

A Systematic Review of the Research Topics in Online Learning During COVID-19: Documenting the Sudden Shift

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Abstract

Since most schools and learners had no choice but to learn online during the pandemic, online learning became the mainstream learning mode rather than a substitute for traditional face-to-face learning. Given this enormous change in online learning, we conducted a systematic review of 191 of the most recent online learning studies published during the COVID-19 era. The systematic review results indicated that the themes regarding “courses and instructors” became popular during the pandemic, whereas most online learning research has focused on “learners” pre-COVID-19. Notably, the research topics “course and instructors” and “course technology” received more attention than prior to COVID-19. We found that “engagement” remained the most common research theme even after the pandemic. New research topics included parents, technology acceptance or adoption of online learning, and learners’ and instructors’ perceptions of online learning.

Keywords: Online learning, distance learning, COVID-19, research trends, systematic review

Doo, M. Y., Zhu, M., & Bonk, C. J. (2023). A systematic review of research topics in online learning during COVID-19: Documenting the sudden shift. *Online Learning*, 27(1), 15-45.
DOI: 10.24059/olj.v27i1.3405

COVID-19 was an unprecedented pandemic in many ways, with massive political, social, environmental, economic, and educational impacts on society. These structural changes in society most assuredly changed many aspects of our lives in a global and unyielding manner, perhaps forever changing how we access, engage in, and refer to education (Maloney & Kim, 2020). Fortunately, open, online, and distance learning has a rich history and many reliable instructional approaches and forms of delivery, such as synchronous, asynchronous, or some type of blend of the two (Bonk, 2020; Lee, 2019; Moore, 2007; Moore & Kearsley, 2013). As with the Spanish flu and polio epidemics in the previous century, countless millions were, once again, forced to learn from alternative means like radio, television, and printed packets via correspondence (Kanwar & Daniel, 2020; Miks & McIlwaine, 2020; Theirworld, 2020). One might conclude that Charles Wedemeyer's (1981) words from four decades ago are finally coming to pass:

Our perceptions of teaching, learning, schooling, and knowledge are all undergoing change. It is possible to delay change, to influence change, even (for those who can control their immediate activities) to deny change momentarily; but trends towards change continue, with important implications for teaching, learning, schooling, and knowledge at all levels and in all methodologies (p. 44).

Due to extensive implementation and rapid acceleration of social distancing restrictions and school closures in the spring of 2020, teaching and learning in online learning environments suddenly became mandatory in all schools and across educational levels. Lederman (2019) reported that there was a small but steady rise in the number of students who took at least one online class in the United States, increasing from 33.1% in 2018 to 34.7% in 2019. Not surprisingly, the number of online learners radically changed in 2020 because of COVID-19. UNESCO (2020) estimated that more than 1.5 billion students in 165 countries were impacted by school closures and thus had to learn online. Given that most teaching and learning occurred online, the perceptions and practices of online learning also changed. However, there were concerns that online learning during COVID-19 was not representative of true online learning. Hodges et al. (2020) called the current practice of online teaching and learning “remote emergency teaching,” thereby distinguishing it from conventional online learning.

Prior to the pandemic in early 2020, several researchers conducted systematic reviews on online learning to better understand the trends by synthesizing individual research (Bond, 2020; Bond et al., 2021; Martin et al., 2020; Mishra et al., 2021). Bond (2020) conducted a systematic review of emergency remote education in K-12 during the pandemic and added another systematic review on emergency remote teaching in higher education in the following year (Bond et al., 2021). Mishra et al. (2021) also investigated the research trends in online learning during the pandemic by using thematic clustering analysis. More details about the previous systematic review will be presented in the literature review. Martin et al. (2020) conducted a systematic review of online learning research from 2009 to 2018, which, in effect, was just prior to the COVID-19 outbreak. Among their key findings, they discovered that engagement (28.92%) and learner characteristics (21.65%) were the most researched themes in online learning. What Martin et al. (2020) discovered was that researchers prior to the pandemic were focused on understanding how online learners effectively engaged in learning and the common characteristics, traits, and perspectives of learners engaged in online learning pursuits. In contrast, the least researched topic area or theme prior to 2020 was online instructor characteristics (3.39%).

Given the structural changes in online learning taking place during the pandemic, including the extraordinary increase in the number of online learners and the shift from online learning being an alternative to traditional schools to being the only true educational option available (Kanwar & Daniel, 2020; Theirworld, 2020; UNESCO, 2020), it is logical to assume that there have been changes in the online learning research approaches and topics as well as the shifts in the countries or regions of the world where that research took place as governments attempted to determine the impact and challenges of online learning and emergency remote forms of teaching and learning during COVID-19.

The present study began with curiosity about the changes in online learning that COVID-19 brought to help inform online learning scholars and practitioners and guide future research. In this study, the scope of online learning includes emergency remote teaching and learning as well as traditional online learning. Emergency remote teaching and online learning have co-existed during the pandemic despite their conceptual differences. It is also difficult or premature to

differentiate between online learning and emergency remote teaching and learning because the perceptions, awareness, and practices of online teaching and learning are constantly changing throughout the pandemic. For these reasons, the scope of online learning in this study includes traditional online learning and emergency remote teaching and learning. To compare the research topics in online learning before and during the pandemic, we adopted Martin et al.'s (2020) online learning research framework and compared their research findings to the more recent findings in our review. The specific research questions explored here are:

1. What are the most and least researched topics in online learning during COVID-19?
2. What are the differences in research trends in online learning before and during the COVID-19 pandemic?
3. What new topics emerged during COVID-19?

A Systematic Review of Online Learning

Reviews of Research on Emergency Remote Teaching and Online Learning

Several researchers have conducted systematic reviews on online learning or emergent remote teaching during the pandemic (e.g., Bond, 2020; Bond et al., 2021; Crompton et al., 2021). For example, Crompton et al. (2021) reviewed 60 studies on online and remote learning in K-12 settings published between 2010 and 2020. They found that: (1) strategies used to support emergent remote learning include communication, delivery systems, student readiness, partnerships, engagement, and resources, and (2) the technologies used were primarily Internet-based technologies along with non-Internet technologies.

In addition, Bond (2020) reviewed 89 studies from 70 countries on emergency remote education in K-12 and found that: (1) the reviewed research was predominantly conducted in European and Asian countries, (2) studies primarily focused on teachers, and (3) an online survey was used most for data collection. Bond (2020) revealed that recommendations from the articles included: (1) further funding support for professional development, (2) promoting equity, (3) adopting collaborative learning opportunities, and (4) leveraging synchronous and asynchronous technology. Then, in a follow-up study, Bond et al. (2021) conducted a systematic mapping review of 282 studies on online and remote learning in higher education. In this follow-up study, Bond et al. (2021) found that: (1) studies reviewed predominantly focus on undergraduate students and their perceptions of emergency remote learning, (2) studies were conducted in various countries and largely focused on Health, Natural Sciences, and Math fields, and (3) synchronous collaborative tools along with text-based tools were the primary technologies used in online education and remote learning.

More recently, Mishra et al. (2021) examined the research trends in online learning during COVID-19. They searched the literature in the Scopus online database on January 22, 2021, to search for relevant research published between January 2020 and January 2021. Their inclusion criteria included: (1) research on online learning and distance learning, (2) articles written in English, and (3) articles published in peer-reviewed journals. The initial search yielded 525 records; however, more than half of the initial search results were excluded because they failed to satisfy their inclusion criteria. Through a screening process using PRISMA guidelines, 330 articles were included in their systematic review. Of the 330 articles, 112 did not indicate the research methods employed as they were often opinion and reflection pieces, leaving 218 research studies for the thematic analysis. Mishra et al. (2021) found that 67.88% of the studies focused on postsecondary education (i.e., higher education), followed by learning in general (14.24%), K-12 (10.3%), and adult and lifelong learning (7.58%). Based on the disproportional ratio of online learning research at each school level, they contended that scholars need to conduct more online learning research in K-12 given the large population of K-12 students.

In their study, research topics were analyzed using keyword cluster analysis, and four clusters were identified: (1) technologies for teaching and learning, (2) psychosocial issues, (3) learners, and (4) an eclectic category with 19 terms (i.e., others). This classification was based on the results of keyword cluster analysis, and, hence, it was different from Martin et al.'s (2020) framework, which focused on the: (1) learner, (2) course and instructors, and (3) organization. The popular research topics identified in their study include remote teaching, the assessment of distance learning, emergency online teaching, virtual learning environments, and student readiness. In terms of research methods, slightly less than half of the 330 studies (N= 144, 43.64%) adopted quantitative methods, while many used either qualitative methods (N= 44, 13.33%) or mixed methods (N= 30, 9.09%).

In addition, Mishra et al. (2021) found that almost 34% of the 330 studies in the eligibility pool did not describe any research methods (e.g., opinions or reflective papers), indicating that one-third of the studies were not empirical studies.

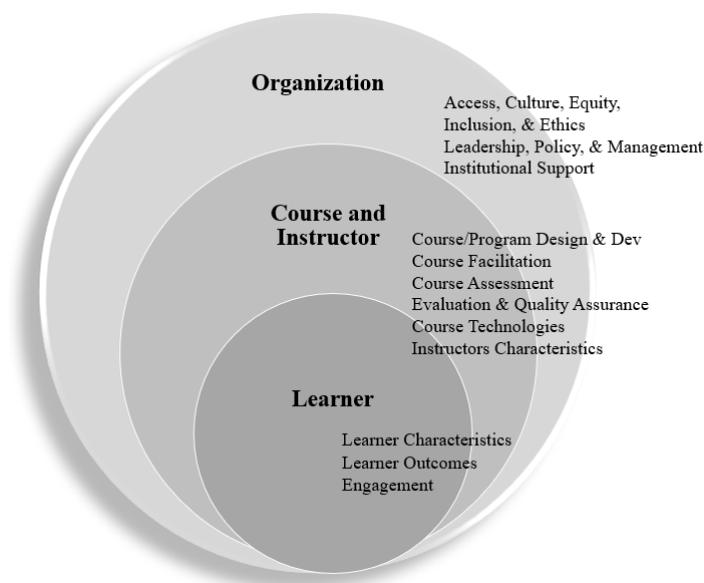
Mishra and his colleagues uncovered a few trends in their recent study. For instance, they discovered that the most productive country in terms of conducting online learning research was the United States (25.1%), which substantially outperformed the second-most and the third-most productive countries (i.e., Saudi Arabia: 6.28%, and the United Kingdom: 6.07%). Taking a broader lens, online learning research during the pandemic was primarily published in 18 countries, including the three mentioned above, as well as Canada, Indonesia, Russia, India, Spain, South Africa, Pakistan, Germany, Brazil, China, Turkey, Egypt, Italy, Greece, and the Philippines. Based on this data, Mishra et al. (2021) contended that a highly diverse array of countries had produced online learning research during the recent COVID-19 era.

Martin et al.'s (2020) Systematic Review of Online Learning

As indicated, Martin et al. (2020) conducted a timely and insightful systematic review of online learning research from 2009 to 2018. To facilitate their analysis, they, in turn, reviewed three systematic reviews of online learning before the pandemic; see Berge and Mrozowski (2001), Tallent-Runnels et al. (2006), and Zawacki-Richter et al. (2009). Based on these three studies, Martin et al. (2020) developed a framework with three components or stakeholders of online learning: (1) the learner, (2) the course and instructor, and (3) the organization. Their resulting framework included 12 research themes, as shown in Figure 1.

Figure 1

Online Learning Research Themes Framework



Note. Reconstructed with permission from Martin, Sun, and Westine's (2020) Figure 1 (p. 4).

In their extensive review of 619 relevant online learning studies published between 2009 and 2018, Martin et al. (2020) found that a considerably high percentage of studies dealt with the learner (55.73%) compared to research that targeted either the course and instructor (29.89%) or the organization (14.38%). Among the 12 research themes in their 619 selected studies, learning/learner engagement was the most researched theme in online learning (28.92%), followed by learner characteristics (21.65%). The least researched theme was instructor characteristics (3.39%).

Given the abundance of research on online learning since the emergence of COVID-19 in early 2020, a systematic review of the most recent research is needed to understand how the focus of online learning researchers has changed since that time. Accordingly, the purpose of this study was to examine the research topics in online learning during COVID-19 using a systematic review methodology.

Method

We conducted a systematic review of the recent literature on online learning published during the COVID-19 pandemic from February 2020 to April 2022. Based on Cooper's (1988)

procedure for a systematic review, our research process included the following five stages: (1) identifying the research problems, (2) collecting eligible studies, (3) evaluating the data, (4) analyzing the data, and (5) presenting the findings.

Inclusion and Exclusion Criteria

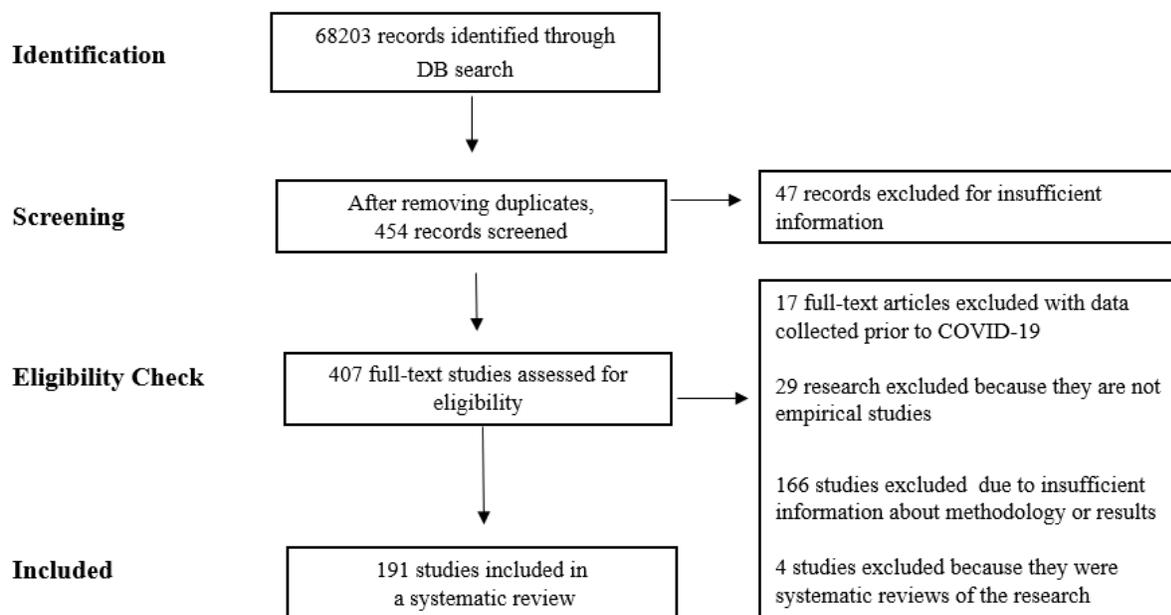
To investigate our three key research questions, we set four key inclusion criteria for the literature search to identify eligible online learning studies published during the COVID-19 pandemic; namely, the studies included in our scope were: (1) confined to online learning environments; (2) empirical studies adopting quantitative, qualitative, or mixed-method approaches; (3) published since the beginning of COVID-19 (i.e., from February 2020 to April 2022); and (4) written in English. Exclusion criteria included studies that did not meet the inclusion criteria, including editorials or opinions, meta-analyses, or systematic reviews (e.g., Salas-Pilco et al., 2022), technical reports, corporate and non-profit documents, unpublished dissertations, conference proceedings, book reviews, and other miscellaneous reports. In the review process, we found that numerous studies included data collected and analyzed prior to February 2020 (i.e., data collection was completed before COVID-19). Hence, we excluded the research with pre-COVID-19 data as a means to retain the objective of this study (e.g., Chang & Kim, 2021; Pollard & Kumar, 2021).

Search Databases, Strategies, and Process

Using the inclusion criteria, the literature search was conducted through a computer-based database search, including *Web of Science* (<https://www.webofscience.com>), Education Resources Information Center (*ERIC*, <https://eric.ed.gov/>), and *Google Scholar* (<https://scholar.google.com>). In fact, scholarly journals of each database are not exclusive (e.g., the same journal articles can be indexed in different databases if two databases subscribe to the same journals). Hence, we chose the three representative databases which have extensive coverage of publications in education fields (i.e., ERIC), in scholarly works (i.e., Web of Science), and in a variety of disciplines with a Web search engine (i.e., Google Scholar). A combination of the following keywords was used to search for relevant studies: “Online learning,” “distance learning,” “online teaching,” or “online learners,” and “COVID-19” or “pandemic.” As noted, we limited the literature search from February 2020 to April 2022 to examine the research trends in online learning during COVID-19.

The search and exclusion processes are illustrated using the PRISMA flow diagram in Figure 3. The screening process started with reviewing the titles and abstracts of 454 publications, and we excluded 47 studies due to insufficient or missing data. The remaining 408 publications were full text screened by two authors. We excluded 216 studies that had insufficient data, or were non-empirical studies or systematic reviews, or involved data collection periods prior to January 2020. To make sure that the data for each publication was collected after the COVID-19 pandemic began, the authors double-checked the methodology sections of these publications. A total of 191 online learning studies out of the initial identification of over 68,000 records were finally included in this systematic review.

Figure 3
Search Process Using PRISMA



Data Analysis

The coding scheme was created in an Excel file and then transformed to SPSS to analyze descriptive data. The coding scheme consisted of journals, titles, years, author names, participants (i.e., school levels), data collection, data analysis, topics, keywords, and others (e.g., when a judgment call is needed). We used Martin et al.’s (2020) research framework for coding for research domains and research themes. First, we categorized each study into one of three domains: organization, courses and instructors, and learner. Based on keywords, abstract, and titles of the study, each study was classified into one of 12 research themes (i.e., (1) Access, culture, equity, inclusion, and ethics, (2) leadership, policy, and management, (3) institutional support, (4) course/program design and development, (5) course facilitation, (6) course assessment, (7) evaluation and quality assurance, (8) course technologies, (9) instructor characteristics, (10) learner characteristics, (11) learner outcomes, and (12) engagement).

If a study did not fit into Martin et al.’s domains or research themes, we called ‘others’ and left memos for further analysis. Two researchers individually conducted a pilot coding of the first ten articles and discussed the discrepancies until reaching consensus (i.e., initial intercoder reliability was 93.99%) on coding schemes. Then each researcher coded half of the rest of the articles. After coding was completed, we conducted a thematic analysis (Braun & Clarke, 2006; Braun et al., 2014).

Results

Publication Patterns

As indicated, this systematic review found 191 articles that met the four key inclusionary criteria. Since February 2020, a third of the online learning studies published during the COVID-19 pandemic were in 2021 (N= 144, 75.4%), followed by 2022 (N= 29, 15.2%) and then 2020 (N= 18, 9.4%). The 191 studies analyzed in the systematic review came from 31 peer-reviewed journals, including *British Journal of Educational Technology*, *Education and Information Technologies*, *Education Sciences*, *Frontiers in Psychology*, *Journal of Computer Assisted Learning*, *Online Learning*, *Computers and Education*, *Frontiers in Education*, *Asia Pacific Education Researchers*, *International Journal of Emerging Technologies in Learning*, *Children and Youth Service Review*, *The International Review of Research in Open and Distributed Learning*, *Distance Education*, *Educational Technology Research & Development*, *Interactive Learning Environments*, and *Journal of University Teaching and Learning Practices*.

In terms of the location of the publications, the 191 studies were conducted around the world. We found that online learning research was conducted in 58 countries, including the United States, Canada, Mexico, China, Bangladesh, Thailand, the UK, Estonia, Ghana, Egypt, United Arab Emirates, Australia, and New Zealand. The United States has been the most productive country in terms of online learning research published during the COVID-19 pandemic thus far, with 17.8% of the total research (N= 34). China, including mainland China,

Hong Kong, and Taiwan, also produced nearly as large a portion (N= 32, 16.7 %) of the publications during this time.

Naturally, there were a variety of methods utilized. Quantitative methods were predominantly used in online learning research (N= 111, 58.1%), followed by qualitative methods (N= 46, 24.1%) and mixed methods (N= 33, 17.3%). Only one study which adopted a developmental research methodology was included in the analysis. As for the data collection methods, more than half of the research (N= 122, 63.54%) adopted survey methodology (e.g., Munir et al., 2021; Oinas et al., 2022), and approximately one in five (i.e., N= 36, 18.75%) used interviews, including focus group interviews, to conduct qualitative research (e.g., Cao et al., 2021; VanLeeuwen et al., 2020). Interestingly, only four studies in our pool of 191 studies adopted an experimental or quasi-experimental research design (e.g., Liu & Butzlaff, 2021; Petersen et al., 2022).

Online Learning Topics: The Most and Least Studied Research Topics

From the three components of Martin et al. (2020) framework (i.e., learners, courses and instructors, and schools and organizations), there was slightly more research on courses and instructors (N= 78, 40.8%) than learners (N= 76, 39.8%). About 9.4% of the research focused on organizations, and the remaining 9.9% included other categories, including parents (N= 7, 3.7%). This ratio is considerably different from Martin et al.’s (2020) research findings that focused on learners (55.73%), courses and instructors (29.89%), and schools and organizations (14.38%).

Table 1 summarizes the 12 topics in online learning research in the current research and compares it to Martin et al.’s (2020) study, as shown in Figure 1. The top research theme in our study was engagement (22.5%), followed by course design and development (12.6%) and course technology (11.0%). The least researched topics included evaluation and quality assurance (0.5%), access, culture, equity, inclusion, and ethics (1.6%), and leadership, policy, and management (2.1%).

Table 1
The Percentage of Research Topics

Category	Research Topics	Current study (2022)	Martin’s study (2020)
Learner	Engagement	22.5	28.92
	Learner Characteristics	6.3	21.65
	Learner Outcome	4.2	5.17
	Learners’ Experiences and Perceptions	6.3	
	Learners’ Psychological Well-Being	1.0	
	Evaluation and Quality Assurance	0.5	6.14
Course and Instructor	Course Technologies	11.0	5.65
	Course Facilitation	3.1	5.49
	Course Assessment	3.1	4.85
	Course Design and Development	12.6	4.36
	Instructor Characteristics	5.8	3.39
Organization	Teachers’ Experiences and Perceptions	5.8	
	Institutional Support	5.8	5.33
	Access, Culture, Equity, Inclusion, and Ethics	1.6	4.68
	Leadership, Policy, and Management	2.1	4.36
Others	Adaptation to Online Learning	4.7	
	Parents’ Involvement in Online Learning	3.7	

The research settings were diverse, including early childhood, K-12, higher education, and adult and lifelong learning. The predominant research settings included higher education (64.5 %), with far less (26.7%) based on K-12 settings, including elementary, middle, and high schools. Only three studies were conducted in early childhood and two studies in adult learning. We also analyzed a total of 2,212 keywords from 191 studies using a Word Cloud.

In terms of the frequencies and relevance of each keyword, the top listed keywords included “online learning” (N=91, .999), “distance learning” (N=38, .539), “distance education” (N=19, .238), “higher education” (N=38, .492), “remote teaching” (N=20, .254), and “COVID-19” (N=146, .018). Excluding the keywords indicating environments (e.g., online learning or education, distance learning or education, and COVID-19 or pandemic), the top listed keywords included “higher education” (N=38, .492), “student engagement” (N=7, .095), “secondary education” (N=6, .063), “community of inquiry” (N=4, .095), “blended learning” (N=6, .095), “perception” (N=12, .045), and satisfaction (N=14, .045).

Newly Emerged Topics in Online Learning

We found unclear or incomparable coding that did not fit into the previous framework. These newly emerged topics included parents (3.7%) (e.g., parents’ well-being, parental involvement, or parent satisfaction) (e.g., Canales-Romero & Hachfeld, 2022; Hamaidi et al., 2021; Zhan et al., 2021), learners’ experiences and perceptions about online learning (6.3%) (e.g., Seabra et al., 2021), teachers’ experience during COVID-19 (5.8%) (e.g., Nguyen et al., 2021), technology acceptance or adoption of technology (4.7%) (e.g., Azizan et al., 2022), and learners’ psychological well-being or stress (1.0%) (e.g., Huang & Zhang, 2021).

Discussion

This study explored the most recent research on online learning during COVID-19 to provide insights about how the research trends or research topics in online learning have changed due to the pandemic. Perhaps it will shed a few clues as to what online learning research will be pursued in the future. In this study, we compared our results with recent systematic reviews by Martin et al.’s (2020) and Mishra et al.’s (2021) research findings to highlight the changes and make some projections about future directions.

The Most and Least Studied Research Topics

First, using Martin et al.’s (2020) framework as a guide, among the three components of online learning (i.e., learners, courses and instructors, and schools and organizations), most previous online learning research was conducted about learners (55.73%). However, the present study found that online learning researchers focused on courses and instructors (41.9%) as well as learners (40.3%) during the first two years of the pandemic. It is interesting to see the research interests moved from mostly focusing on learners to now also exploring courses and instructors. In terms of school levels of learners, more than 70% of the studies were conducted in higher education in the reviewed literature, which is similar to Mishra et al.’s (2021) findings (i.e., higher education: 67.88%, K-12: 10.3%).

In accordance with the study from Mishra and his colleagues (Mishra et al., 2021), in the present study, only 26.7% of the research was conducted in K-12 settings, which is considerably less than in higher education settings. As might be expected given concerns about cost, quality, flexibility, and access of education, K-12 online learning was rapidly growing even before COVID-19 suddenly struck the world and then it accelerated during the pandemic (Erwin, 2021; Gross, 2021). Based on the National Center for Education Statistics related to America’s public schools, during school year of 2013-2014, the total number of virtual schools was 478 (National Center for Education Statistics, 2015). Five years later, during 2018 and 2019, the total number of virtual schools was 675 and the number of not fully virtual schools was 7,872 (National Center for Education Statistics, 2020). Then, during 2019-2020 the number of fully virtual schools was 691 and the number of not fully virtual schools was 8,673 (National Center for Education Statistics, 2021). This rise in virtual schools in the United States during the past decade (Erwin, 2021; Gross, 2021) indicates the K-12 online learning was significantly increasing before the pandemic started. Given the increasing number of fully virtual schools and not fully virtual schools in the U.S. during the past few years, we agree with Mishra et al.’s (2021) assertion that greater online learning research at the K-12 level might be warranted.

Second, in terms of the first main research question regarding the most and least researched topics in online learning during COVID-19, the most researched theme in online learning during COVID-19 was engagement (22.5%). The significance or popularity of engagement as a research theme has remained stable as this result is identical to Martin et al.’s (2020) research finding (28.92%). Similarly, the research targeting learning outcomes also remained low at about four percent, which is, again, roughly the same as Martin et al.’s previous finding (5.17%). It is necessary to examine why engagement is much more popular than learning outcomes as a research theme in online learning research.

The Differences in Research Trends in Online Learning Before and During the COVID-19 Pandemic

There were several differences between these studies as well. For instance, unlike previous studies, course design and development (12.6%) and course technology (11.0%) have received greater attention in academia during the past couple of years compared to the pre-COVID-19 era (i.e., 4.36% and 5.65%, respectively). The substantial change may be because the population of online teaching and learning has changed during the pandemic. In the past, online learning was mostly considered a substitute for traditional classrooms or was often a key aspect of non-formal learning for adult learners. Regardless of school level, online learning was offered during the pandemic and, during this time, many instructors and teachers were asked to teach online regardless of their preference for online learning as a teaching mode. As a result, researchers appear to have become more interested in course design and development and course technology in online learning research.

Our review of the research also highlighted the fact that the heavy research interest in learners before the pandemic shifted toward research on instructors during the pandemic. In fact, the proportions of research about learner characteristics dramatically lessened from 21.65% in 2020 to 6.3% in 2022, whereas the research on instructor characteristics in 2020 (3.39%) moved up to 5.8% in 2022. The gigantic structural changes taking place in schools and higher education institutions during COVID-19 enabled researchers to appreciate the importance of the roles and responsibilities of instructors and the components of effective or high-quality course design and development for successful online learning. Meanwhile, many of the least researched areas remained unchanged through the COVID-19 pandemic, such as “access, culture, equity, inclusion, and ethics,” “leadership, policy, and management,” “course facilitation,” and “course assessment.” These topics might need greater attention to better understand the long-term success of online learning.

Third, in terms of where the studies were published, researchers in the United States have been the most prolific in terms of the published online learning research in the past, as noted by Mishra et al. (2021) and this leadership remained in our study (17.8%). However, it is notable that the present study included research conducted in 58 countries in Asia, Africa, North America, South America, Europe, Australia, and Oceania, which is far more than Mishra et al.’s (2021) review of the research had found, which included only 17 countries.

Given that there are 195 countries, our data revealed that nearly 30% of all the countries in the world community produced online learning research during the pandemic, demonstrating just how extensively online learning has permeated the globe in both usages and as a focus of research. This result also confirms Mishra et al.’s (2021) contention that researchers in many countries started to produce online learning research due to COVID-19. Of course, the global expansion of online learning was the likely trigger for researchers around the world to decide to conduct research on this topic, many of whom were likely responding to requests from their governments as well as local institutions and organizations for such more focused and intensive research analysis and insights to better understand the impact of online learning during the pandemic, and how to better equip educators for various online delivery formats and pedagogical approaches.

What is interesting is the nearly nonexistent experimental research studies in our investigation of the research on online learning during the first two years of the pandemic. When only two percent of the studies reviewed employed experimental design methodology, one must ponder on the causes. While pure experimental design approaches with treatment and comparison groups in the field of education have often been of questionable value and fallen out of favor for the past couple of decades, these findings are also likely due to the suddenness of the shift to online environments during the pandemic that left minimal time to plan complex studies involving treatment and control groups. Stated another way, during the past couple of years, researchers were unlikely to be manipulating variables, but instead attempting to study what was, in fact, happening throughout the ebb and flow of the COVID-19 pandemic and the associated educator, educational institution, and community reactions to the latest news and pronouncements.

New Topics Emerged During COVID-19

Last, to address Research Question #3, the new topics that emerged in our systematic review demonstrate how online learning environments changed during COVID-19. For example, we found several studies about parents, including parents' perceptions about online learning, parents' well-being, and parents' involvement in online learning, including one study in Germany (Canales-Romero & Hachfeld, 2022), one study in China (Zhan et al., 2021), and another in Jordan (Hamaidi et al., 2021). This finding aligns with the study by Aslan et al. (2022) that showed that parental involvement is important in the success of K-12 online education.

Given that most K-12 students had to learn in an online manner while at home during the pandemic, parents' roles and responsibilities became even more pronounced and vital. Technology acceptance or adoption of online learning was also a new or more prominent theme in the present study (e.g., Azizan et al., 2022). The technology acceptance model (TAM) by Davis (1989) is a well-known and extensively applied research framework for emerging technology research. Not too surprisingly, this model has recently re-emerged to understand the experiences of those who had no prior online learning experiences in terms of their acceptance and adoption of online learning.

While new trends in the research on online learning were revealed, we caution the reader that some topical changes and emerging areas of research could simply be due to the evolution of online learning research that would have taken place despite the pandemic. Stated another way, as with most any field, there is a ceaseless evolution in the research literature as each study typically attempts to build upon the previous ones. It just may have been time for greater research on the technologies used in online courses as they have matured since online courses became mainstream more than two decades ago. Online course design and development may have become increasingly essential during the pandemic when countless millions were learning online with educators espousing goals of elevating course quality and effectiveness as well as learner satisfaction. The days solely focusing on learner characteristics and learning outcomes, without consideration of instructor training, motivation to teach online, and pedagogical decision making, or the course design and overall quality appear to be over.

Limitations and Future Directions

This systematic review has some limitations. First, in this study, we only examined peer-reviewed journal articles. Hence, research published in conference proceedings, magazines, book chapters, reports, technical reports, white papers, etc., would most likely have been excluded from this systematic review. Future researchers could extend the scope of the publication outlets to gain a more comprehensive picture of the relevant research.

Second, the articles reviewed in this study were limited to publications in English. Articles published in languages, such as Spanish, Korean, or Chinese, were excluded. Undoubtedly, important findings and discussions within the online learning research during the pandemic published in non-English journals were missed. To obtain a more comprehensive picture of global online learning research, future systematic reviews might review articles on online learning published in diverse languages and cultures.

Third, while the pandemic seems to be significantly subsiding, it is clearly not over (CDC, 2022; Charumilind et al., 2022). Research is needed that takes a more longitudinal look at online learning effectiveness and impact during the pandemic and far beyond. As part of such long-range views, it is vital to know about the impact of instructor online training programs and initiatives.

Fourth, given the fact that educational research often takes years to publish from the inception of a study, there are likely a wide array of studies currently in process or accepted for publication that took place during the pandemic but as yet are unpublished. Ambitious and insightful researchers might pose interesting and insightful research questions in the coming decade or two that extend the purview of this study while helping to understand the effectiveness of online educational delivery options during times of crisis or structural educational changes.

In this study, we did not differentiate traditional online learning and emergency remote teaching despite the conceptual and historical differences between the two terms. Online learning and emergency remote teaching have co-existed during the pandemic, but the term online learning was used more often in general unless other terms were delineated by the researchers.

The other reason is that this study analyzed the literature (i.e., secondary data) published during the COVID-19 era as a systematic review; as such, it was difficult and potentially inaccurate to tell which studies were about emergency remote teaching and which ones were not. Some authors clearly indicated the emergency remote teaching in the titles or keywords (e.g., Oliveira et al., 2021; Valsaraj, 2021; Xie et al., 2021); however, it was deemed dangerous to make such assumptions about each of the 191 articles in this study without making further inquiries to the authors of each of these publications.

Clearly, there are myriad directions for online learning researchers in the years to come. For instance, while blended learning has been researched for decades (Bonk et al., 2002; Bonk & Graham, 2006; Shen et al., 2013; Picciano, et al., 2014; Picciano et al., 2022), the hybridization of learning that was witnessed since the pandemic arose to dramatically disrupt educational spaces and common delivery mechanisms begs for greater research attention than has been witnessed to date. It is vital to know how educators innovated in terms of educational delivery models like HyFlex course design (Beatty, 2019). And as open and online educational resources proliferate, it is extremely critical to determine how such resources help lessen the impact of the shift to online delivery formats.

Finally, additional research is also needed on the wellness and mental health of online learning participants, including learners, instructors, instructional designers, and program administrators. Too often, the focus of research is strictly limited to cognitive gains, while the emotional aspects of online learning and the psychological well-being of online learners and developers and deliverers of online instruction remain underexplored (An et al., 2022; Heo et al., 2022). From our own previous research (Heo et al., 2022), we realize that highly anxious, stressed-out, and depressed students will exhibit lowered degrees of learning engagement and have reduced self-efficacy as learners.

Implications for Instructors, Practitioners, and Researchers

Systematic reviews of the research on educational technology trends can shine a light on where that technology is being deployed and how it is being evaluated. As is clear from this review of the research since the start of the pandemic, the forced deployment of forms of online learning around the globe has set in motion hundreds, if not thousands, of researchers who are concerned with the impact on the learner, instructor, course, and organizational or institutional level. No longer can instructors, communities, governments, schools, or higher education entities sit idly by and ignore online and blended forms of learning. The students in their local K-12 school communities or attending institutions of higher learning in their cities, as well as the workers in the companies or governments organizations in their region or across the state or provincial lines, are now relying on quality online learning courses and programs to equip them for their future careers, prepare them for entrance into higher levels of education, and reskill them for new or emerging job roles and responsibilities.

Online forms of learning are pervasive. As this study, as well as the recent one from Mishra et al. (2021) before, revealed, online and remote learning research is currently being conducted across the world. This implies that all teachers will need professional development for such online teaching at some point in their careers, especially, during tumultuous times such as a public health emergency or weather-related catastrophe. Similarly, students need preparedness and readiness training. And, as young people are increasingly learning from home, their parents need such readiness training and online learning advice. Of course, proactive training programs will lessen the burden when the next tragedy arises.

At the same time, researchers in the online learning camp need to ponder their long-term goals and research possibilities. No longer will one-off interventional or observational studies be enough; researchers intending to make a substantive contribution have to conduct studies or initiatives that are cross-institutional, cross-cultural, or longitudinal in nature as well as involving mixed methods to help triangulate the data obtained so as to provide a clearer understanding of the implementation and impact of online teaching and learning. They also need to conduct research on emerging flexible and blended forms of learning that were experimented with during the pandemic and that were continued or refined after it. Such novel forms of learning are not going away. And researchers must find ways to share their findings on the known gaps in the research on fully online and blended learning with others both locally and internationally.

Online learning possibilities have expanded to every citizen of this planet as a result of the COVID-19 pandemic. More flexible and open models of learning were experimented with in the first weeks, months, semesters, and now years. Some of these experiments were highly successful; others clearly were not. As a result, online learning quality remains a pressing concern. It is also true that there are many doors and windows now open to learners, educators, researchers, institutions, organizations, and governments today that were fully closed just a few short years ago. It is time to push on and make new discoveries and design novel pedagogical methods that can advance the various forms of online teaching and learning taking place around the planet today.

Conclusions

The education world entered a state of turmoil in early 2020 due to a public health pandemic that threatened the lives of nearly everyone on this planet. Instructors across educational sectors had to adjust their teaching practices, many of them in transformative ways never considered or contemplated. With those sudden and often transformative changes came interesting shifts in the research on online learning uncovered in this systematic review. However, by the spring of 2022, some two years later, there had been a significant reduction in deaths in the United States resulting from COVID-19 due to several viable vaccines, improved understanding of effective public health practices, and other factors. As deaths abated, a prevailing controversy about whether a controlled pandemic or endemic had emerged (Park, 2022). In fact, the Centers for Disease Control and Prevention (CDC) predicted that COVID-19 was likely to become an endemic disease soon (Charumilind et al., 2022). Accordingly, there will likely be additional adjustments and changes in teaching and learning in the post-COVID-19 era. As those adjustments occur, additional reviews of the online and blended learning research literature will likely be needed.

This systematic review examined the research trends in online learning during COVID-19 from February 2020 to April 2022. As shown, this review of 191 peer-reviewed journal articles published in English shed some light on the direction of online learning research during the initial years of the pandemic. The findings reveal that during this time more researchers focused their research efforts on online courses and instructors, especially the course technology utilized during the pandemic, and fewer of them concentrated on learner characteristics and learning outcomes as much as they had in the past. This is a marked shift in the research in a short span of time. However, learner engagement in online learning remained of high interest to online researchers and educators during the pandemic. New research topics regarding parent involvement, technology acceptance, and instructors' perceptions of online learning emerged during the pandemic.

As the pandemic subsides, it will be interesting to determine if the research topics in online education identified in this study will continue to be the areas of concentration witnessed in the relevant journals and publications. It will also be intriguing to see how these topics evolve over the next decade and in what directions. Future investigations should explore how the research topics evolve post-pandemic as new technologies, delivery mechanisms, and pedagogical practices are developed and refined. Whatever the direction, these are exciting times for online learning research and development as well as for those teaching in these continually evolving online environments.

Acknowledgement

This study was supported by 2022 Research Grant from Kangwon National University.

Declarations

The authors declare no conflicts of interest in this research.

The data used and/or analyzed in the current study are available from the author upon request.

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Appendix: A

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