in this process. Of the roughly 60% of teachers who are engaging, two thirds are using other teachers' creations, while about one third are active in their creation processes. Fortunately, because of the sharing system, this means that roughly 60% are using more culturally grounded digital materials (which adds up to about 240 teachers in this district).

Limitations and Cautions

There are a number of important limitations to consider when thinking about implementing this process and what this work entails. The first is that while the decades of advocacy from Indigenous scholars and allies successfully brought policy changes to allow for culturally grounded education, this does not mean that racism, machismo, and bias against rural and Indigenous communities is no longer present. Some of the authors continue to work against negative biases against Indigenous knowledge even with some teachers and even with individuals in the collaborating organizations. This project is not an example of harmonious partnership, but instead a constant negotiation and struggle to do work to improve Indigenous students' and other marginalized students' experiences in schools. This point is important to highlight because there is a lot of political work that some of the authors undertook as privileged allies outside of Peru to push levers of power so that Indigenous knowledge would be included. This was part of our work in asambleas to reach a consensus to be able to advocate for the kind of system the community found necessary. Building this procedural knowledge, to ensure community engagement first, is key to actualize the potential for real positive pedagogical and curricular change that can support students. Tensions were also present between the pedagogical team and the digitalization team, as there are disagreements about what knowledge is of most worth and how to operationalize it.

Additionally, while there are many policy spaces where this initiative can work (e.g., most provinces in Canada, some states in the USA, Finland, Mexico, Panama, India, and others), not all policy contexts are going to support this work because they do not use a competency-based curricular framework and they do not have a diversification policy. Continuing advocacy for making changes that allow for this kind of shift are important in different contexts.

Another implementation challenge was due to teachers not necessarily being from the communities where they work. While there were some teachers who had local knowledge, there were many who lacked local knowledge, which made coordinating with Elders essential. But because teachers may not have understood community norms, this work also required cultural liaisons. In addition, the technological learning curve could also be a challenge for teachers, and we have had to design different approaches for adjusting digital content development depending upon teacher capacities.

It is also important to note that while research has shown that contextualized education supports students' learning (Haerazi, et al., 2019), the research team still needs to examine the learning outcomes of this process. Creating contextualized education is part of making the educational system more ethical for Indigenous students (Sumida Huaman, 2020), so it is a worthwhile endeavor in itself, but more research is needed to examine if it supports students' learning based on community and competency-based objectives.

Finally, and perhaps most importantly, there is a possibility for misuse, or at least, not closing the contextual knowledge gap, with this approach. While this work is directed toward a community who has the cultural knowledge, contextual knowledge, values, and history that can support this change, there are ways that this approach can go wrong and lead to ethnocentrism, supremacy, or problematic content if multiple voices are not heard, Elders are not consulted, students are not consulted, and minority voices are not incorporated. Refining and analyzing the different power dynamics to see how this process may get co-opted would be important to ensure that there is not misuse. There needs to be further research on the supports and fine distinctions that could be made to ensure content creation is supportive of local values and bridges understandings.

Processes are only as good as the people who are putting those processes into action. If their inherent axiology is not oriented towards democratic engagement and opening knowledge to be more expansive and inclusive of multiple realities, theories, and epistemologies, then this process will not work. Considering this, one of the main priorities of the research team, based on years of experience in the field, has been to build strong relationships with the communities. Collaborative work, reciprocity, and trust have allowed us to guide each step and engage in decision-making incorporating multiple voices and perspectives, even through conflicts. Further research on these details is needed.

Conclusion and Areas for Further Research

Contextualized e-learning can address current educational challenges for remote and rural communities, especially communities whose knowledge(s) and epistemologies have been marginalized. It also offers significant improvements to digital learning, as it bridges two promising trends in education, contextualization and distributed e-learning via an intranet/Internet system, to increase access and quality materials. To be able to engage in these processes, a few elements are necessary: a policy and curricular environment that allows for flexibility in the creation of content, buy-in from teachers, leaders, and districts, the creation of a facilitation team, and researchers who can work with Elders, students, teachers, and other collaborators to ensure quality content and pedagogical materials. Many school districts already have people who can do this. It is just a matter of bringing this process to them.

Further research about the results and impact of contextualized e-learning is needed, not only in terms of evaluating our initiative, but also to know if and how contextualized e-learning can be a process that allows a more just education experience in rural educative settings. In a country such as Peru, with a long history of racism and violence, advocating for contextualized education can be a way to contribute to forms of reparation and justice, while continuing to support the rights of all Peruvians to engage with materials that are important to them. Moreover, contextualized e-learning could open new possibilities for promoting local knowledge and contributing to its preservation.

The collaboration between specialists from different areas is key and can be challenging. However, this work is possible with shared goals, values, and openness to unlearn and learn about different epistemological orientations. The processes for engaging in the synthesis of two disparate trends in education also offers considerable strengths, as it allows for greater flexibility and innovation to address ongoing challenges to improving education for rural students. This paper demonstrates the practical approaches to align contextualized digital education with competency-based curriculum standards. We have shown that creating contextualized education through combining e-learning and competency-based education is a feasible approach for using the strengths of both processes to improve education.

Conflict of Interest Statement

Collaboraccion is a consulting firm that facilitates and implements public works projects using a public-private funding mechanism called obras por impuestos (public works for taxes). This mechanism allows private companies to reduce their tax burden by funding public infrastructure and social projects approved by townships or city governments. This funding mechanism is overseen and must be approved by the national government. The authors who are members of Collaboraccion, Daniel Zuñiga, Gerson Cadena, Juan Huertas, Cesar Cáceres, and Carlos Torres receive payment via the obras por impuestos mechanism to implement the project described in this paper, as well as others. The authors who are academics, elders, and teachers do not receive payment for the implementation of the projects and have no financial stake in the project. The Elders and Teacher were independently compensated for their time to consult on the project and for the contributions to the framework and materials.

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[i] Despite governmental initiatives such as the National Strategy for Reinsertion and Educational Continuity and the "Rutas Solidarias Program" that MINEDU launched to facilitate the return of roughly 100,000 students to schools in 2022 (Rodriguez Paredes et al., 2023), the reinsertion has not been successful. We have observed that students from low-income families in particular find schooling not worthwhile once they find a job, and many young people did find jobs in rural areas during and after the pandemic.

[ii] Peru has one of the highest percentages of Indigenous populations in North and South America, with statistics ranging from 24–46% depending upon the "calculation" or "classification" of what "counts" as Indigeneity, which is a hotly contested, complex, and controversial subject. Self-identification is one approach that, while problematic, shows that there are almost six million Indigenous people in Peru, which is about 20% of the population (The Indigenous World, 2024).

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Twenty-Five Years of the *International Review of Research in Open and Distributed Learning*: A Bibliometric Analysis

Carlos J. Torres-Vergara[1], Víctor G. Alfaro-García[1], José M. Merigó[2], Amara Atif[2], and Rory McGreal[3]
[1]Faculty of Accounting and Administrative Sciences, Michioacana University of San Nicolas of Hidalgo, Gral. Francisco J. Mugica s/n, 58030, Morelia, Michoacan, Mexico; [2]School of Computer Science, Faculty of Engineering and Information Technology, University of Technology Sydney, 81 Broadway, Ultimo 2007, NSW, Australia; [3]Centre for Interdisciplinary Studies, Athabasca University, Alberta, Canada

Abstract

The *International Review of Research in Open and Distributed Learning* (IRRODL) published its first issue in 2000. This paper provides an overview of the journal's development over its 25-year history using bibliometric indicators. We analyzed IRRODL's performance relative to other journals in the field and have highlighted key contributing countries, institutions, and authors based on the Scopus database. Our approach used various bibliometric techniques, including the number of articles and citations, cites per paper, and the *h*-index. The findings reveal that IRRODL is a leading journal in open and distributed learning, attracting a diverse group of authors from institutions and countries worldwide. Currently, Athabasca University is by far the most productive university, and the United States and Canada are the most productive countries appearing in the journal. However, the journal is very diverse with publications from all over the world.

Keywords: bibliometrics, Scopus, open and distributed learning, Web of Science

Introduction

The *International Review of Research in Open and Distributed Learning* (IRRODL) is a leading international journal in the field of open and distributed learning. Over the past 25 years, IRRODL has adapted to the evolving educational landscape and has played a central role in advancing the discussion around digital education, online pedagogies, and the use of technology in learning environments. With a CiteScore of 5.8 and an *h*-index of 95 in 2024, the journal maintains a strong academic presence globally.

In 2025, IRRODL celebrates its 25th anniversary (Anderson et al., 2025). It is common in academic literature for journals to commemorate significant anniversaries through various special activities (see Arrow et al., 2011; Monastersky & Van Noorden, 2019). Many journals mark these milestones by publishing special anniversary issues; for example, the *Journal of Management Learning* (Durepos et al., 2020) or the *British Journal of Educational Administration Quarterly* (Hallinger, 2023). Others publish dedicated editorials or thematic reviews. These studies offer a comprehensive overview of the research output, providing a broad retrospective of trends and influences within the journal (Figuerola-Wischke et al., 2024).

Motivated by this 25th anniversary, this article presents a bibliometric overview exploring the journal's growth in terms of publication output to offer a comprehensive view of its global academic influence. Bibliometric analyses provide valuable insights into the development and influence of academic fields by quantifying the scholarly output and impact of journals and articles (Hussain et al., 2025). This bibliometric analysis aimed to assess the impact and scholarly contribution of IRRODL since its inception, focusing on key metrics such as citation and publication patterns, and the most productive authors, universities, and countries.

To do so, we collected all documents published in the journal between 2000 and 2023 using the Scopus database and analyzed the bibliographic information using a wide range of bibliometric indicators (Hussain et al., 2025). Understanding these dynamics is crucial for contextualizing the journal's contributions to the field of open and distributed learning.

The rest of the paper is organized as follows. The Methods section briefly reviews the bibliometric methodology used in this paper. The Results section presents our findings, including the publication and citation structure, the most cited papers, and the leading authors, institutions, and countries publishing in the journal. The concluding section summarizes the main findings and reviews the journal's present status.

Methods

Bibliometric Methods

This study used several bibliometric techniques to analyze the scholarly contribution of IRRODL over its 25-year history. Bibliometrics is the quantitative study of scholarly publications, offering a systematic method to evaluate research trends, academic productivity, and overall influence within a field (Broadus, 1987). Bibliometrics is one of the most widely employed quantitative methods used to thoroughly analyze and explain the movement and interaction of knowledge (Donthu et al., 2021).

The earliest bibliometric analysis can be traced back to the late 19th century, although for centuries there have been studies on bibliography statistics (Cole & Eales, 1917). Although the study did not incorporate citation analysis, it is still considered the first example of a bibliometric study. During the 20th century, the pioneering works of Eugene Garfield and other authors consolidated the field (Bensman, 2007; Garfield, 1955). Nowadays, the effectiveness of modern bibliometrics has significantly improved with the advent of comprehensive databases such as Scopus and Web of Science. Although the term *bibliometrics* was first used by Paul Otlet in 1934 (Rousseau, 2014), the modern definition was coined by Alan Pritchard in 1969 (Pritchard, 1969).

Bibliometrics can be applied to analyze a variety of academic subjects, such as a journal (Chen et al., 2020; Rialp et al., 2019), a topic (Rojas-Sánchez et al., 2023), or a country (Merigó et al., 2016). This methodology is widely used across fields, including economics, environmental sciences, and educational research. In education, for example, bibliometric studies have highlighted leading authors, institutions, and countries contributing to open and distance learning (Cheng et al., 2014; Durak et al., 2024; Rojas-Sánchez et al., 2023). Many journals have published a bibliometric overview of their publications, including the *Journal of Computer Assisted Learning* (Akturk, 2022), *IEEE Transactions on Learning Technologies* (Zurita et al., 2022), *Journal of Research on Technology in Education* (Wilson, 2022), and the *British Journal of Educational Technology* (Chen et al., 2020).

Data Collection

This study used data from Scopus, which is managed by Elsevier. Scopus contains a vast array of scholarly content, including over 1.7 billion cited references from more than 90.6 million records, and it covers approximately 27,950 active titles across various disciplines (Scopus, 2024). Other databases, including Google Scholar, Web of Science (WoS), and Microsoft Academic could also be considered (Bar-Ilan, 2008). However, Google Scholar and Microsoft Academic, although comprehensive, have several limitations in their search functionalities. These include limited support for Boolean and advanced search operators, restricted filtering options, and non-transparent algorithms for query processing and document ranking, which make them less suitable for rigorous bibliometric analysis. In this study, Scopus was selected due to its extensive coverage of peer-reviewed content, providing a comprehensive and representative view of global research, and because it is often preferred over other databases in bibliometric studies for its broader scope and more detailed citation data (Ding et al., 2014; Glanzel et al., 2019).

The data for this study was collected from the Scopus database between July and September 2024, using the query "International Review of Research in Open and Distributed Learning" OR "International Review of Research in Open and Distance Learning" (the former title) in the "Source Title" option, excluding documents from 2024 as the year was not finished. This resulted in a total of 1,247 documents, covering articles, reviews, and conference papers from 2000 to 2023. The advanced search for the replicability of this procedure is: SOURCE-ID (17781) AND PUBYEAR > 1999 AND PUBYEAR < 2024 AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re") OR LIMIT-TO (DOCTYPE , "cp").

Data Analysis

To properly evaluate a bibliometric study, it is essential to define the specific bibliometric indicators used in the analysis. The most frequently employed indicators are the total number of publications and the total number of citations, both of which are generally seen as reliable measures of productivity and impact (Podsakoff et al., 2008). However, it is important to acknowledge that these indicators offer only a broad understanding and may not always perfectly capture productivity or influence. Co-authorship, for example, can affect productivity measures, as papers authored by individuals alone may show lower productivity, while some authors who did not contribute as much to the paper are still considered.

Other commonly used bibliometric indicators include the average citations per paper, the h-index, and citation thresholds (Hussain et al., 2025). The h-index is a measure that aims to represent the importance of a set of papers defining the largest number of H for which an author has H papers with at least H citations each (Hirsch, 2005). The h-index, which combines measures of both productivity and influence, has been extended and generalized by many authors. It is considered a good method by which to evaluate the influence of an author or journal because it combines different metrics in one indicator (Alonso et al., 2009). However, it has some weaknesses in measuring and analyzing very highly cited papers, but it works quite well with huge volumes of publications (Alonso et al., 2009).

Citation thresholds are used to count the number of publications that have surpassed a specific citation level, such as 10 or 100 citations. This is one of the most used metrics for bibliometric analysis and one of the main indicators used in this document. We sought to provide a comprehensive evaluation of bibliographic data by using multiple indicators for the same variable. This approach is justified by the absence of a universally accepted method for evaluating research. In practice, the evaluation strategy must be tailored to the specific problem being studied, as the relative importance of productivity and influence can vary. In some cases, their correlation may shift, either increasing or decreasing, depending on the context.

By applying these bibliometric techniques, this study offers a comprehensive evaluation of IRRODL's academic impact, contributing to a deeper understanding of the journal's role in shaping research in open and distributed learning.

Results

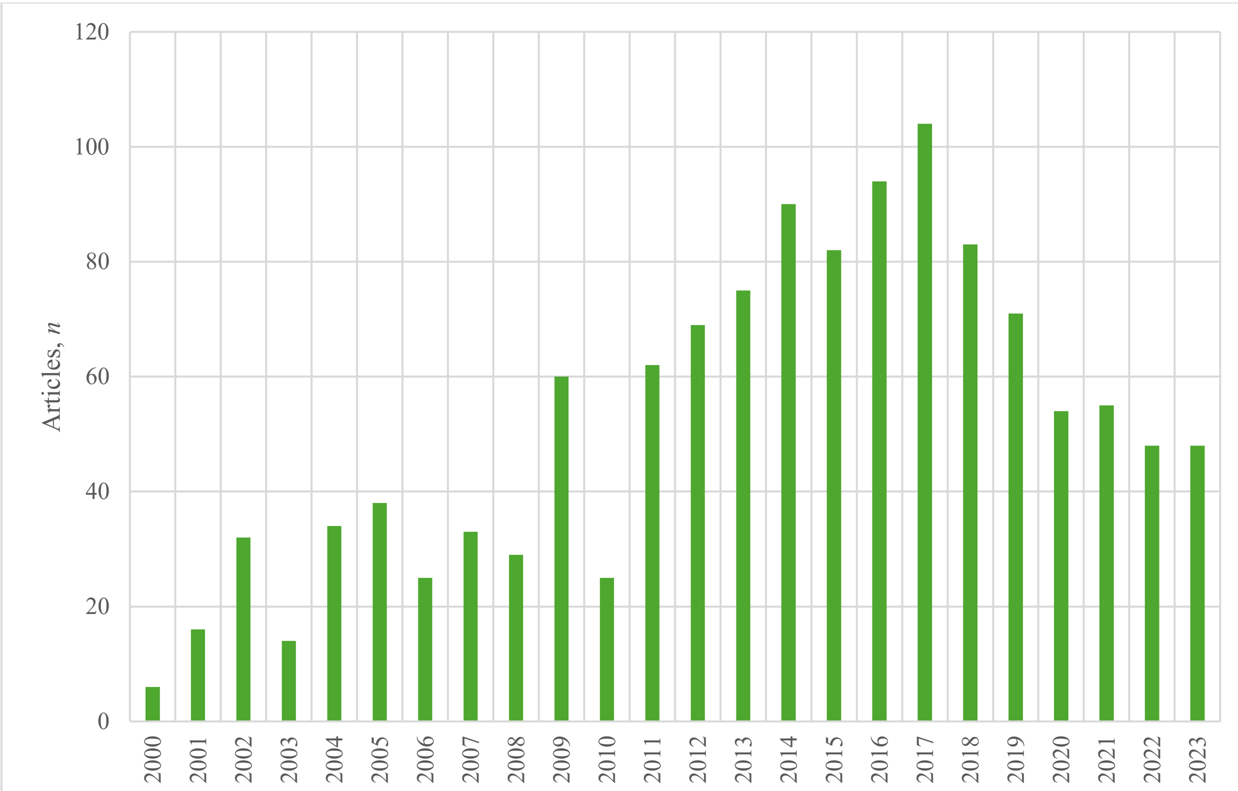
This section presents the results of our analysis. Between 2000 and 2023, IRRODL published 1,247 documents, when considering solely articles, reviews, letters, and notes. As of August 2024, the journal has 42,505 citations, and the h-index is 95.

Publication and Citation Structure of IRRODL

Figure 1 illustrates the annual number of papers published by IRRODL from 2000 to 2023. Up to 2018, the journal saw a steady increase in its publication output, reflecting its growing influence and recognition within the field of open and distributed learning. In 2018, the editorial team made a decision to limit the number of publications to 40 research articles per year. This policy remains in place.

Figure 1

Annual Number of Papers Published in IRRODL



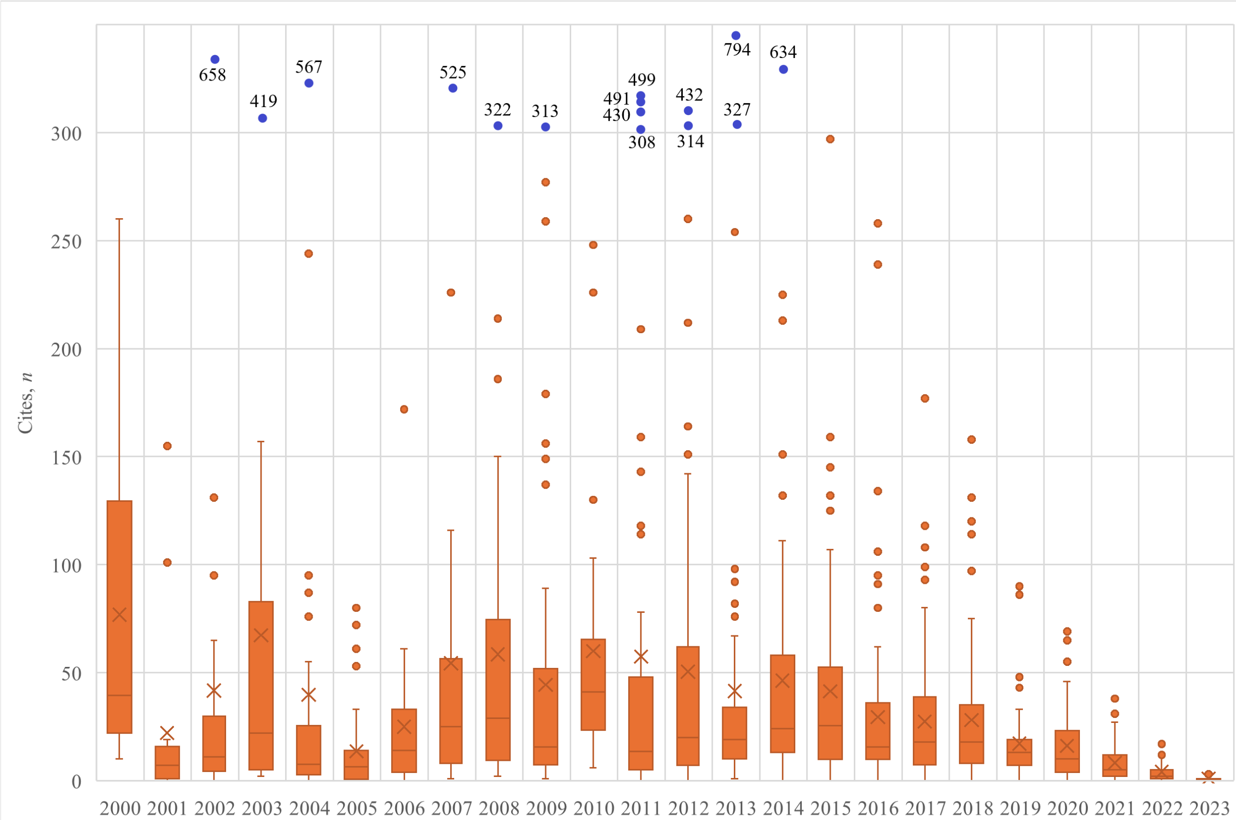
During its initial years (2000–2004), IRRODL published a modest number of articles, starting with just 6 papers in 2000 and reaching 38 papers by 2005. This early period marks the foundation of the journal as it began to establish itself in the academic community.

From 2010 onwards, there was a steady and significant rise in publication numbers, peaking at 104 papers in 2017. This surge correlates with the broader growth of open education resources and online learning, topics central to IRRODL's scope. Following this peak, the new policy to reduce the number of published research articles to 40 was implemented.

The box-plot structure in Figure 2 provides a visual representation of the annual distribution of citations received by papers published in IRRODL. Each box plot summarizes the spread of citations for each publication year, offering insights into the median, quartiles, and outliers within the citation patterns (Hussain et al., 2025; Tukey, 1977). Note that the figure is adjusted to 300 citations so outliers with fewer than 300 citations appear in orange, while extreme outliers with more than 300 citations are depicted in blue.

Figure 2

Annual Box-Plot Structure of the Citations of all Papers Published in IRRODL



Note. Articles with fewer than 300 citations appear in orange. Articles with more than 300 citations appear in blue.

The central trend observed across the years is a general increase in the median number of citations per article, reflecting the growing influence and visibility of the journal. The upper quartiles in most years indicate a significant number of highly cited papers, with some extreme outliers, representing exceptional research that has had a considerable impact on the field of open and distributed learning.

Notably, the years 2011, 2014, and 2017 show particularly high variability, with several papers achieving a citation count far above the median, highlighting the presence of a few standout articles that garnered substantial attention from the academic community. Conversely, the box plots for the years 2019–2023 show narrower ranges. However, this is expected due to their relative recency.

Table 1 presents a detailed analysis of IRRODL's performance in the Journal Citation Reports (JCR) of the Web of Science (WoS; Clarivate, 2024) and Scopus (Scopus, 2024).

Table 1

Analysis of IRRODL in the JCRs of the WoS and Scopus

Year	TC	IF	5YIF	ImIn	CI	AIS	REER	Q	PEER	CS	PS	QS
2011	228	0.68	-	0.14	63	-	108/206	Q3	47.82	1.6	73	Q2
2012	308	0.60	-	0.13	68	-	114/219	Q3	48.17	1.8	77	Q1
2013	349	0.74	-	0.04	75	-	108/219	Q2	50.91	2.3	83	Q1
2014	466	0.73	1.00	0.04	73	0.27	116/224	Q3	48.44	3.0	90	Q1
2015	725	1.24	1.44	0.19	47	0.32	61/231	Q2	73.81	3.5	90	Q1
2016	1,273	1.73	2.13	0.16	92	0.33	47/235	Q1	80.21	4.0	90	Q1
2017	1,899	1.82	2.60	0.18	85	0.35	70/239	Q2	70.92	4.3	93	Q1
2018	2,188	1.83	2.70	0.15	80	0.32	83/243	Q2	66.05	4.2	93	Q1
2019	2,443	2.29	2.88	0.32	70	0.36	59/263	Q1	77.76	4.2	93	Q1
2020	3,340	2.74	3.52	0.57	52	0.89	97/265	Q2	63.58	5.8	95	Q1
2021	3,489	2.77	3.48	0.52	51	0.78	105/270	Q2	61.3	6.1	94	Q1
2022	3,610	3.4	3.7	0.5	45	0.76	73/269	Q2	73	5.6	89	Q1
2023	3,040	2.5	3.4	0.3	48	0.72	133/760	Q1	82.6	5.8	86	Q1

Note. JCR = journal citation report; WoS = Web of Science; TC = total citations; IF = impact factor; 5YIF = 5-year impact factor; ImIn = immediacy index; CI = citable items; AIS = article influence score; REER = ranking in the WoS category of education and educational research; Q = quartile in education and educational research; PEER = journal impact factor percentile in education and educational research; CS = CiteScore of Scopus; PS = percentile in Scopus; QS = quartile in Scopus.

The data demonstrates IRRODL's steady rise in prominence within its field, particularly in the categories of "education and educational research" and "communication." Since its inclusion in the JCRs in 2011, IRRODL has seen a continuous improvement in its impact factor, reflecting its growing influence and the increasing quality of research it publishes. By 2016, the journal's impact factor exceeded 1.7, positioning it among the top quartile in its category. Since then, the journal has been fluctuating between the first and second quartiles (Q1 and Q2). Note that in Scopus, since 2012, IRRODL has always been ranked in the first quartile (Q1).

The 5-year impact factor also provides a broader perspective of the journal's sustained impact over time, showing consistent growth that mirrors global trends in open and distributed learning research. Note that the 5-year impact factor and the article influence score (Bergstrom et al., 2008) require six years before they can be calculated instead of the three years of the impact factor. This is the reason why there are no results between 2011 and 2013 for these two indicators. The table reveals that in recent years, IRRODL has maintained a strong citation base, indicating that its publications continue to be highly relevant and frequently referenced in ongoing research.

Table 2 highlights the publication records of the leading journals in the field of educational research, ranked by the C10 index (the number of citations received by the papers published between 2014 and 2023). This metric provides a clear indication of both the productivity and impact of these journals within the academic community, serving as a reliable measure of long-term influence. IRRODL is consistently positioned among the top-tier journals in educational research, demonstrating strong performance in terms of both the number of published papers and the number of highly cited articles.

Table 2

Publication Record of Leading Journals Connected to IRRODL (Rank by C10)

Journal name	P10	C10	C/P10	H10	TP	TC	C/P	H	Articles, *n*	
									≥ 500 citations	≥ 100 citations
IRRODL	**729**	**18,741**	**25.71**	**66**	**1,247**	**42,505**	**34.09**	**95**	**7**	**88**
Computers & Education	1,948	126,570	64.97	161	5,096	323,194	63.42	243	61	874
Review of Educational Research	697	51,356	73.68	123	3,984	276,367	69.37	260	118	640
British Journal of Educational Technology	1,187	39,968	33.67	89	3,085	96,844	31.39	123	5	188
Journal of Educational Psychology	866	35,106	40.54	90	7,983	425,570	53.31	299	124	1,041
Interactive Learning Environments	1,578	28,648	18.15	69	1,870	36,842	19.70	77	1	46
Educational Technology Research and Development	960	22,624	23.57	68	1,934	76,278	39.44	119	16	157
Educational Technology & Society	716	22,356	31.22	69	1,988	68,747	34.58	114	5	136
Educational Researcher	569	21,180	37.22	76	2,150	170,268	79.19	189	67	346
The Internet and Higher Education	274	19,970	72.88	77	702	63,817	90.91	122	19	159
Journal of Computer Assisted Learning	788	19,115	24.26	62	1,984	63,354	31.93	118	4	150
Journal of Educational Computing Research	591	12,782	21.63	53	1,368	36,591	26.75	82	3	53
Australasian Journal of Educational Technology	618	11,916	19.28	55	1,064	26,303	24.72	72	2	36
Distance Education	334	8,127	24.33	48	1,101	24,205	21.98	73	2	46
American Journal of Distance Education	287	3,588	12.50	29	652	11,016	16.90	47	4	11
Open Learning	236	2,633	11.16	27	1,004	9,809	9.77	44	0	11
International Journal of Distance Education Technologies	187	1,948	10.41	21	411	3,321	8.08	23	0	2
Journal of Asynchronous Learning Networks	84	1,829	21.77	24	369	14,298	38.75	56	3	33
Journal of Interactive Media in Education	101	1,131	11.20	18	101	1,131	11.20	18	0	1
Open Praxis	111	487	4.39	11	111	487	4.39	11	0	0

Note. P10 = publications; C10 = citations; C/P10 = citations per paper; H10 = *h*-index between 2014 and 2023; TP = total publications; TC = total citations; C/P = citations per paper; H = *h*-index available in Scopus. This table includes documents only up to December 31, 2023. The figures in bold are for IRRODL.

Table 2 reveals that *Computers and Education* and *Review of Educational Research* lead in terms of overall citations, citations per paper, and the *h*-index for the last 10 years. These journals represent pillars in educational research, not only due to their broader citation counts but also due to their sustained impact in key areas, for example, technology in education and comprehensive educational review studies.

Other notable journals are the *British Journal of Educational Technology* and the *Journal of Educational Psychology*. However, IRRODL is consistently positioned among these top-tier journals, showcasing a robust performance in terms of both its publication volume and the impact of its highly cited articles.

Influential Papers in IRRODL

Table 3 lists the 30 most cited documents published in IRRODL over its 25-year history. The citation count for these top papers highlights both the quality and the relevance of the research disseminated by the journal. The most cited papers are diverse in terms of topics, ranging from the pedagogical implications of online education to the development of technological tools that enhance the learning experience in distributed environments.

Table 3

The 30 Most Cited Documents of IRRODL

R	TC, *n*	Title	Author(s)	Year	C/Y
1	794	MOOCs: A systematic study of the published literature 2008-2012	Liyanagunawardena, Adams, & Williams	2013	72.18
2	658	Building sense of community at a distance	Rovai	2002	29.91
3	634	Initial trends in enrolment and completion of massive open online courses	Jordan	2014	63.40
4	567	Blended learning and sense of community: A comparative analysis with traditional and fully online graduate courses	Rovai & Jordan	2004	28.35
5	525	Defining, discussing, and evaluating mobile learning: The moving finger writes and having writ...	Traxler	2007	30.88
6	499	A pedagogical framework for mobile learning: Categorizing educational applications of mobile technologies into four types	Park	2011	38.38
7	491	Three generations of distance education pedagogy	Anderson & Dron	2011	37.77
8	432	Heutagogy and lifelong learning: A review of heutagogical practice and self-determined learning	Blaschke	2012	36.00
9	430	The challenges to connectivist learning on open online networks: Learning experiences during a massive open online course	Kop	2011	33.08
10	419	Getting the mix right again: An updated and theoretical rationale for interaction	Anderson	2003	19.95
11	327	A predictive study of student satisfaction in online education programs	Kuo, Walker, Belland, & Schroder	2013	29.73
12	322	Connectivism: Learning theory of the future or vestige of the past?	Kop & Hill	2008	20.13
13	314	Building an inclusive definition of e-learning: An approach to the conceptual framework	Sangrà, Vlachopoulos, & Cabrera	2012	26.17
14	313	Virtual spaces: Employing a synchronous online classroom to facilitate student engagement in online learning	McBrien, Jones, & Cheng	2009	20.87
15	308	A pedagogy of abundance or a pedagogy to support human beings? Participant support on massive open online courses	Kop, Fournier, & Mak	2011	23.69

16	297	Massive open online course completion rates revisited: Assessment, length and attrition	Jordan	2015	33.00
17	277	Creating effective collaborative learning groups in an online environment	Brindley, Walti, & Blaschke	2009	18.47
18	260	Theoretical challenges for distance education in the 21st century: A shift from structural to transactional issues	Garrison	2000	10.83
19	260	Investigating instructional strategies for using social media in formal and informal learning	Chen & Bryer	2012	21.67
20	259	The technological dimension of a massive open online course: The case of the CCK08 course tools	Fini	2009	17.27
21	258	A systematic analysis and synthesis of the empirical MOOC literature published in 2013-2015	Veletsianos & Shepherdson	2016	32.25
22	254	Factors influencing students' acceptance of m-learning: An investigation in higher education	Abu-Al-Aish & Love	2013	23.09
23	248	Profiles in self-regulated learning in the online learning environment	Barnard-Brak, Lan, & Paton	2010	17.71
24	244	The relationship between self-regulation and online learning in a blended learning context	Lynch & Dembo	2004	12.20
25	239	Flipped classroom research and trends from different fields of study	Zainuddin & Halili	2016	29.88
26	226	Using mobile phones to improve educational outcomes: An analysis of evidence from Asia	Valk, Rashid, & Elder	2010	16.14
27	226	Mobile usability in educational contexts: What have we learnt?	Kukulska-Hulme	2007	13.29
28	225	Where is research on massive open online courses headed? A data analysis of the MOOC research initiative	Gašević, Kovanović, Joksimović, & Siemens	2014	22.50
29	214	Open educational resources: Enabling universal education	Caswell, Henson, Jensen, & Wiley	2008	13.38
30	213	Online instruction, e-learning, and student satisfaction: A three year study	Cole, Shelley, & Swartz	2014	21.30

Note. R = rank; TC = total citations; C/Y = citations per year.

The most cited document is "MOOCs: A systematic study of the published literature 2008–2012" by Liyanagunawardena et al. (2013), with 794 citations, reflecting the strong academic interest in MOOCs and online education, followed by "Building sense of community at a distance" by Rovai (2002), and "Initial trends in enrolment and completion of massive open online courses" by Jordan.Haga clic o pulse aquí para escribir texto.

Several key themes emerge from this list of top-cited documents. Research on massive open online courses (MOOCs), learner engagement, and digital pedagogies features prominently. Furthermore, the strong representation of research focused on the development of open educational resources (OER) and the pedagogical strategy for enhancing online learning indicates the journal's pivotal role in shaping discussions around educational technology and innovation.

Leading Authors, Institutions, and Countries

Table 4 provides a comprehensive analysis of the most productive and influential authors in the journal over its 25-year history. The data reflect the central role of key contributors in shaping research in open and distributed learning.

Terry Anderson from Athabasca University leads with 12 publications and a total of 1,198 citations, highlighting his significant influence with a high C/P ratio of 99.83. Following Anderson, David Wiley from Lumen Learning ranks second with 12 publications and 784 citations, giving him a solid C/P ratio of 65.33

Other prominent authors who have also made substantial contributions with multiple publications and high citation counts are Aras Bozkurt, Rory McGreal, Olaf Zawacki-Richter, and George Veletsianos. Note that 7 authors in Table 4 work at Athabasca University. The USA leads with 12 authors, followed by Canada with eight.

Table 4

Top 30 Most Productive Authors Published in IRRODL

R	Author	University or other affiliation	Country	TP	TC	H	C/P	Articles, *n*	
								≥ 100 citations	≥ 10 citations
1	Anderson, T.	Athabasca U	Canada	12	1,198	9	99.83	2	9
2	Wiley, D.	Lumen Learning	USA	12	784	11	65.33	2	12
3	Bozkurt, A.	Anadolu U	Turkey	11	516	8	46.91	3	8
4	McGreal, R.	Athabasca U	Canada	11	198	5	18	0	4
5	Zawacki-Richter, O.	U Oldenburg	Germany	10	523	9	52.3	3	8
6	Veletsianos, G.	U Minnesota	USA	9	641	8	71.22	2	7
7	Hilton, J.	Brigham Young U	USA	8	330	7	41.25	1	7
8	Baggaley, J.	Athabasca U	Canada	7	30	4	4.28	0	0
9	Bonk, C. J.	Indiana U Bloomington	USA	7	206	6	29.43	0	4

10	Jung, I.	Seoul National U	South Korea	7	183	7	26.14	0	7
11	Borup, J.	George Manson U	USA	6	111	4	18.5	0	3
12	Ching, Y. H.	Boise State U	USA	6	200	6	33.33	0	6
13	Fahy, P. J.	Athabasca U	Canada	6	175	4	29.16	1	1
14	Kimmons, R.	Brigham Young U	USA	6	177	6	29.5	0	4
15	Prinsloo, P.	U South Africa	South Africa	6	151	6	25.16	0	6
16	Sangrà, A.	Open U Catalonia	Spain	6	450	6	75	1	6
17	West, R.E.	Brigham Young U	USA	6	146	5	24.33	0	4
18	Abeywardena, I. S.	U Waterloo	Canada	5	26	4	5.2	0	1
19	Barbour, M. K.	Isabelle Farrington College	USA	5	222	5	44.4	1	4
20	Cleveland-Innes, M.	Athabasca U	Canada	5	244	4	48.8	1	2
21	Costley, J.	UAE U	United Arab Emirates	5	70	5	14	0	3
22	Graham, C. R.	Brigham U	USA	5	212	4	42.4	0	4
23	Schuwer, R.	OER Consultancy	Netherlands	5	149	5	29.8	0	5
24	Mackness, J.	Independent Consultant	UK	4	311	4	77.75	1	4
25	Aydin, C. H.	Anadolu U	Turkey	4	294	4	73.5	1	4
26	Ally, M.	Athabasca U	Canada	4	273	4	68.25	1	4
27	Shea, P.	SUNY Albany	USA	4	270	4	67.5	1	4
28	Richardson, J. C.	Purdue U	USA	4	266	4	66.5	1	4
29	Annand, D.	Athabasca U	Canada	4	185	4	46.25	1	4
30	Gulbahar, Y.	Ankara U	Turkey	4	168	4	42	1	4

Note. R = rank; TP = total publications; TC = total citations; H = *h*-index available in Scopus; C/P = citations per publication.

Table 5 highlights the key academic institutions that have significantly contributed to the journal's body of research over the past 25 years.

IRRODL's publisher, Athabasca University in Canada, leads with 128 publications and over 4,031 citations. It has a strong *h*-index of 30 and a notable C/P ratio of 31.49. Other leading institutions include the University of South Africa, The Open University, and Brigham Young University, all of which demonstrate strong academic contributions with high citation counts and significant papers with equal or more than 100 citations. Note that the USA has eight institutions in Table 5 and Canada, six.

Table 5

The Most Productive and Influential Institutions Contributing to IRRODL

R	Institution	Country	TP	TC	H	C/P	Articles, *n*	
							≥ 100 citations	≥ 10 citations
1	Athabasca U	Canada	128	4,031	30	31.49	10	57
2	U South Africa	South Africa	44	994	20	22.59	1	35
3	Open U	UK	36	2,093	21	58.14	4	30
4	Brigham Young U	USA	33	1,064	18	32.24	1	24
5	Open U Catalonia	Spain	31	1,262	19	40.71	2	26
6	Anadolu U	Turkey	20	765	12	38.25	4	13
7	Purdue U	USA	16	567	12	35.44	1	13
8	U Oldenburg	Germany	14	1,099	9	78.50	4	9
9	Open U	Netherlands	14	268	11	19.14	0	11
10	Boise State U	USA	12	380	10	31.67	0	10
11	Beijing Normal U	China	12	359	9	29.92	0	9
12	U British Columbia	Canada	11	225	7	20.45	0	7
13	Pennsylvania State U	USA	9	297	8	33.00	1	6
14	Ankara U	Turkey	9	286	7	31.78	2	5
15	Fern U Hagen	Germany	9	455	8	50.56	1	8
16	Open U Israel	Israel	9	350	8	38.89	1	8
17	UNED	Spain	9	153	7	17.00	0	5
18	U South Australia	Australia	9	217	8	24.11	0	5
19	U Florida	USA	8	307	7	38.38	1	6
20	Royal Roads U	Canada	8	435	6	54.38	1	5
21	U Alberta	Canada	8	175	7	21.88	0	6
22	U Calgary	Canada	7	427	6	61.00	2	6
23	Tel Aviv U	Israel	7	208	7	29.71	0	7
24	Old Dominion U	USA	7	357	7	51.00	1	7
25	George Mason U	USA	7	120	5	17.14	0	3
26	National Central U	Taiwan	7	119	6	17.00	0	5
27	Utah State U	USA	7	698	7	99.71	2	6
28	Thompson Rivers U	Canada	7	114	4	16.29	0	3
29	National Open U Nigeria	Nigeria	7	102	5	14.57	0	4

Note. R = rank; TP = total publications; TC = total citations; H = *h*-index available in Scopus; C/P = citations per publication. There are also 12 universities tied in the 30th position with 6 documents each. Not listed here because of space considerations.

Table 6 presents a detailed overview of the countries that have made significant contributions to the journal over its 25-year history.

The United States leads the ranking. Canada follows with approximately two thirds as many publications and half as many citations. Other notable countries include the United Kingdom, Turkey, and South Africa, each contributing a significant number of publications and citations, underscoring their influence in the field of open and distributed learning.

This table highlights the global impact of research in IRRODL, with contributions from countries across North America, Europe, Asia, and Africa. It reflects the growing international collaboration in educational research, particularly in the areas of online learning and digital education technologies.

Table 6

The Most Productive and Influential Countries in IRRODL Publications

R	Country	TP	TC	H	C/P	Articles, *n* ≥ 100 citations	≥ 10 citations	P/Po	C/Po
1	United States	309	14,977	69	48.47	37	225	0.90	43.41
2	Canada	211	7,556	41	35.81	18	109	5.40	193.25
3	United Kingdom	95	6,279	36	66.09	15	78	1.37	90.74
4	Turkey	66	1,898	24	28.76	7	41	0.76	21.72
5	South Africa	62	1,263	21	20.37	1	47	0.98	20.05
6	Spain	62	2,003	25	32.30	2	45	1.29	41.82
7	Australia	52	1,214	21	23.34	1	30	1.90	44.31
8	China	57	1,353	20	23.74	1	37	0.05	1.30
9	Taiwan	40	904	18	22.6	1	27	1.67	37.82
10	Germany	38	2,038	23	53.63	6	28	0.45	24.12
11	South Korea	36	1,105	18	30.70	2	30	0.70	21.54
12	Malaysia	25	754	14	30.16	1	16	0.73	22.11
13	Netherlands	23	545	17	32.05	0	19	1.33	31.50
14	Israel	21	742	14	35.33	2	19	2.23	78.94
15	New Zealand	19	798	12	42	1	13	3.65	153.46
16	Sweden	17	225	10	13.24	0	8	1.60	21.23
17	Greece	15	490	10	32.67	2	9	1.50	49.00
18	Iran	15	80	7	5.33	0	3	0.17	0.89
19	Nigeria	15	194	7	12.93	0	7	0.06	0.83
20	India	14	212	8	15.14	0	7	0.01	0.15
21	Japan	14	1,096	10	78.28	1	10	0.11	8.86
22	Brazil	12	167	7	13.92	0	6	0.06	0.79

23	Portugal	12	245	8	20.42	0	8	1.15	23.56
24	Mexico	11	95	6	8.64	0	4	0.08	0.73
25	Norway	11	278	8	25.27	1	7	2.00	50.55
26	France	9	59	5	6.55	0	3	0.14	0.89
27	Indonesia	9	451	7	50.11	1	6	0.03	1.59
28	Switzerland	9	418	7	46.44	1	7	1.03	48.05

Note. R = rank; TP = total publications; TC = total citations; H = *h*-index available in Scopus; C/P = citations per publication; P/Po = number of papers per million inhabitants; C/Po = number of citations per million inhabitants. There are 4 countries tied in the 29th position with 8 papers each. Not listed here for space considerations.

Conclusions

In 2025, IRRODL celebrates 25 years. To mark this anniversary, this study has presented a bibliometric overview of the leading trends of the journal between 2000 and 2023. This bibliometric analysis provides a comprehensive overview of IRRODL's impact, examining the evolution of its publication and citation structure, leading contributors, and geographic trends. The findings show IRRODL's sustained growth in reach and academic influence, establishing it as a cornerstone for research in open education and digital pedagogies.

Since its inception, IRRODL has experienced steady increases in both publications and citations, mirroring global trends in the educational technology and open learning fields. The journal's annual publication count has grown consistently, peaking at 104 articles in 2017, after which a policy change limited the number of research articles to 40 per year. IRRODL's citation structure further reflects this growth: as of 2023, the journal has amassed more than 42,000 citations with a substantial *h*-index of 95. This extensive citation reach, paired with a high *h*-index, attests to the significant academic value and quality of research disseminated through IRRODL, with numerous articles among the top-cited references in digital learning research.

The international nature of IRRODL's contributions reflects the journal's reach across a diverse array of educational contexts. The United States leads in terms of publications and citations, followed closely by Canada, the United Kingdom, and China, highlighting these nations' strong influence on global educational research. Notably, IRRODL's publisher, Athabasca University in Canada, ranks as the most productive institution, aligning with its reputation as a pioneering institution in distance education. Other leading institutions include the University of South Africa, Beijing Normal University, and The Open University (UK), all of which have consistently contributed to IRRODL.

While historically dominated by North American and European contributions, IRRODL has seen an increase in publications from institutions in developing countries, such as Turkey, Malaysia, and South Africa. This trend emphasizes the journal's role in promoting educational research across varied contexts, enhancing the inclusivity of perspectives in digital learning. Emerging countries, particularly Turkey, have made significant contributions, evidencing IRRODL's impact on expanding research from regions that are rapidly embracing educational technologies. This international scope not only supports a diversified understanding of digital learning but also allows for the dissemination of innovative pedagogical practices adaptable to a variety of cultural and technological contexts.

IRRODL's ability to attract influential articles and consistently high citation rates signals its established role in educational research. Looking forward, sustaining this growth will require ongoing responsiveness to technological advancements and pedagogical shifts, particularly as digital education increasingly incorporates elements of personalized and data-driven learning. Enhancing contributions from emerging regions and exploring new topics such as AI and virtual learning environments could further strengthen IRRODL's position as an inclusive and forward-looking publication.

This study has provided a representative bibliometric analysis of IRRODL's impact over its 25-year history, though certain limitations are inherent to bibliometric methodologies. Citation data, while insightful, may not fully capture the interdisciplinary and applied impact of research, particularly for studies with applications outside academia. Additionally, this analysis relies on Scopus data, which, although comprehensive, may omit relevant contributions from other indexing databases. These factors underscore the importance of considering multiple perspectives when evaluating IRRODL's scholarly impact.

In sum, IRRODL's 25-year history reflects a remarkable trajectory of growth and influence, cementing its role as a foundational publication in open and distributed learning. The journal has successfully navigated shifts in the educational landscape, demonstrating resilience and adaptability to emerging trends and new research needs. Looking ahead, IRRODL is well-positioned to continue as a leader in digital education research, fostering innovative scholarship that not only addresses current challenges but also anticipates future directions in the field of educational technology.

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