

Reformulating Education for a digital Era: A systematic Review of Digital Literacy and Learning Transformation During the COVID -19 Pandemic

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Abstract: The pandemic forced a rapid and global shift to digital education, disrupting conventional pedagogical practices. This transformation exposed both structural limitations and opportunities within existing educational systems. This study aims to synthesize lessons from the pandemic and conceptualize the transformation of educational programs and learning approaches from a philosophical and foundational perspective. We conducted a systematic literature review (n = 15 studies) following PRISMA guidelines and integrated a philosophical analysis grounded in constructivism and the philosophy of praxis. The review identified four central themes: the emergence of digital literacy as a multidimensional and indispensable competency; the accelerated institutional adoption of hybrid and technology-mediated learning models; the persistence of a multi-layered digital divide that shapes access and learning outcomes; and the growing need for teacher capacity-building to sustain pedagogical innovation. The philosophical lens reveals that these shifts represent not only technical adjustments but also deeper epistemological and axiological transformations in the meaning of teaching and learning. The study concludes that the pandemic acted as a catalyst for a permanent pedagogical reorientation, emphasizing the urgency of policies that promote digital equity and embed technology within a constructivist, praxis-oriented, and humanistic philosophical framework. Its novelty lies in integrating philosophical analysis to reinterpret digital education transformation, offering conceptual guidance for developing adaptive, sustainable, and value-driven educational programs in the post-pandemic era.

Keywords: COVID-19 Pandemic, Digital Literacy, Online Learning, Philosophy of Education, Program Reformulation

A. Introduction

The COVID-19 pandemic is the biggest disruptive event in the history of modern education. The COVID-19 pandemic has created the most severe disruption to global education systems in history, forcing more than 1.6 billion learners in over 190 countries out of school at the peak of the crisis (Harmey & Moss, 2023). Since early 2020, schools and universities worldwide have been forced to rapidly transition from face-to-face learning to online learning to ensure the continuity of the educational process (Bertoletti & Karpiński, 2024). This drastic change relates not only to the use of technology but also to a paradigm shift in how education is designed, implemented, and evaluated (Alam et al., 2022). Numerous international and national studies have shown that the pandemic has accelerated the digitalization of education to levels previously unattainable through regular reforms. The pandemic created an emergency that forced the education system to shift to a digital model in record time, driving innovation and technological adoption at levels previously thought unattainable (Cone et al., 2022).

The success of the learning process during the pandemic is highly dependent on the digital literacy of teachers including technical, pedagogical, and managerial skills in utilizing learning technology, as shown that digital leadership among school principals increased the integration of technology by teachers during the pandemic (Alajmi, 2022). This is in line with the finding that the pandemic has highlighted three levels of the digital divide access, capability, and utilization which significantly impact the effectiveness of online learning (Guo & Wan, 2022). This means that the challenge of education in the pandemic and post-pandemic era is not only providing digital devices, but also ensuring the equitable distribution of digital literacy competencies across all levels: teachers, students, and educational institutions. The COVID-19 pandemic has disordered the educational process across the globe, as schools suddenly had to provide their teaching in an online environment (Werfhorst et al., 2022).

In addition, the pandemic accelerated the development of new learning models such as online learning, blended learning, and hybrid learning. This led to the introduction of the term Emergency Remote Teaching (ERT) to describe the sudden transition to online learning (Technol et al., 2021). However, several subsequent studies confirmed that this period marked the beginning of a more permanent transformation in digital pedagogy. Learning was no longer understood as a classroom-bound activity, but as a learning experience that leveraged technology to provide greater flexibility, personalization, and access.

However, various literature also emphasizes that digital transformation does not come without problems. This phenomenon can lead to inequality since the students do not have equal access to improving their [digital literacy] (Peng, 2022).The

pandemic has exacerbated educational inequalities, especially for students from low-income families and remote areas. This finding is consistent with the articles analyzed in this study, which show that the digital divide remains a major barrier to the effective and equitable implementation of digital learning.

This major change has prompted the need for curriculum reform and education policies, as well as strengthening educator competencies to align with the challenges of the digital era. Digital literacy is no longer considered an optional skill, but a fundamental 21st-century competency, as emphasized (Tsz et al., 2023). Therefore, post-pandemic educational transformation must be based on humanizing philosophical thinking, so that technology not only increases efficiency but also strengthens human values in education (Eslit, 2023). Ki Hadjar Dewantara's thoughts on student-centered education and Nel Noddings' ideas on care ethics provide an important foundation that digital education must remain oriented towards humanization, not just digitalization.

Based on a synthesis of 15 scientific articles, this study aims to illustrate how the pandemic has fundamentally changed the educational landscape, particularly regarding strengthening digital literacy, changing learning models, and the challenges of the digital divide. Furthermore, this study develops an integrated conceptual framework to understand the new direction of post-pandemic education that is more inclusive, adaptive, and based on philosophical educational values. This introduction also serves as a foundation for further discussion on the theoretical and practical contributions of digital transformation in education

B. Methods

This study employs a Systematic Literature Review (SLR) guided by PRISMA 2020 standards. The design aims to systematically identify, evaluate, extract, and synthesize scientific publications on digital literacy, learning transformation, and the reformulation of educational programs during the COVID-19 pandemic. A philosophical lens constructivism and the philosophy of praxis is incorporated to interpret the deeper pedagogical implications of the findings.

C. Results and Discussion

This research resulted in 15 selected articles from the Systematic Literature Review (SLR) process using the PRISMA diagram (Ramasamy, 2022). The research findings are summarized into several main categories relevant to the study's focus on digital literacy, learning transformation during the pandemic, and reformulation of educational programs from a philosophical perspective.

Table 1. Articles Reviewed

No.	Author (Year)	Title	Method	Findings	Conclusion
1.	(Bahçelerli & Çelik, 2022)	Digital literacy during COVID-19 distance education: Evaluation of communication-based problems in line with student opinions	Research using case study (qualitative method)	Before the pandemic, participants frequently met with friends/family ("able to meet with everyone at any time"), participated in social activities, and interacted face-to-face. During the pandemic, communication was mostly online, with no physical meetings, and some participants met at home via video calls or social media. Negative psychological impacts included psychological difficulties, internet addiction, a sense of missing face-to-face communication, and financial problems (for some).	This study concludes that students' digital literacy is not yet fully adequate to optimally support distance learning. Communication between students and instructors during online learning faces various barriers: both technical and psychological limitations (e.g., feelings of isolation and lack of motivation).
2.	(Brianza et al., 2024)	The digital upside of the pandemic: Its impact on pre-service teachers' technology knowledge and confidence	The authors studied three cohorts of preservice (pre-service) upper-secondary-school teachers at a Swiss university: pre-lockdown (n = 179), during lockdown (n = 48), and post-lockdown (n = 228).	Preservice teachers in the post-lockdown cohort reported significantly higher levels of technological knowledge (TK) and technological pedagogical content knowledge (TPCK), compared to the pre-lockdown cohort	Despite the disruptions caused by the pandemic (lockdowns, remote teaching), the shift to emergency remote education appears to have had a positive "silver lining" for preservice teachers' technological preparedness: after lockdown, many feel more confident in their technological knowledge (TK) and competence to teach with technology (TPCK)
3.	(Dhawan, 2020)	<i>A panacea in the time of COVID-19 crisis.</i> Journal of Educational	This article is a conceptual view/reflective essay (not an empirical quantitative study), as Dhawan outlines arguments and analysis on	Strengths of online learning during a crisis: Accessibility: e-learning allows students from remote locations to	Dhawan concluded that online learning could be a "panacea" during the COVID-19 crisis, as its flexibility, potential access, and cost-efficiency are particularly

		Technology Systems.	the role of online learning during the COVID-19 crisis.	<p>continue learning due to geographic and time flexibility. Cost: reduces transportation, accommodation, and operational costs associated with face-to-face learning. Time flexibility: students can learn "anytime, anywhere," thus supporting lifelong learning. Pedagogical innovation: the use of video, text, audio, and combinations (blended learning, flipped classroom) allows for a variety of teaching and learning methods. Weaknesses: Digital divide: not all students/teachers have adequate devices, internet access, or a stable connection. Low digital literacy: many teachers and students are unfamiliar with digital learning tools and need step-by-step guidance in using e-learning tools. Social interaction: the loss of face-to-face interaction can weaken the personal connection between teachers and students.</p>	<p>helpful when face-to-face learning is not possible. However, for e-learning to be effective and equitable, significant investment in digital infrastructure (devices and internet access) and digital literacy education for teachers and students is needed. Educational institutions need to design guidelines or protocols for e-learning use (e.g., tool usage instructions, mixed-format content) to ensure a more structured and high-quality transition to online learning. Dhawan also suggested that going forward, education should not return entirely to the traditional face-to-face model, but rather adopt a hybrid (blended) model that leverages technology to increase the resilience of the education system in the face of future crises.</p>
4.	(Catherine & Hannah, 2025)	Digital Competencies of Facilitators: A Panacea for effective	The research uses a descriptive survey design, namely a descriptive survey.	<p>Facilitators' Digital Competence Levels Facilitators demonstrated high levels of digital literacy across various domains: digital devices, pedagogical skills, technological proficiency,</p>	<p>Digital competencies as a panacea Digital competencies of facilitators are crucial as a panacea for enhancing the effectiveness of instructional</p>

		instructional delivery in open and distance learning in Higher Education in the South-South Zone of Nigeria		communication and collaboration tools, and assessment and feedback in digital contexts. For example, in terms of content creation skills, they strongly agreed that they could use PowerPoint, collaborate, and communicate material. The grand mean was approximately 3.45 (scale not specified, but likely 1–5) with a standard deviation of ~0.76.	delivery in open and distance learning in higher education, particularly in the South-South zone of Nigeria.
5.	(Usman et al., 2022)	Social media literacy: fake news consumption and perception of COVID-19 in Nigeria	The study adopted a survey design.	The study found that the participating students generally possessed what the authors call “the requisite media literacy” – i.e., they were fairly able to identify fake news on social media.	The authors conclude that social media literacy matters: when people (in this case, students) have sufficient media-literacy skills, they are better equipped to resist being misled by fake news, which helps shape more accurate perceptions about COVID-19 – even when exposed to misinformation.
6.	(Yu & Liu, 2024)	A systematic review of the effectiveness of online learning in higher education during the COVID-19 pandemic period.	systematic review.	The results of these 25 studies varied widely: there was no strong consensus on whether online learning during the pandemic was generally "effective" or not. Of the 25 studies: 9 studies (36%) reported that online learning was effective. 13 studies (52%) stated that online learning was ineffective in the context of the pandemic.	Because research findings vary widely, it is difficult to draw a single conclusion that online learning during the pandemic is always effective. Nevertheless, this review highlights important factors that need to be considered to increase the effectiveness of online learning: digital infrastructure, good instructional design, more

7.	(Werfhorst et al., 2022)	The digital divide in online education: Inequality in digital readiness of students and schools. <i>Computers & Education Open</i>	The study used secondary data analysis from two large international surveys.	<p>3 studies (12%) showed neutral results (it was unclear whether it was effective or not).</p> <p>Digital divide among students There are significant differences in students' ICT skills related to SES: students from higher socioeconomic backgrounds are substantially more proficient in computing and information literacy skills than students from lower SES. Differences based on migration background are also found: in some countries, students with migration backgrounds have lower ICT skills than non-migrants. Gender differences: in some countries, girls show slightly higher ICT skills scores than boys in the context of digital education. In terms of ICT use for school activities, differences between SES also emerge, but tend to be smaller than the differences in skills.</p>	<p>constructive social interactions, and emotional support for students. The authors also note that the challenges of online learning are more severe in developing countries, where infrastructure and access issues are particularly acute. Research concludes that the digital divide was already evident before the pandemic: differences in ICT skills between students based on SES, gender, and migration were significant and a dominant factor in students' digital readiness. However, schools' digital readiness (ICT infrastructure and teacher competencies) did not consistently reflect the social composition of students. In other words, schools serving students from disadvantaged SES or migration backgrounds did not necessarily have lower digital infrastructure and competencies.</p>
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8.	(Mahajan et al., 2023)	COVID-19 and management education: From pandemic to endemic	systematic literature review	The number of studies on the impact of COVID-19 on management/business education has increased dramatically: from just 2 studies in 2020, to 16 in 2021, and 38 in 2022.	The authors conclude that the impact of COVID-19 on management education is unprecedented and broad, affecting institutions across the globe, regardless of discipline or geography.
9.	(Yun, 2023)	Digitalization challenges in education during COVID-19: A systematic review	This research is a systematic review using the PRISMA approach to examine the literature related to the challenges of digitalization in education during the COVID-19 pandemic.	Access and infrastructure gaps. Many students, especially those from poor or rural backgrounds, face serious challenges in accessing digital devices and internet connections. These inequalities exacerbate the digital divide and make it difficult to implement online learning equitably.	The authors conclude that the COVID-19 pandemic has accelerated digitalization in education, but many structural challenges remain, particularly related to infrastructure access, educator preparedness, and social inequality. To address these challenges, policies and interventions are needed that focus on: Improving digital infrastructure, especially for students from disadvantaged backgrounds. Digital literacy training for teachers, so they can design effective and meaningful online learning. Pedagogical design that is long-term (not just emergency) in nature, integrating social interaction and digital collaboration.

10.	(Tinmaz et al., 2022)	A systematic review on digital literacy	The research uses a systematic literature review method.	This theme encompasses definitions of digital literacy in many contexts: computer literacy, media literacy, cultural literacy, disciplinary literacy, data literacy, internet literacy, and multiliteracies. For example, computer literacy refers to the use of software/hardware, while multiliteracies involve understanding the context of digital culture.	This research concludes that digital literacy is highly multidimensional and cannot be simply defined as "operating a computer" it encompasses diverse competencies, skills, and mindsets. Based on the thematic analysis, the digital literacy framework developed by the authors can be used as a foundation for developing contemporary digital literacy frameworks, for example in education or policy.
11.	(Su et al., 2022)	I enjoy critical thinking, and I am in control": Examining the influence of media literacy factors on misperceptions amidst the COVID-19 infodemic	The study used a survey design. The authors collected data via an online questionnaire distributed from March 3 to April 18, 2020 in two major Chinese cities (Xi'an and Qingdao).	SMIS → COVID-19 misperceptions: There was a positive association. People who sought COVID-19 news information on social media more frequently were more likely to endorse COVID-19 misperceptions.	The study concludes that both information behavior (seeking news on social media) and individual traits (critical-thinking orientation, perceived media control) shape susceptibility to misinformation during an infodemic.
12.	(Cullinan et al., 2021)	The disconnected: COVID-19 and disparities in access to quality broadband for higher education students	The authors combined national data on domiciles of students enrolled in higher-education institutions (HEIs) in Ireland (academic year 2017/18) with spatial data on broadband coverage from Ireland's national broadband	About 1 in 6 students (~ 16.6%) in the dataset corresponding to 27,869 out of 167,576 enrolments lived in areas with poor broadband coverage (below the 50% coverage threshold)	The shift to mass online or blended learning during the COVID-19 pandemic risks deepening a digital divide in higher education, because a non-trivial fraction of students lack reliable access to high-quality internet at home

13.	(Orville, 2020)	COVID-19 causes unprecedented educational disruption: Is there a road towards a new normal?	plan, using Geographic Information Systems (GIS) conceptual analysis and literature review.	Unprecedented educational disruptions have occurred due to school closures affecting more than 1.5 billion students worldwide. Digital access inequality is increasing, especially for students from low-income families and developing countries.	The author concludes that the COVID-19 pandemic is a turning point for global education.
14.	(Aristovnik et al., 2023)	Impact of the COVID-19 pandemic on online learning in higher education: a bibliometric analysis	Bibliometric analysis of literature related to online learning in higher education during the COVID-19 pandemic	The COVID-19 pandemic has significantly increased research interest in online learning in higher education, with the number of publications increasing drastically.	This study concludes that the pandemic has led to a significant surge in research in the field of online learning in higher education, indicating that the academic community is responding to the urgent need to understand and improve online learning.
15.	(Liu, 2021)	Bridging Digital Divide Amidst Educational Change for Socially Inclusive Learning During the COVID-19 Pandemic	mixed-methods (quantitative + policy)	Access to distance learning and educational technology such as devices and the internet has significantly impacted students' learning experiences during the pandemic. This means that the availability of "digital capital" determines how well students can learn remotely.	Distance learning and educational technology can be a quick fix to school disruptions caused by the pandemic but a real risk arises if the "digital divide" is not addressed: it could reinforce social/educational inequalities.

The analysis of 15 articles yielded four main interrelated findings that illustrate how the pandemic has changed the epistemological structure, pedagogy, and praxis of education.

Digital Literacy as a Fundamental Competence

The first finding shows that digital literacy is a core competency for teachers and students. Digital literacy encompasses not only the ability to use digital platforms but also encompasses information selection skills, digital ethics, data security, and reflective thinking skills. Philosophically, digital literacy is the construction of knowledge in line with constructivism, where students become creators of meaning, not just recipients of information. Teachers with high digital literacy can design learning experiences that enable students to construct knowledge through digital interactions, as emphasized by (Falloon, 2020). From an epistemological perspective, digital literacy transforms the way knowledge is acquired and validated. Knowledge is no longer a linear flow from teacher to student, but rather a networked process. From an axiological perspective, digital literacy is also related to values such as ethical literacy, security, and responsibility in the digital space.

Transformasi Pembelajaran Menuju Model Online dan Hybrid

The second finding shows that the pandemic has driven a massive transformation of learning toward online and hybrid models. The articles emphasize that LMSs, collaborative applications, and blended learning models are solutions for maintaining learning continuity (Wang, 2024). Philosophically, this shift reinforces flexible pedagogy that aligns with constructivism, as hybrid learning provides space for students to construct knowledge through digital and face-to-face experiences. This model also has a humanistic feel, as it gives students freedom and space for personalization although it doesn't always work if technical support is minimal. Emphasizes that the effectiveness of digital models is greatly influenced by instructional design and technical readiness (Catherine & Hannah, 2025).

The Digital Divide as a Structural Challenge

The third finding shows that there is still a large digital divide between urban and rural areas, especially regarding access to devices and internet networks (Werfhorst et al., 2022). Philosophically, the digital divide is not just a technical issue, but an issue of social justice (axiology). When some students lack adequate access, digital transformation has the potential to widen the educational gap. This problem demands reflective action. Education policy must not only acknowledge inequality, but also change the structural conditions that cause this inequality.

Reformulation of Education Programs

The fourth finding suggests that education needs to be reformulated to meet the demands of the digital era. This reformulation includes: 1) Integrating technology into the curriculum; 2) Digital literacy training for teachers; 3) Digital-based assessments; 4) Flexible learning policies. This reformulation rests on the foundation of the philosophy of praxis, namely the cyclical relationship between theory and practice. Technology should not be positioned merely as a tool, but as an integral part of a meaningful learning process. However, several articles note that this reformulation has not been accompanied by institutional readiness, resulting in teachers experiencing increased workloads and decreased learning effectiveness. This demonstrates the disparity between theoretical demands and practical realities on the ground.

Research Implications and Limitations

Based on the findings and philosophical analysis, there are three main implications: 1) For Teachers: Teachers need to develop digital literacy sustainably, covering technical and ethical aspects; Teachers need to design constructivism-based learning placing students as active subjects in digital exploration; Teachers must be able to flexibly combine traditional and digital pedagogy; 2) For School Principals: Adequate digital infrastructure is needed; Internal policies are needed that support teacher workload management when implementing digital learning; There is a need for a structured and relevant professional development program; and 3) For Policy Makers: Affirmative policies are needed for areas with limited access to technology; Integration of technology into the curriculum must consider pedagogical and humanistic aspects, not just technical orientation; There is a need for national standards for digital literacy for students and teachers. The research limitations are: 1) Only 15 articles were analyzed, so generalization is still limited; 2) Most of the articles are in English, so research from the local Indonesian context may not be fully represented; 3) The methodological quality of the source articles varies, so the depth of the findings depends on the strength of the primary data from each study; 4) The focus on the pandemic period makes the findings highly contextual; and 5) post-pandemic changes may require reanalysis.

D. Conclusion

Based on a synthesis of 15 articles, this study addresses the research problem formulation with four main findings. First, regarding the question of what competencies are needed for post-pandemic learning, the findings indicate that digital literacy has become a fundamental competency for both teachers and students. This literacy encompasses technical skills, digital ethics, information security, and evaluative skills in managing digital knowledge. Second, addressing the question of

changing learning models, this study found that learning is shifting toward online and hybrid models, which reinforce the principles of flexibility, independent learning, and digital constructivism. This shift requires teachers to design learning experiences that balance in-person interactions and digital experiences. Third, regarding implementation challenges, this study identified that the digital divide remains a significant structural barrier, particularly in regions with limited devices and connectivity. This directly impacts equality of learning opportunities and the effectiveness of digital learning. Fourth, to address questions about the direction of educational policies and programs, the findings emphasize the need for curriculum reformulation, teacher training, and digital assessment design based on philosophical educational values such as humanism, constructivism, and praxis. This reformulation positions technology not merely as a tool, but as a meaningful pedagogical medium in the learning process. This study provides an important contribution in the form of a comprehensive, synthetic framework for understanding the post-pandemic educational landscape. It integrates three key dimensions digital literacy competencies, pedagogical transformation, and digital equity and adds a philosophical foundation that strengthens the meaning of these changes. Thus, this research broadens theoretical and practical understanding of how education should be designed, managed, and evaluated in the post-pandemic era. To strengthen and extend these findings, further research is recommended to conduct a longitudinal study to examine the long-term effectiveness of the hybrid learning model on learning outcomes, student motivation, and teachers' digital competence. Conduct classroom action research that develops, implements, and evaluates teacher professional development programs based on the multidimensional digital literacy framework found in this study. Analyze the local context more specifically, especially in areas with limited digital infrastructure, to formulate more targeted affirmative policies. Examining the digital leadership model as a determining factor for the success of school transformation in the post-pandemic era. Research digital assessment designs that align with constructivist pedagogy and 21st-century learning needs.

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References

- Alajmi, M. K. (2022). The impact of digital leadership on teachers ' technology integration during the COVID-19 pandemic in Kuwait. *International Journal of Educational Research*, 112(January), 101928. <https://doi.org/10.1016/j.ijer.2022.101928>
- Alam, M., Hasan, N., Jahan, I., Akther, T., & Hossain, J. (2022). *Heliyon Paradigm shifting of education system during COVID-19 pandemic: A qualitative study on*

- education components*. 8(March). <https://doi.org/10.1016/j.heliyon.2022.e11927>
- Aristovnik, A., Karampelas, K., Umek, L., & Ravšelj, D. (2023). *Impact of the COVID-19 pandemic on online learning in higher education : a bibliometric analysis*. August, 1–13. <https://doi.org/10.3389/educ.2023.1225834>
- Bahçelerli, N. M., & Çelik, M. U. (2022). *Digital Literacy During COVID-19 Distance Education ; Evaluation of Communication-Based Problems in Line With Student Opinions*. 13(July), 1–6. <https://doi.org/10.3389/fpsyg.2022.809171>
- Bertoletti, A., & Karpiński, Z. (2024). Investigating the effect of COVID - 19 disruption in education using REDS data. *Large-Scale Assessments in Education*. <https://doi.org/10.1186/s40536-024-00195-x>
- Braun, V., & Clarke, V. (2023). Toward good practice in thematic analysis: Avoiding common problems and becoming a knowing researcher. *International Journal of Transgender Health*, 24(1), 1–6. <https://doi.org/10.1080/26895269.2022.2129597>
- Brianza, E., Schmid, M., Tondeur, J., & Petko, D. (2024). The digital silver lining of the pandemic : The impact on preservice teachers ' technological knowledge and beliefs. *Education and Information Technologies*, 29(2), 1591–1616. <https://doi.org/10.1007/s10639-023-11801-w>
- Catherine, U., & Hannah, D. (2025). *Digital Competencies of Facilitators : A Panacea for effective instructional delivery in open and distance learning in Higher Education in the South-South Zone of Nigeria*. 9(2), 117–127. <https://doi.org/10.56201/wjimt.v9.no2.2025.pg117.127>
- Cone, L., Decuyper, M., Hartong, S., Hillman, T., Landri, P., Player-koro, C., & Rönnberg, L. (2022). *Pandemic Acceleration : Covid-19 and the emergency digitalization of European education*. <https://doi.org/10.1177/14749041211041793>
- Cullinan, J., Flannery, D., Harold, J., Lyons, S., & Palcic, D. (2021). *The disconnected : COVID - 19 and disparities in access to quality broadband for higher education students*. 1–21. <https://doi.org/10.1186/s41239-021-00262-1>
- Dhawan, S. (2020). *Online Learning : A Panacea in the Time of COVID-19 Crisis*. <https://doi.org/10.1177/0047239520934018>
- Eslit, E. R. (2023). *Redefining Literature Education in the Digital and Post-Pandemic Landscape*. <https://doi.org/10.20944/preprints202311.1684.v1>
- Falloon, G. (2020). From digital literacy to digital competence : the teacher digital competency (TDC) framework. *Educational Technology Research and Development*, 68(5), 2449–2472. <https://doi.org/10.1007/s11423-020-09767-4>
- Guo, C., & Wan, B. (2022). *Technology in Society The digital divide in online learning*

- in China during the COVID-19 pandemic. *Technology in Society*, 71(March), 102122. <https://doi.org/10.1016/j.techsoc.2022.102122>
- Harmey, S., & Moss, G. (2023). Learning disruption or learning loss : using evidence from unplanned closures to inform returning to school after COVID-19. *Educational Review*, 00(00), 1–20. <https://doi.org/10.1080/00131911.2021.1966389>
- Liu, J. (2021). *Bridging Digital Divide Amidst Educational Change for Socially Inclusive Learning During the COVID-19 Pandemic*. <https://doi.org/10.1177/215824402111060810>
- Mahajan, R., Marc, W., Kumar, S., & Sareen, M. (2023). The International Journal of Management Education COVID-19 and management education : From pandemic to endemic. *The International Journal of Management Education*, 21(2), 100801. <https://doi.org/10.1016/j.ijme.2023.100801>
- Orville, H. (2020). COVID - 19 causes unprecedented educational disruption : Is there a road towards a new normal? *Prospects*, 49(1), 11–15. <https://doi.org/10.1007/s11125-020-09475-0>
- Peng, D. (2022). *A Literature Review of Digital Literacy over Two Decades*. 2022. <https://doi.org/10.1155/2022/2533413>
- Ramasamy, A. (2022). PRISMA 2020: Key Changes and Implementation Aspects. *Journal of Oral and Maxillofacial Surgery*, 80(5), 795–797. <https://doi.org/10.1016/j.joms.2021.12.018>
- Su, Y., Ka, D., Lee, L., & Xiao, X. (2022). Computers in Human Behavior “ I enjoy thinking critically , and I ’ m in control ” : Examining the influences of media literacy factors on misperceptions amidst the COVID-19 infodemic. *Computers in Human Behavior*, 128(June 2021), 107111. <https://doi.org/10.1016/j.chb.2021.107111>
- Technol, J. E., Educ, H., Bond, M., Bedenlier, S., Marín, V. I., & Händel, M. (2021). Emergency remote teaching in higher education : mapping the first global online semester. *International Journal of Educational Technology in Higher Education*. <https://doi.org/10.1186/s41239-021-00282-x>
- Tinmaz, H., Lee, Y. T., Ivanovici, M. F., & Baber, H. (2022). A systematic review on digital literacy. *Smart Learning Environments*. <https://doi.org/10.1186/s40561-022-00204-y>
- Tsz, D., Ng, K., Ka, J., Leung, L., Su, J., Chi, R., Ng, W., Kai, S., & Chu, W. (2023). Teachers ’ AI digital competencies and twenty - first century skills in the post - pandemic world. *Educational Technology Research and Development*, 71(1), 137–161. <https://doi.org/10.1007/s11423-023-10203-6>

- Usman, B., Msughter, A. E., Olaitan, A., Usman, B., Msughter, A. E., & Ridwanullah, A. O. (2022). Social media literacy : fake news consumption and perception of COVID-19 in Nigeria Social media literacy : fake news consumption and perception of COVID-19 in Nigeria. *Cogent Arts & Humanities*, 9(1). <https://doi.org/10.1080/23311983.2022.2138011>
- Wang, Y. (2024). Analyzing Teaching Effects of Blended Learning With LMS : An Empirical Investigation. *IEEE Access*, 12(March), 42343-42356. <https://doi.org/10.1109/ACCESS.2024.3352169>
- Werfhorst, H. G. Van De, Kessenich, E., & Geven, S. (2022). The digital divide in online education : Inequality in digital readiness of students and schools. *Computers and Education Open*, 3(July), 100100. <https://doi.org/10.1016/j.caeo.2022.100100>
- Yu, L., & Liu, C. (2024). A systematic review of the effectiveness of online learning in higher education during the COVID-19 pandemic period. *January*, 1-14. <https://doi.org/10.3389/feduc.2023.1334153>
- Yun, W. S. (2023). Digitalization challenges in education during COVID-19: A systematic review Digitalization challenges in education during COVID-19: A systematic review. *Cogent Education*, 10(1). <https://doi.org/10.1080/2331186X.2023.2198981>