



Adapting Educational Practices and Technologies in the Post-COVID-19 Era: A Scoping Review

Sara Gonçalves

University of Trás-os-Montes and Alto Douro

Bárbara Longa

University of Trás-os-Montes and Alto Douro

Isabel Barroso

University of Trás-os-Montes and Alto Douro and University of Porto

Conceição Rainho

University of Trás-os-Montes and Alto Douro and University of Porto

Vítor Rodrigues

University of Trás-os-Montes and Alto Douro and University of Porto

Abstract: The transformative impact of online tools in post-COVID-19 education is explored through a scoping review encompassing eight fundamental studies. This scoping review uniquely contributes to the existing literature by addressing specific gaps, such as the detailed comparison between pre- and post-pandemic educational practices and the underexplored aspects of digital tool integration across different disciplines. The analysis encompasses studies exploring the effectiveness of digital tools in libraries, archives, and museums and the feasibility of mobile app development for teaching practices. It also investigates the impact of subtitles on language learning, the implementation of flipped classrooms in geography education, and the effectiveness of scaffolding in online learning environments. Additionally, the review assesses Islamic education teachers' methods to enhance student motivation and engagement and compares the outcomes of online versus face-to-face anatomy teaching in medical schools. The findings reveal significant insights into the evolving landscape of education, highlighting both the opportunities and challenges of digitalization and online instruction. Overall, the research underscores the importance of adapting pedagogical strategies to meet the diverse needs of learners in the current and post-pandemic educational landscape.

Keywords: *Online tools; education; post-covid-19; online teaching; teaching practice*

Citation:

Gonçalves, S., Longa, B., Barroso, I., Rainho, C. & Rodrigues, V. (2025). Adapting educational practices and technologies in the post-COVID-19 era: A scoping review. *Current Issues in Education*, 26(1). <https://doi.org/10.14507/cie.vol26iss1.2253>

Accepted: 02/10/20

Adapting Educational Practices and Technologies in the Post-COVID-19 Era: A Scoping Review

Education plays a crucial role in shaping individuals and societies, providing knowledge, skills, and opportunities for personal and professional development (Idris et al., 2012). The COVID-19 pandemic has disrupted educational systems worldwide, and there was an urgent need to shift to online and distance learning (Li, 2022). In response to these challenges, audiovisual tools—such as video conferencing, pre-recorded lectures, instructional videos, and multimedia content—became essential components of the educational environment (Mayer, 2014). These tools have facilitated remote instruction by bridging physical distance, providing educational content access, and supporting interactive learning experiences (Bates & Sangra, 2011; Li, 2022).

In the post-pandemic educational landscape, audiovisual materials offer numerous advantages, including flexible, personalized, and independent learning opportunities. Students can access pre-recorded lectures and instructional content at their convenience, enhancing engagement, motivation, and comprehension (Huffman & Huffman, 2012). Furthermore, video conferencing platforms and multimedia resources enable real-time communication and collaboration, allowing for a blend of synchronous and asynchronous learning that encourages active participation, discussion, and peer-to-peer support. However, the rapid integration of these tools also poses challenges, including limited access to technology and connectivity, varying levels of digital literacy among students and educators, and the persistence of a digital divide that impacts equitable access to quality education (Stoian et al., 2022). While previous studies have explored integrating audiovisual tools in education, there remains a significant gap in understanding the specific changes in instructional methodologies and technologies pre- and post-pandemic. Given the transformative changes brought by COVID-19, this scoping review aims to assess the integration of audiovisual technology in education, particularly in the post-pandemic era. Specifically, this study addresses the following research questions:

1. How have educational institutions and educators adapted instructional methodologies and technologies to optimize student engagement and learning outcomes in the post-COVID era?
2. What are the observed impacts of specific digital tools—such as mobile apps, subtitles in language instruction, flipped classroom models, scaffolding techniques, and engagement methods used—on pedagogical effectiveness and student motivation?
3. What gaps exist in the current research on digital education and audiovisual integration, and what implications can be drawn for future educational policies and practices?

This review uniquely contributes to the existing literature by comprehensively examining audiovisual technologies across diverse educational contexts, including traditional, blended, and fully online learning environments. Additionally, this study highlights the timeliness of these insights, given the novelty of the post-COVID educational landscape and the continuous evolution of teaching strategies in response to technological advancements.

In doing so, this review aims to inform educators, policymakers, and researchers by providing an overview of current practices, identifying gaps, and outlining recommendations for future research. The findings are expected to contribute to a better understanding of how audiovisual tools can support more inclusive, adaptive, and effective educational experiences in a digital age.

Research Gaps

This review highlights several research gaps in integrating audiovisual technologies in post-COVID-19 education. First, while the current literature documents the effectiveness of digital tools in engaging students, there is limited research on the long-term impact of these tools on sustained motivation and learning outcomes across diverse educational levels. Additionally, studies examining the role of mobile applications in supporting real-time interaction and feedback are focused mainly on primary and secondary education, leaving a gap in understanding their effectiveness in higher education and specialized fields. There is also a need for comparative studies to determine the specific impacts of subtitles on language learning across various proficiency levels and language contexts. Furthermore, the scalability and sustainability of flipped classroom models in resource-limited and rural settings remain underexplored, posing a challenge for inclusive access. Finally, the literature lacks sufficient studies on culturally responsive audiovisual methods, particularly in fields like Islamic education, where tailored engagement strategies are crucial. Addressing these gaps in future research could provide a stronger foundation for implementing digital tools that are both effective and equitable.

Methods

Scoping Review Methodology

The primary objective of the scoping review is to comprehensively chart the landscape of existing research, identifying its scope and depth while pinpointing areas where research gaps exist, offering valuable direction for future investigations (Pham et al., 2014). Within this review, we adhere to the recommended five-stage approach (Arksey & O'Malley, 2005), encompassing: (1) formulating the research question, (2) identifying pertinent studies, (3) selecting studies, (4) organizing and synthesizing data, and (5) compiling, condensing, and presenting the outcomes.

Search Strategy

Research Question

Our study posited the following question: *How do educational institutions and practitioners adapt to and optimize instructional modalities and technologies in the post-COVID-19 era to enhance learning outcomes and student engagement?*

Identifying Relevant Studies

To address the research objectives of this study, a comprehensive literature search was conducted over an extended period to ensure thorough coverage of relevant studies. The search spanned from September 1, 2023, to October 1, 2023, to identify relevant articles related to utilizing audiovisuals in education after the COVID-19 pandemic. The search was performed in the following databases: PubMed (<https://www.ncbi.nlm.nih.gov>), Web of Science (<https://www.webofscience.com>), b-on (<https://www.b-on.pt>), Google Scholar (<https://scholar.google.com/>), and Scopus (<https://www.scopus.com>). These databases were selected based on their coverage of relevant fields, including education, technology, and psychology. The search terms were developed through an iterative process, considering the key concepts of audiovisuals, education, and the post-COVID-19 context. The search queries were constructed by combining the relevant keywords and search terms using Boolean

operators. For example, the query "(audiovisuals OR multimedia) AND education AND post-COVID-19" identified articles encompassing all three key concepts.

Inclusion Criteria

Studies included were: (1) Articles discussing the integration, utilization, impact, or implications of audiovisual technologies in educational settings post-COVID-19 pandemic. (2) Studies focusing on various educational settings, including but not limited to traditional classrooms, blended learning environments, or fully online/remote learning scenarios, were included to capture diverse applications of audiovisual technologies. (3) Articles that evaluated or discussed the impact of audiovisual tools on learning outcomes, student engagement, pedagogical approaches, access to education, or any other relevant educational outcome were included. (4) Peer-reviewed articles published between 2022 and 2023 were considered, ensuring the review covered the most recent and up-to-date literature within the chosen timeframe. The selection of peer-reviewed articles between 2022 and 2023 for this scientific study, which explores post-COVID education and integrating audiovisual technologies, is paramount due to its alignment with the immediate aftermath of the pandemic. This timeframe ensures the inclusion of the most recent and relevant literature, capturing emerging practices and innovations adopted in response to the transformed educational landscape. Focusing on this period also guarantees the incorporation of up-to-date insights, methodologies, and trends specific to the post-pandemic educational context, enhancing the study's credibility and relevance. By considering peer-reviewed articles within these two years, the research maintains a balance between timeliness, quality, and managing the scope of the review, which is crucial for comprehensively analyzing and synthesizing the dynamic changes in education following the COVID-19 crisis. (5) Research conducted globally, capturing diverse applications and contexts from different regions worldwide.

Exclusion Criteria

Studies excluded were (1) Grey literature, conference abstracts, unpublished studies, review articles, books, book chapters, and non-empirical studies. (2) Articles not directly addressing the impact or utilization of audiovisual tools in education post-COVID-19 were excluded. (3) Studies not conducted within an educational setting or lacking explicit relevance to educational contexts were excluded. The search summary is summarised in Table 1.

Table 1
The Search Strategy Summary

Items	Specification
Date of search	09/01/2023 – 10/01/2023
Database and other sources searched	PubMed, Web of Science, b-on, Google Scholar, and Scopus
Search terms used	Audiovisuals, multimedia, education, post-covid-19
Timeframe	Articles published between 2022 and 2023
Inclusion criteria	All included studies were available in English and Portuguese; all selected studies were relevant to the review topic.
Exclusion criteria	Studies in other languages only contained abstracts, papers published in conferences, books or book

	chapters, and studies not conducted within an educational setting or lacking explicit relevance to educational contexts.
Selection process	All sources selected by the first author

Types of Outcomes Measured

The outcome measured in this scoping review is the impact or implications of audiovisual technologies on various aspects of education in the post-COVID-19 era. This includes evaluating the effects of audiovisual tools on learning outcomes, student engagement, pedagogical approaches, access to education, and any other relevant educational outcomes. The review aims to capture the multifaceted impacts of integrating audiovisual technologies into educational settings following the COVID-19 pandemic, focusing on understanding how these technologies have influenced different facets of education.

Study Selection

Two authors conducted the screening process independently, each performing a duplicate review. One author (SG) meticulously examined all citations, reviewing titles and, when available, abstracts to identify potentially relevant studies. Concurrently, another author (BL) conducted a parallel screening. We obtained the full-text articles for additional evaluation for citations deemed relevant or lacking sufficient information for a clear decision. Any disagreements over eligibility during the screening or full-text review phases were resolved through team discussions, ensuring a comprehensive and rigorous assessment of the selected studies.

Data Extraction

Files (.ris format) containing the exported search results were saved and imported into the Rayyan web tool (Ouzzani et al., 2016). Rayyan facilitated the screening process by allowing the researchers to collaborate on selecting articles. The tool was used to import search results from multiple databases, conduct initial screening based on titles and abstracts, apply inclusion and exclusion criteria systematically and resolve any conflicts through discussion among the researchers. Each article was reviewed in detail within Rayyan to extract relevant information related to the integration, utilization, impact, or implications of audiovisual technologies in educational settings. Key data points such as study objectives, methods, sample size, results, and conclusions were systematically recorded.

Next, a data extraction table (SG) was developed. The extracted data included the journal, year of publication, title, main findings, limitations and effects of audiovisual tools. One author (SG) abstracted the information above, which a second author (BL) double-checked.

Data Analysis

After selecting the studies for review, we employed a thematic analysis approach to identify key characteristics and recurring themes across the literature. We developed a coding framework to ensure a systematic analysis based on an initial reading of the selected articles. This framework was organized around central themes related to integrating audiovisual technologies in post-COVID-19 education, such as mobile app usage, subtitles in language

learning, flipped classrooms, and scaffolding in online environments. Each study was coded according to these thematic categories, which allowed for structured data extraction and facilitated comparisons across studies.

We applied a two-stage coding process. In the first stage, open coding was used to identify each study's emerging concepts or unique characteristics. This included factors such as educational level, subject focus, and type of audiovisual tool employed. In the second stage, we used axial coding to group these initial codes into broader themes, such as "student engagement," "instructional challenges," and "technological accessibility." This approach helped to capture the commonalities among studies and allowed us to examine the relationships between different educational practices and outcomes.

The coding framework guided our analysis by providing a structured means of capturing and comparing the data across diverse study contexts, helping us systematically identify overarching trends and unique insights. Additionally, this framework enabled us to recognize gaps in the literature, such as the limited focus on long-term impacts, scalability, and accessibility challenges within specific educational levels and settings.

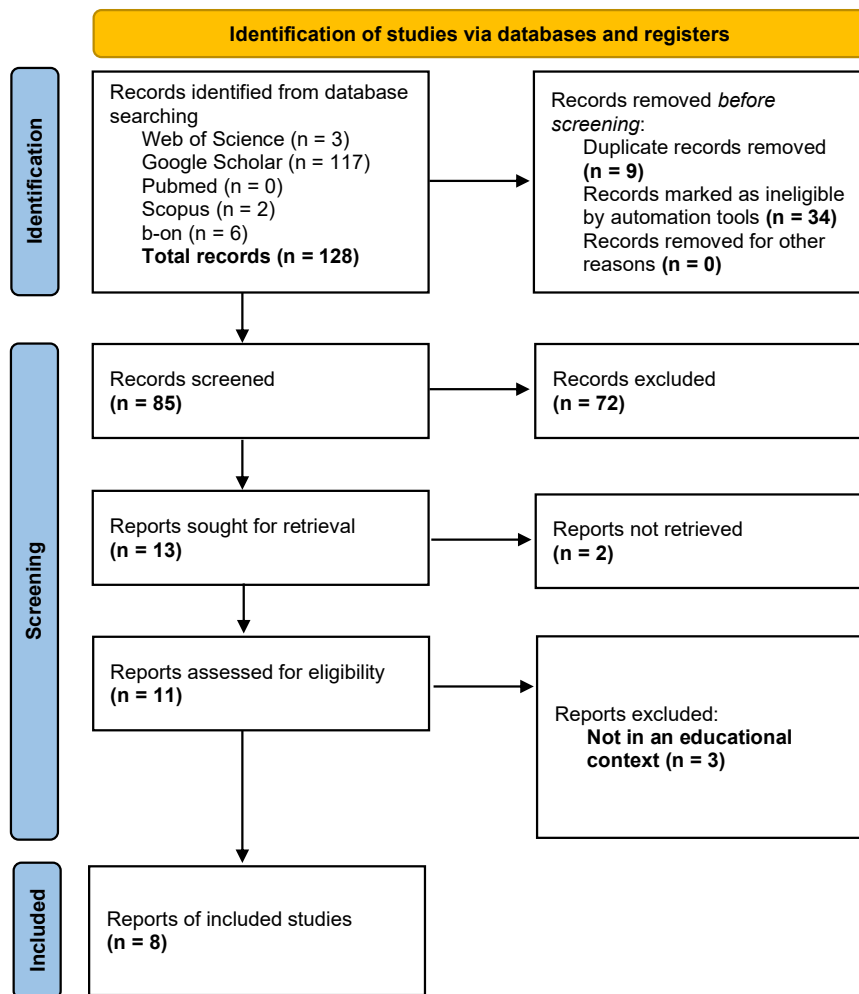
Results

Study Selection

The search was executed in the selected databases, initially retrieving 128 articles. Duplicate articles were removed and marked as ineligible by automation, resulting in a preliminary pool of 85 unique articles. The search included peer-reviewed articles published between 2022 and 2023 written in English or Portuguese, the languages the researchers speak. Titles and abstracts of the articles were reviewed to identify potentially relevant studies. Articles irrelevant to the research topic were excluded at this stage, leading to a refined set of 13 articles. Full-text access to these articles was obtained through institutional subscriptions and interlibrary loan services when necessary. However, two reports based on titles and abstracts were not retrieved during the screening process due to the inaccessibility of the full text. The search process and the inclusion of articles were documented and tracked using reference management software. The entire search process is summarised in a flowchart (Figure 1), illustrating the number of articles identified, screened, and included at each stage under the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2021).

Figure 1

Diagram of Article Selection and Inclusion Process on the PRISMA Methodology by Page et al., 2021



This figure illustrates the number of articles identified, screened and included at each stage. Following rigorous application of inclusion and exclusion criteria, eight articles were considered suitable for analysis, as displayed in Table 2, including the main findings, limitations and effects of audiovisual tools.

Table 2
Scoping Review Articles (n=8)

Article Title, Year, Reference	Main Findings	Limitations	Effects of Audiovisual Tools
Technologies changing in the post pandemic era, 2022, (Oyelude, 2022)	<ul style="list-style-type: none"> -There is a greater need for digital tools in libraries, archives, and museums in the post-COVID-19 era. -These digital tools offer services that can be accessed anytime, anywhere, and from any device, highlighting the importance of remote access. -Libraries need to adapt to the changing nature of education by incorporating more artificial intelligence, audiovisual immersive technologies, and digital and media literacy initiatives. -Technologies such as cloud-based systems, security measures, analytics, and automation 	<ul style="list-style-type: none"> - The study might provide a general overview without delving deeply into specific challenges or opportunities libraries, archives, and museums face in integrating audiovisual technologies post-COVID-19. - The study may not cover all aspects of the integration of audiovisual technologies into post-COVID-19 education, potentially overlooking important factors or developments in this area 	<ul style="list-style-type: none"> - On student engagement. Digital tools increased student engagement by providing remote access to services. - On access to education: Emphasized the role of digital literacy initiatives in improving remote access. - On pedagogical approaches: Suggested incorporating AI and immersive technologies in education

Gonçalves et al.: Educational practices in the post-COVID era

	<p>are essential for thriving in the new normal of service delivery.</p> <ul style="list-style-type: none"> -Library, archives, and museum workers need to prioritize re-skilling to adapt to the evolving service delivery landscape in the post-pandemic era. 	<ul style="list-style-type: none"> - Findings from specific libraries, archives, and museums featured in the study may not be applicable universally, limiting the generalizability of the conclusions. 	
<p>The Feasibility of Digitalizing Teaching Practice Through Mobile App Development: Supervisors' Reactions, 2023, (Davids et al., 2023)</p>	<ul style="list-style-type: none"> - The study discusses the need for a mobile app solution to transition teaching practice (TP) from manual to digital due to the demands imposed by COVID-19. This adaptation involves addressing the absence of digital solutions, enhancing ICT capacities, and overcoming connectivity challenges. - The mobile app facilitates communication and feedback between supervisors and students, enabling real-time interaction, immediate feedback, and efficient storage of evaluations. This enhanced communication supports student learning and development. - The study highlights how the mobile app promotes student collaboration and interaction, reducing isolation and fostering a sense of community. This collaborative environment supports knowledge sharing and improves teaching practice. - The findings discuss the importance of addressing anxieties and challenges related to internet connectivity, data costs, and digital literacy. This includes providing training and support to students and supervisors and ensuring access to necessary hardware and internet connectivity. 	<ul style="list-style-type: none"> - While the mobile app is seen as a supplementary innovation, the study acknowledges concerns about online and distance learning quality compared to traditional classroom experiences. It emphasizes that the app cannot fully replace in-person interactions and experiences. - The study highlights potential resistance to technological innovations among academic and administrative staff, which could hinder the successful implementation of the mobile app project. This resistance may stem from concerns about job security or unfamiliarity with digital tools. - The study suggests the need for pilot studies and continuous monitoring to improve the mobile app's functionality and ensure its effectiveness. This indicates that the full impact and efficacy of the mobile app solution may not be fully understood until further evaluation is conducted. 	<ul style="list-style-type: none"> - On student engagement: Enhanced real-time interaction and feedback through mobile apps reduced student isolation and promoted community. - On access to education: Addressed connectivity challenges and enhanced ICT capacities to improve education access. - On pedagogical approaches: Mobile apps promoted collaboration and interaction among students.
<p>Effectiveness of Subtitles in L2 Classrooms: A Meta-Analysis Study, 2023, (Alotaibi et al., 2023)</p>	<ul style="list-style-type: none"> - The meta-analysis of 26 studies found that the overall effect size of using subtitles on L2 learning was medium ($d = 0.69$), indicating a positive impact of subtitles on language learning. - Context: Subtitles had a medium effect size in foreign language (FL) learning contexts but did not significantly affect second language (SL) learning contexts. - Language Skills: Subtitles had large effect sizes for listening, speaking, and writing skills, a medium effect size for reading comprehension, a small effect size for vocabulary, and no significant effect for mixed skills. - Educational Level: Subtitles had medium effect sizes across different institutional levels, including schools, universities, and language institutes. - Learners' L2 Proficiency Levels: Subtitles had a large effect size for advanced learners, a medium effect size for intermediate learners, and no significant effect for beginner learners. - Native Language Used in Subtitles: Effect sizes varied depending on participants' native languages, ranging from large to negative effects. - Subtitles Implementation Method: Subtitles had a large effect size when learners were asked to create them, a medium effect size in mixed implementation, and a medium effect size when learners only viewed subtitles without participating in their creation. 	<ul style="list-style-type: none"> - Limited number of studies. - There was a lack of diversity in the target languages used in the included studies, which may limit the generalizability of the findings to other language pairs. Further research is needed to explore the effectiveness of subtitles in different language combinations. - The measurement of participants' native language proficiency varied across studies, which could have influenced the effect sizes reported. Standardized measures of native language proficiency would enhance the comparability of results across studies. - Some variables, such as the impact of subtitles on grammar, pronunciation, and other language skills, were not extensively explored due to the limited number of studies available. Future research should investigate these aspects to provide a more comprehensive understanding of the effects of subtitles on language learning. - While the study examined the effect of different subtitles implementation methods, such as viewing and creating subtitles, a limited number of studies explored these aspects. More research is needed to assess the effectiveness of 	<ul style="list-style-type: none"> - On pedagogical approaches: Subtitles significantly improved various language skills, with a large effect size for listening, speaking, and writing skills, indicating their effectiveness in enhancing pedagogical approaches in L2 classrooms.

Gonçalves et al.: Educational practices in the post-COVID era

		various subtitles implementation methods in language learning contexts.	
A hidden benefit in the COVID-19 pandemic: Rethinking physical geography pedagogy in higher education using a flipped classroom approach, 2023, (Taylor, 2023)	<ul style="list-style-type: none"> - Most students (69%) preferred the flipped classroom approach over traditional lecture-based methods for online delivery. This approach involved pre-recorded lectures and live class activities, providing more significant interaction between students and staff. - Students appreciated using multimedia resources, including pre-recorded lectures with detailed slides and audio, live class activities, graphs, images, and Google Earth imagery. This multimedia approach facilitated engagement and deeper learning. - The flipped classroom approach led to increased engagement and understanding among students. Qualitative feedback highlighted the effectiveness of repetition in learning, consistency in upload times, and the helpfulness of audio transcripts or captioning. - In a post-COVID-19 scenario, students preferred a hybrid approach that combines online and on-campus flipped classroom methods. This preference indicates a shift from traditional lecture-based undergraduate physical geography education methods. - Technological proficiency and broadband access did not significantly influence student preferences for lecture delivery methods. Both basic and proficient technology users preferred the online flipped classroom approach. - The average exam grade increased by 2% compared to the previous year, which utilized traditional lecture-based delivery methods. This improvement suggests a positive impact of the flipped classroom approach on learning outcomes. 	<ul style="list-style-type: none"> - Despite the positive findings, the study acknowledges several limitations, including reliance on self-reported data, the need for larger sample sizes, and the potential challenges posed by student-directed aspects of the flipped classroom approach. 	<ul style="list-style-type: none"> - On student engagement: Flipped classroom methods increased engagement through multimedia resources.
The Effects of Using Scaffolding in Online Learning: A Meta-Analysis, 2023, (Zuo et al., 2023)	<ul style="list-style-type: none"> - Scaffolding significantly impacts students' online learning performance, with an overall effect size of 0.53 ($p < 0.001$), indicating that scaffolding is more effective than learning without scaffolding. - Scaffolding is effective across different learning disciplines, including language and literature, chemistry, computer science, mathematics, science, and educational technology. While the effect sizes varied across disciplines, scaffolding significantly benefited online learning in all fields. - Scaffolding was effective for students across different grade levels, including elementary school, secondary school, and university students. There was no statistically significant difference in the effect sizes among these learner populations. - Scaffolding has a moderate impact on various learning outcomes, including the affective, cognitive, and meta-cognitive domains. The effect on the affective domain was significantly more robust than the other domains. - Scaffolding is beneficial for both individual online learning and collaborative online learning. While scaffolding showed a medium effect size for personal online learning, it substantially impacted collaborative online learning more. - Different types of scaffolding, including conceptual, meta-cognitive, procedural, and strategic scaffolding, were analyzed. Conceptual scaffolding had the greatest impact on students' online learning performance, followed by meta-cognitive and procedural scaffolding. However, strategic scaffolding 	<ul style="list-style-type: none"> - Limited Research Focus - The study only includes articles published in English, which may introduce language bias. - The study mentions a limitation regarding the scarcity of articles focusing on scaffolding's affective and meta-cognitive outcomes in online learning. This suggests that the analysis might not fully capture the impact of scaffolding on these essential aspects of learning. - The study suggests several avenues for future research, indicating areas where additional investigation is needed to address the limitations identified in the current literature. This highlights the ongoing nature of research in this field and the need for continued exploration and validation of findings. 	<ul style="list-style-type: none"> - On pedagogical approaches: Digital scaffolding significantly improved online learning performance across various disciplines.

Gonçalves et al.: Educational practices in the post-COVID era

	showed a smaller effect size, possibly due to the limited number of studies focusing on its application.		
Enhancing Online Instructional Approaches for Sustainable Business Education in the Current and Post-Pandemic Era: An Action Research, 2023, (Ng & Lo, 2023) Study of Student Engagement	<ul style="list-style-type: none"> - Online Traditional Classrooms resulted in disengagement and passive learning - Flipped Classroom showed no significant improvement in student participation. - Gamified Flipped Classroom significantly increased student engagement and participation. - Improvements in perceived learning and behavioural engagement were shown. - Technical issues such as network problems, software disruptions, and inadequate digital skills hindered effective online teaching. - Students sought collaborative learning experiences, missed in-person interactions, and valued authoritative input from teachers. - Students exhibited competitive behaviour, competing while collaborating, fostering discussions, and seeking to win in group activities. - Students expressed interest in continuing discussions and studying with peers beyond online class sessions. - Flexible learning hours aided self-study, but technical issues required additional technical support and digital skill development among educators. - Developed a framework emphasizing flexibility, all-inclusive learning, competition, sustainable learning, and technical support for effective online pedagogy. 	<ul style="list-style-type: none"> - The study was conducted in one discipline, limiting the generalizability of findings to other educational fields or institutions. - Findings on student engagement and perceptions were subjective, demanding further studies for scientific validation. - Studies with larger participant samples are required to strengthen the scientific validity of findings. - Invites exploration of other pedagogical options (e.g., personalization, VR) to enhance student engagement and learning. - Higher Education Institutions must consider budget constraints while developing engaging online pedagogies. 	<ul style="list-style-type: none"> - On access to education: Highlighted the importance of flexible learning hours and technical support.
Methods of Islamic Religion Teachers in Improving Post-Online Student Learning Motivation at MTs Al-Washliyah 18 Tembung Academic Year 2021-2022, 2023, (Nasution & Mahariah, 2023)	<ul style="list-style-type: none"> -Emphasizes the importance of intrinsic motivation in driving active learning behaviours in Islamic religious education. - Reduced interest, peer influences, residential environment, and gadget use were identified as significant factors negatively impacting student motivation. - Highlighted the application of interactive, inspirational, pleasant impression, challenge, and motivation-based strategies by teachers. - Teachers utilize urgency explanations, competitive groups, rewards, punishments, conducive atmospheres, and consultation opportunities to boost student motivation. - Cooperative learning, project-based learning, and interactive multimedia are effective methods teachers use to motivate students. 	<ul style="list-style-type: none"> - Findings might be specific to the context of MTs Al-Washliyah 18 Tembung and might not apply universally to other educational settings. - The research doesn't delve deeply into the sustained impact of these methods on long-term student motivation and academic outcomes. - The study might have limitations in its scope, possibly missing out on exploring other potential factors influencing student motivation. - External factors beyond the scope of the research, such as socioeconomic status or broader cultural influences, could impact student motivation. 	<ul style="list-style-type: none"> - On student engagement: Interactive and motivational strategies, including competitive groups and cooperative learning, significantly improved student engagement and motivation in post-online Islamic education.
Achievement of learning outcomes in non-traditional (online) versus traditional (face-to-face) anatomy teaching in medical schools: A mixed method systematic review, 2023, (Abualadas & Xu, 2023)	<ul style="list-style-type: none"> - 19 studies found no significant difference in academic performances between online and face-to-face teaching. - Quantitative and qualitative analyses of test scores revealed comparable outcomes. - 26 studies indicated higher satisfaction with face-to-face teaching compared to online teaching. - Factors influencing satisfaction include technical issues, interaction, visualization, and reduced eye strain. - While academic performance remained comparable, online teaching couldn't replace face-to-face teaching due to various factors. - Cadaveric dissection, interaction, and spatial learning remained significant in face-to-face teaching. 	<ul style="list-style-type: none"> - Varied study designs and quality from cross-sectional to randomized controlled trials affected the systematic review's consistency and comparability. - Some studies lacked participant characteristics across online and face-to-face groups, leading to potential bias. - Subjective satisfaction responses collected through Likert scales lacked uniformity and might not fully capture nuanced student experiences. - English-only inclusion might overlook valuable non-English publications, potentially introducing language and publication bias. - Lack of standardized examination formats across schools limited the 	<ul style="list-style-type: none"> - On access to education and pedagogical approaches: While academic performance was similar in both settings, face-to-face teaching was preferred due to better interaction and visualization, indicating that while online education improves access, certain pedagogical benefits are more pronounced in traditional settings.

		comparability of academic performance data.	
--	--	---	--

Study Characteristics

All studies acknowledge the profound impact of the COVID-19 pandemic on education and the necessity to adapt instructional modalities and technologies in response to the challenges posed by the pandemic. Many studies discuss the shift from traditional, face-to-face instruction to online or hybrid learning models necessitated by the pandemic. They explore various technologies and approaches used to facilitate this transition (Abualadas & Xu, 2023; Alotaibi et al., 2023; Davids et al., 2023; Ng & Lo, 2023; Oyelude, 2022; Taylor, 2023; Zuo et al., 2023). Across the studies, there is a common emphasis on integrating digital tools and technologies to enhance teaching and learning experiences. This includes videoconferencing, mobile apps, multimedia resources, and online platforms. Several studies highlight the importance of student engagement in online learning environments and discuss strategies to promote active participation and interaction. They explore gamification, flipped classrooms, and scaffolding methods to enhance student engagement (Ng & Lo, 2023; Taylor, 2023; Zuo et al., 2023). Each study recognizes the challenges and limitations of online learning and technological integration. These include issues related to technical infrastructure, internet accessibility, digital literacy, and concerns about the quality of online instruction compared to traditional methods. Despite the challenges, the studies also identify pedagogical innovations and best practices for effective online teaching. These include cooperative learning, project-based learning, interactive multimedia, and scaffolding techniques. Many studies employ a mixed methods approach, combining quantitative analysis with qualitative insights to understand the research topic comprehensively. This approach allows for a nuanced exploration of the complexities of online learning and instructional technologies.

The interconnected cloud of concepts centered around COVID-19, learning, and intelligence suggests an intriguing convergence of themes within the scientific article (Figure 2). This conceptual nexus reveals how these domains interrelate and inform one another, offering a comprehensive lens through which to examine contemporary educational and cognitive dynamics. The prominence of COVID-19 within this cloud underscores its role as a transformative force. The pandemic has disrupted traditional educational models and accelerated the adoption of digital learning technologies and methodologies. This shift likely encompasses discussions on remote learning adaptations, namely on how schools and universities transitioned to online platforms, the effectiveness of these measures, and the long-term implications for educational delivery; also on equity and access since the pandemic highlighted and, in some cases, exacerbated disparities in access to technology and quality education. Examining these issues provides insights into the socioeconomic dimensions of educational resilience and mental health and well-being because of the psychological impact of the pandemic on students and educators, including stress, anxiety, and the challenges of maintaining engagement in a virtual environment.

The concept of "learning" within this framework suggests a deep dive into various educational strategies and the adaptive measures necessitated by the pandemic, like innovative pedagogical approaches, such as flipped classrooms, blended learning, and gamification. Another aspect is how educational institutions managed interruptions, shifted to asynchronous learning, and developed new curricula to suit an online format. It also included analyzing how remote learning environments affected student engagement, motivation, and academic performance, including the challenges and successes experienced.

Including "intelligence" suggests a nuanced examination of cognitive processes and how the pandemic influenced them. This might encompass how students and educators

Gonçalves et al.: Educational practices in the post-COVID era

adapted cognitively to new learning environments and the impact of these changes on cognitive development and problem-solving skills; the broader implications of prolonged remote learning on intellectual growth, critical thinking, and creativity; and the role of artificial intelligence and other advanced technologies in supporting learning during the pandemic, and their potential to shape future educational landscapes. Intelligence, a multifaceted concept encompassing cognitive, emotional, adaptive, and practical dimensions, is critical in education. Cognitive intelligence involves logical reasoning, mathematical skills, and analytical thinking; emotional intelligence pertains to understanding and managing emotions; adaptive intelligence emphasizes adjusting to new situations and solving novel problems; and practical intelligence relates to everyday tasks. Understanding these dimensions has profound implications for developing educational technologies and practices. For instance, adaptive learning systems and AI-driven feedback tools can personalize learning experiences, while VR and AR can create immersive, engaging environments that enhance practical intelligence. Social learning platforms can foster collaboration, boosting cognitive and emotional intelligence, and crisis management tools can improve resilience in educational settings. By embracing a comprehensive view of intelligence, we can create innovative educational solutions that address both immediate challenges and long-term needs, ultimately fostering more resilient and effective educational systems.

The interconnected cloud of concepts highlights the profound and multifaceted impact of COVID-19 on education and cognitive processes. It underscores a period of significant transformation, innovation, and adaptation, offering valuable insights into the future of learning and the evolving nature of intelligence in response to global challenges.

Figure 2

Word Cloud Representation of Key Themes in the Scoping Review Literature



Discussion

This review underscores the transformative impact of audiovisual technologies in reshaping educational practices, student engagement, and pedagogical outcomes in the post-COVID-19 era. The integration of these tools has shifted from mere facilitators to essential pillars that enhance instructional delivery, bridge physical divides, and cater to diverse student needs. Audiovisual technologies have provided critical support for both instructors and students across various educational fields, from business to religious studies and from language acquisition to science education. However, these tools do not replace the irreplaceable value of face-to-face instruction; instead, they highlight the potential of a hybrid educational model that combines the strengths of in-person and online learning to maximize student engagement and inclusivity. Amid this progress, several challenges persist, such as the digital divide and inequalities in access, which underscore the importance of continued efforts toward equitable education.

Mobile App Development for Teaching

Mobile apps for teaching and learning emerged as a valuable resource during the pandemic, allowing for real-time interaction, feedback, and collaborative learning. These applications enable instructors to communicate with students directly, providing instant feedback that enhances student learning and reduces feelings of isolation. Nevertheless, successful implementation of mobile applications requires sufficient infrastructure, digital literacy, and strategies for overcoming connectivity challenges, particularly in under-resourced areas. Further research could focus on expanding the use of mobile applications beyond primary and secondary education into higher education and specialized fields, exploring usability, accessibility, and their role in student-centered learning (Davids et al., 2023).

Impact of Subtitles on Language Learning

Subtitles have become a powerful tool in language education, effectively aiding listening comprehension, vocabulary building, and overall language proficiency. By reinforcing auditory input with visual text, subtitles make language learning more accessible and cater to different proficiency levels (Alotaibi et al., 2023). Research shows that intermediate and advanced learners benefit significantly from subtitles, but there is a gap in understanding their impact on beginner learners (Bianchi & Ciabattoni, 2008; Wong et al., 2020). Future studies could examine the effects of various subtitle types—such as same-language and translated subtitles—on learning in different linguistic contexts. This line of research would support language educators in tailoring instruction to diverse learner needs and preferences.

Flipped Classrooms in Geography Education

Flipped classroom models have proven particularly useful in geography education, where spatial concepts and visual learning are critical. In this model, students engage with core content through multimedia resources before class, allowing for deeper, application-based learning during interactive sessions (Ng & Lo, 2023; Taylor, 2023). Geography education benefits from this approach, as students can explore complex spatial data, maps, and visualizations at their own pace before working collaboratively in class (Obi, 2024). However, implementing flipped

Gonçalves et al.: Educational practices in the post-COVID era

classrooms effectively requires carefully balancing self-paced learning with guided instruction (Agyeman & Aphane, 2024). Future research should explore adapting the flipped model to meet the needs of various geography curricula, addressing factors such as student engagement, access to technology, and the integration of experiential learning activities.

Scaffolding in Online Learning Environments

Scaffolding techniques are essential in online learning environments, providing students with step-by-step guidance as they navigate digital coursework (Zuo et al., 2023). Scaffolding is precious in disciplines like science and mathematics, where sequential learning and skill-building are fundamental (Anghileri, 2006; Dominguez & Svihla, 2023). While research on scaffolding has primarily focused on procedural and conceptual types, further studies could examine the impact of meta-cognitive scaffolding, which encourages students to self-assess and regulate their learning. Additionally, exploring scalable scaffolding approaches for large online classrooms could address the diverse learning needs of a broader student population and support a more inclusive learning experience.

Adapting Pedagogical Practices and Educational Technologies

Integrating emerging technologies into education necessitates a dynamic interaction between adapting existing pedagogical practices and ensuring these technologies respond to identified educational needs (Ibrahim, 2024). Traditionally, pedagogical practices have been developed within the constraints and possibilities of the available technologies (Pliushch & Sorokun, 2022). With the advent of new educational technologies, there is a need for these practices to evolve (T. Lim et al., 2024). For instance, online learning platforms require educators to adopt new methods for delivering content, engaging students, and assessing their progress (Faridi & Shaheen, 2024). This adaptation includes designing interactive and multimedia-rich curricula, incorporating synchronous and asynchronous communication tools, and using data analytics to personalize learning experiences (F. Lim, 2023; Sengupta et al., 2024).

Conversely, educational technologies should be developed with a deep understanding of pedagogical principles and educational needs. Technologies that fail to align with or support effective teaching strategies are unlikely to be successful or widely adopted. Thus, a feedback loop is essential, where educational needs inform technology development, and new technologies inspire pedagogical innovation (Mhlongo et al., 2023).

The context significantly alters this interaction. When technologies complement an in-person educational environment, they are typically used to enhance and extend traditional teaching methods (Smith et al., 2000). For example, blended learning models combine face-to-face instruction with online activities, leveraging the strengths of both approaches. In this scenario, technologies act as supplementary tools that provide additional resources, facilitate collaboration, and offer flexible learning options.

In contrast, when technologies entirely replace in-person education, as seen during the initial years of the pandemic, the demands on both technologies and pedagogical practices increase dramatically. Here, technologies must provide a comprehensive platform for all aspects of education, including content delivery, student engagement, assessment, and support services. This shift requires a thorough rethinking of pedagogical practices to ensure they are effective in a wholly digital environment.

Gonçalves et al.: Educational practices in the post-COVID era

Similarly, the success of online instructional approaches in business education is influenced by factors such as student preferences, technical support, and pedagogical frameworks (Volery & Lord, 2000). These findings emphasize the need for personalized, context-specific approaches to technology integration that align with learners' diverse needs and preferences.

Furthermore, the studies highlight the importance of ongoing evaluation and adaptation of technology-enhanced teaching methods. Continuous monitoring, pilot studies, and feedback mechanisms are essential for assessing the impact and effectiveness of technological interventions in educational settings (Kushwaha et al., 2024).

The application of audiovisual technologies in education reveals significant variations across different educational levels and local contexts. These technologies are often utilized at the primary and secondary education levels to enhance engagement and interactivity, catering to younger students' visual and auditory stimulation needs (Balalle, 2024). However, deploying such technologies must be age-appropriate, considering cognitive development stages and attention spans (Vedechkina & Borgonovi, 2021). In higher education, audiovisual tools are increasingly sophisticated, supporting complex simulations, virtual laboratories, and multimedia presentations that cater to more mature learners. These technologies also facilitate research and collaborative projects, which are pivotal at the tertiary level (Jensen et al., 2005; Samaniego Erazo et al., 2015).

Local context significantly influences the effectiveness and implementation of audiovisual technologies (Jeljeli et al., 2022). In regions with robust digital infrastructure, integrating these tools can be seamless, offering high-quality, uninterrupted educational experiences. Conversely, deploying audiovisual tools faces significant challenges in areas with limited access to technology and internet connectivity (Xie & Zhang, 2024). Socioeconomic factors also play a critical role; students from underprivileged backgrounds might lack the necessary devices and internet access to fully benefit from these technologies (Joshi et al., 2024).

Moreover, cultural factors influence the adoption and adaptation of audiovisual technologies (Jeljeli et al., 2022). For instance, traditional teaching methods may be deeply rooted in some educational contexts, making transitioning to technologically enhanced education more challenging (Mhlongo et al., 2023; Noroozi et al., 2023). Educators must be culturally sensitive and aware of these dynamics to effectively integrate audiovisual tools into their teaching practices (Eden & Chisom, 2024a). Tailoring such technologies to fit the local educational culture and infrastructure is essential for maximizing their benefits and ensuring equitable access for all students (Eden & Chisom, 2024b).

Challenges and Limitations of the Audiovisual Technologies

Several challenges and limitations must be addressed in transitioning educational practices from in-person to online formats using audiovisual technologies. Firstly, technology and internet connectivity pose significant barriers, particularly in regions with limited infrastructure (Ferrari et al., 2022). This digital divide can exacerbate educational inequalities, as students without reliable internet access or adequate devices may struggle to participate fully in online learning (Miah, 2024). Additionally, both students and educators may face challenges related to technology literacy, necessitating comprehensive training to ensure the effective use of these tools (Mhlongo et al., 2023; MOKHTARI, 2023). There are also pedagogical challenges, such as adapting interactive and hands-on learning experiences to a virtual environment, which can impact student engagement and comprehension (Kazu & Kuvvetli, 2023; Verma et al.,

2023). Furthermore, the overreliance on audiovisual materials may lead to issues of screen fatigue, reducing the effectiveness of learning over extended periods (Kaur et al., 2022; Wolffsohn et al., 2023). Continuous monitoring and feedback mechanisms are essential to address these limitations and refine audiovisual technologies' integration, ensuring they enhance rather than hinder educational outcomes (Cavalcanti et al., 2021; Kushwaha et al., 2024).

To address the cognitive, emotional, personal, and educational implications of fully transitioning the educational environment from in-person to online formats, several key factors must be considered. Cognitively, the shift to online learning requires students to develop new skills in self-regulation, time management, and digital literacy, which can be both a challenge and an opportunity for growth (Miertschin et al., 2015; Rahman et al., 2020; Vishwakarma & Tyagi, 2023). Emotionally, isolation from peers and teachers can lead to feelings of loneliness and anxiety, potentially impacting mental health and motivation (Brandt et al., 2022; Loades et al., 2020). However, online platforms can also offer personalized support and flexibility, catering to individual emotional needs (Gligorea et al., 2023). Personally, students may experience a significant change in their daily routines and environments, affecting their overall well-being and work-life balance (Chu & Li, 2022). Educationally, the transition can disrupt traditional pedagogical models, necessitating the adaptation of curricula to suit digital platforms, which can initially lead to a decline in the quality of education if not appropriately managed (Singh et al., 2023). Nevertheless, it also opens the door to innovative teaching methods, such as gamified learning and interactive multimedia resources, which can enhance engagement and learning outcomes if effectively implemented (Lampropoulos & Kinshuk, 2024).

Also, this study does not deeply explore the role of cultural contexts in shaping the adoption and efficacy of digital tools. Cultural norms and values significantly influence educational practices and attitudes toward technology, yet these dimensions remain underexplored in the reviewed literature. The studies included in this review may reflect selection bias, as they predominantly focus on recent English-language research. This focus limits the generalizability of findings to non-English speaking regions or settings where digital infrastructure is less developed. A notable gap exists in understanding the long-term impacts of digital tools on educational outcomes, including sustained student engagement, knowledge retention, and motivation. The lack of longitudinal studies in the existing literature constrains the ability to conclude the enduring efficacy of these tools. Also, measuring the nuanced effects of digital tools, especially in diverse and evolving educational settings, poses a challenge. The heterogeneity of methodologies and metrics across studies further complicates comparisons and synthesis.

Limitations of This Study

While this scoping review provides valuable insights into integrating audiovisual technologies in post-COVID-19 education, several limitations must be acknowledged. First, the study was restricted to articles published in English and Portuguese, which excluded potentially relevant research in other languages. This language constraint may have introduced bias and limited the generalizability of findings to non-English-speaking or non-Portuguese-speaking contexts. Additionally, the review focused solely on peer-reviewed journal articles, excluding books, book chapters, conference papers, and grey literature. While these sources can offer significant insights, their exclusion may have narrowed the scope of evidence considered.

The study also employed a relatively short timeframe, analyzing only articles published between 2022 and 2023. This temporal limitation may have excluded earlier research with

Gonçalves et al.: Educational practices in the post-COVID era

relevant findings or emerging studies published after the review period. Furthermore, the reliance on specific databases may have inadvertently omitted studies from smaller or less commonly indexed journals, potentially affecting the comprehensiveness of the review.

The review predominantly examines audiovisual technologies' immediate and short-term effects, leaving the long-term sustainability and broader educational impacts underexplored. Finally, although the review spans multiple disciplines, it may not fully capture the nuances of how audiovisual technologies perform across various educational levels, socioeconomic contexts, or regions with differing levels of digital infrastructure. By acknowledging these limitations, this study underscores the need for more inclusive, diverse, and comprehensive research efforts to inform future educational practices and policies.

Future Research Directions

Future research in this realm should extend beyond the confines of these initial studies to encapsulate a broader spectrum of educational settings and contexts. For instance, exploring the integration of audiovisual technologies in specific disciplines such as language learning, science education, and religious studies could provide a more nuanced understanding of their unique impacts on pedagogy, motivation, and learning outcomes. Additionally, investigating audiovisual tools' long-term effects, sustainability, and scalability across diverse demographic groups and resource-limited settings would offer invaluable insights, especially concerning digital divide challenges. Emerging technologies such as virtual and augmented reality represent promising areas for future exploration, particularly their integration within audiovisual frameworks to enhance student engagement and practical learning experiences.

To address socioeconomic and cultural factors influencing access to educational technology, future studies should focus on how these variables impact digital equity and the effectiveness of hybrid and flipped classroom models in underserved communities. Moreover, as Islamic and other religious education may have specific engagement needs, the research could further develop culturally responsive audiovisual strategies in these fields. Finally, longitudinal studies on audiovisual tools' evolving use and continuous impact in post-COVID education would deepen understanding of their transformative potential and inform sustainable, inclusive educational practices.

Future studies should investigate how cultural factors influence audiovisual technologies' adoption, adaptation, and success. Comparative studies across regions could reveal critical insights into culturally responsive pedagogical practices. Expanding research to include diverse geographical, linguistic, and socioeconomic contexts will enhance understanding of digital education's global applicability and equity challenges. Conducting longitudinal research to track the sustained impacts of audiovisual tools on learning outcomes, engagement, and educator efficacy is crucial. Such studies can provide evidence of the durability of benefits and inform long-term policy and implementation strategies. Cross-regional studies examining variations in access, usage, and outcomes of audiovisual technologies can highlight inequities and drive solutions tailored to local challenges. Employing innovative methods, such as data analytics and artificial intelligence, can offer more precise measurements of the impacts of digital tools, particularly in large-scale educational settings.

Conclusion

According to the analysis of the articles selected, integrating audiovisual technologies into post-COVID-19 education has unveiled a transformative landscape, redefining the essence of pedagogy, student motivation, and learning outcomes. The multifaceted impacts observed underscore a paradigm shift in educational methodologies, marked by the omnipresence of audiovisual tools. These technologies, once mere facilitators, now stand as pillars reshaping educational delivery and engagement. A resounding narrative emerges across varied studies, from techno-pedagogy in business education to innovative methods in Islamic and religious teachings and the comparison of online versus traditional anatomy teaching. These technologies bridge physical gaps, augment interactive learning experiences, and address diverse learning needs. However, while showcasing promising strides in learning outcomes and student engagement, they don't eliminate the irreplaceable essence of face-to-face instruction. Thus, the future heralds a hybrid educational landscape, a fusion that marries the strengths of both worlds, harnessing technology's potential while cherishing the value of personal interaction. Yet, amidst this evolution, persisting challenges of technology inequality beckon, underscoring the imperative for inclusivity and equitable access to ensure the promises of post-COVID-19 education are universal.

References

- Abualadas, H. M., & Xu, L. (2023). Achievement of learning outcomes in non-traditional (online) versus traditional (face-to-face) anatomy teaching in medical schools: A mixed method systematic review. *Clinical Anatomy (New York, N.Y.)*, 36(1), 50–76. <https://doi.org/10.1002/ca.23942>
- Agyeman, N., & Aphane, V. (2024). Implementing Flipped Classroom to Enhance Student Engagement: An Action Research. *E-Journal of Humanities, Arts and Social Sciences*, 1860–1878. <https://doi.org/10.38159/ehass.202451119>
- Alotaibi, H. M., Mahdi, H. S., & Alwathnani, D. (2023). Effectiveness of Subtitles in L2 Classrooms: A Meta-Analysis Study. *Education Sciences*, 13(3), Artigo 3. <https://doi.org/10.3390/educsci13030274>
- Anghileri, J. (2006). Scaffolding practices that enhance mathematics learning. *Journal of Mathematics Teacher Education*, 9, 33–52. <https://doi.org/10.1007/s10857-006-9005-9>
- Arksey, H., & O'Malley, L. (2005). Scoping studies: Towards a methodological framework. *International Journal of Social Research Methodology*, 8(1), 19–32. <https://doi.org/10.1080/1364557032000119616>
- Balalle, H. (2024). Exploring student engagement in technology-based education in relation to gamification, online/distance learning, and other factors: A systematic literature review. *Social Sciences & Humanities Open*, 9, 1–10. <https://doi.org/10.1016/j.ssaho.2024.100870>
- Bates, A. W., & Sangra. (2011). *Managing Technology in Higher Education: Strategies for Transforming Teaching and Learning* | Wiley. Wiley.Com. <https://www.wiley.com/en-au/Managing+Technology+in+Higher+Education%3A+Strategies+for+Transforming+Teaching+and+Learning-p-9780470584729>
- Bianchi, F., & Ciabattini, T. (2008). *Captions and Subtitles in EFL Learning: An investigative study in a comprehensive computer environment*.
- Brandt, L., Liu, S., Heim, C., & Heinz, A. (2022). The effects of social isolation stress and discrimination on mental health. *Translational Psychiatry*, 12, 398. <https://doi.org/10.1038/s41398-022-02178-4>
- Cavalcanti, A. P., Barbosa, A., Carvalho, R., Freitas, F., Tsai, Y.-S., Gašević, D., & Mello, R. F. (2021). Automatic feedback in online learning environments: A systematic literature review. *Computers and Education: Artificial Intelligence*, 2, 100027. <https://doi.org/10.1016/j.caeai.2021.100027>
- Chu, Y.-H., & Li, Y.-C. (2022). The Impact of Online Learning on Physical and Mental Health in University Students during the COVID-19 Pandemic. *International Journal of Environmental Research and Public Health*, 19(5), 2966. <https://doi.org/10.3390/ijerph19052966>
- Davids, M. N., Wyk, M. V., Jojo, Z. M., Taole, M. J., Sethusha, M., & Prins, K. (2023). The Feasibility of Digitalizing Teaching Practice Through Mobile App Development: Supervisors' Reactions. *International Journal of Information and Communication Technology Education (IJICTE)*, 19(1), 1–15. <https://doi.org/10.4018/IJICTE.324717>

Gonçalves et al.: Educational practices in the post-COVID era

- Dominguez, S., & Svihla, V. (2023). A review of teacher implemented scaffolding in K-12. *Social Sciences & Humanities Open*, 8(1), 100613. <https://doi.org/10.1016/j.ssaho.2023.100613>
- Eden, C., & Chisom, O. (2024a). Cultural Competence in Education: Strategies For Fostering Inclusivity and Diversity Awareness. *International Journal of Applied Research in Social Sciences*, 6, 383–392. <https://doi.org/10.51594/ijarss.v6i3.895>
- Eden, C., & Chisom, O. (2024b). Harnessing technology integration in education: Strategies for enhancing learning outcomes and equity. *World Journal of Advanced Engineering Technology and Sciences*, 11, 001–008. <https://doi.org/10.30574/wjaets.2024.11.2.0071>
- Faridi, B., & Shaheen, D. (2024). Online learning platforms and teacher efficacy. *International Journal of Humanities and Education Research*, 6, 15–24. <https://doi.org/10.33545/26649799.2024.v6.i1a.64>
- Ferrari, A., Bacco, M., Gaber, K., Jedlitschka, A., Hess, S., Kaipainen, J., Koltsida, P., Toli, E., & Brunori, G. (2022). Drivers, barriers and impacts of digitalisation in rural areas from the viewpoint of experts. *Information and Software Technology*, 145, 106816. <https://doi.org/10.1016/j.infsof.2021.106816>
- Gligorea, I., Cioca, M., Oancea, R., Gorski, A.-T., Gorski, H., & Tudorache, P. (2023). Adaptive Learning Using Artificial Intelligence in e-Learning: A Literature Review. *Education Sciences*, 13(12), Artigo 12. <https://doi.org/10.3390/educsci13121216>
- Huffman, W. H., & Huffman, A. H. (2012). Beyond basic study skills: The use of technology for success in college. *Computers in Human Behavior*, 28(2), 583–590. <https://doi.org/10.1016/j.chb.2011.11.004>
- Ibrahim, U. (2024). Integration of Emerging Technologies in Teacher Education for Global Competitiveness. *International Journal of Educational and Life Sciences*, 2, 127–138. <https://doi.org/10.59890/ijels.v2i2.1334>
- Idris, F., Hassan, Z., Ya'acob, A., Gill, S. K., & Awal, N. A. M. (2012). The Role of Education in Shaping Youth's National Identity. *Procedia - Social and Behavioral Sciences*, 59, 443–450. <https://doi.org/10.1016/j.sbspro.2012.09.299>
- Jeljeli, R., Farhi, F., Elfatih, H., & Saidani, S. (2022). The Impact of Technology on Audiovisual Production in the Social Media Space. *Academic Journal of Interdisciplinary Studies*, 11, 48. <https://doi.org/10.36941/ajis-2022-0148>
- Jensen, N., Seipel, S., Voigt, G., Raasch, S., Olbrich, S., & Nejd, W. (2005). *Development of a virtual laboratory system for science education and the study of collaborative action*.
- Joshi, B., Khatiwada, S., & Pokhrel, R. (2024). Influence of Socioeconomic Factors on Access to Digital Resources for Education. *Rupantaran: A Multidisciplinary Journal*, 8, 17–33. <https://doi.org/10.3126/rupantaran.v8i01.65197>
- Kaur, K., Gurnani, B., Nayak, S., Deori, N., Kaur, S., Jethani, J., Singh, D., Agarkar, S., Hussaindeen, J. R., Sukhija, J., & Mishra, D. (2022). Digital Eye Strain- A Comprehensive Review. *Ophthalmology and Therapy*, 11(5), 1655–1680. <https://doi.org/10.1007/s40123-022-00540-9>

Gonçalves et al.: Educational practices in the post-COVID era

- Kazu, İ. Y., & Kuvvetli, M. (2023). *The Impact of Virtual Reality Technology on Student Engagement and Learning Outcomes in Higher Education*.
- Kushwaha, A., Kushwaha, R., & Ahmad, S. (2024). *Transforming Learning: The Power of Educational Technology*.
- Lampropoulos, G. & Kinshuk. (2024). Virtual reality and gamification in education: A systematic review. *Educational Technology Research and Development*.
<https://doi.org/10.1007/s11423-024-10351-3>
- Li, D. (2022). The Shift to Online Classes during the Covid-19 pandemic: Benefits, Challenges, and Required Improvements from the Students' Perspective. *Electronic Journal of e-Learning*, 20(1), pp1-18. <https://doi.org/10.34190/ejel.20.1.2106>
- Lim, F. (2023). *Designing synchronous online learning experiences with social media as semiotic technologies* (pp. 195–214). <https://doi.org/10.4324/9781003342922-12>
- Lim, T., Gottipati, S., & Cheong, M. (2024). *Educational Technologies and Assessment Practices: Evolution and Emerging Research Gaps*. <https://doi.org/10.4018/979-8-3693-1310-7>
- Loades, M. E., Chatburn, E., Higson-Sweeney, N., Reynolds, S., Shafran, R., Brigden, A., Linney, C., McManus, M. N., Borwick, C., & Crawley, E. (2020). Rapid Systematic Review: The Impact of Social Isolation and Loneliness on the Mental Health of Children and Adolescents in the Context of COVID-19. *Journal of the American Academy of Child and Adolescent Psychiatry*, 59(11), 1218-1239.e3.
<https://doi.org/10.1016/j.jaac.2020.05.009>
- Mayer, R. E. (Ed.). (2014). *The Cambridge Handbook of Multimedia Learning* (2.^a ed.). Cambridge University Press. <https://doi.org/10.1017/CBO9781139547369>
- Mhlongo, S., Mbatha, K., Ramatsetse, B., & Dlamini, R. (2023). Challenges, opportunities, and prospects of adopting and using smart digital technologies in learning environments: An iterative review. *Heliyon*, 9(6), e16348. <https://doi.org/10.1016/j.heliyon.2023.e16348>
- Miah, M. (2024). *Digital Inequality: The Digital Divide and Educational Outcomes*.
- Miertschin, S., Goodson, C., & Stewart, B. (2015). Time management skills and student performance in online courses. *ASEE Annual Conference and Exposition, Conference Proceedings*, 122.
- MOKHTARI, F. (2023). Fostering Digital Literacy in Higher Education: Benefits, Challenges and Implications. *International Journal of Linguistics, Literature and Translation*, 6, 160–167. <https://doi.org/10.32996/ijllt.2023.6.10.19>
- Nasution, N. A. M., & Mahariah. (2023). Methods of Islamic Religion Teachers in Improving Post-Online Student Learning Motivation at MTs Al-Washliyah 18 Tembung Academic Year 2022-2023. *EDUKASIA: Jurnal Pendidikan Dan Pembelajaran*, 4(1), Artigo 1. <https://jurnaledukasia.org/index.php/edukasia/article/view/258>
- Ng, L.-K., & Lo, C.-K. (2023). Enhancing Online Instructional Approaches for Sustainable Business Education in the Current and Post-Pandemic Era: An Action Research Study of Student Engagement. *Education Sciences*, 13(1), Artigo 1. <https://doi.org/10.3390/educsci13010042>

Gonçalves et al.: Educational practices in the post-COVID era

- Noroozi, O., Publication, I., & Organization, I. (2023). *Technology-Enhanced Learning Environments in Education*.
- Obi, M. (2024). Pedagogical Strategies for Enhancing Online Collaboration. *Journal of Online and Distance Learning*, 3, 41–52. <https://doi.org/10.47941/jodl.1692>
- Ouzzani, M., Hammady, H., Fedorowicz, Z., & Elmagarmid, A. (2016). Rayyan—A web and mobile app for systematic reviews. *Systematic Reviews*, 5, 210. <https://doi.org/10.1186/s13643-016-0384-4>
- Oyelude, A. A. (2022). Technologies changing in the post pandemic era. *Library Hi Tech News*, 39(1), 1–4. <https://doi.org/10.1108/LHTN-04-2021-0018>
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., ... Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, n71. <https://doi.org/10.1136/bmj.n71>
- Pham, M. T., Rajić, A., Greig, J. D., Sargeant, J. M., Papadopoulos, A., & McEwen, S. A. (2014). A scoping review of scoping reviews: Advancing the approach and enhancing the consistency. *Research Synthesis Methods*, 5(4), 371–385. <https://doi.org/10.1002/jrsm.1123>
- Pliushch, V., & Sorokun, S. (2022). Innovative pedagogical technologies in education system. *Revista Tempos e Espaços Em Educação*, 15(34). <https://www.redalyc.org/journal/5702/570272314022/html/>
- Rahman, Ariawan, V., & Pratiwi, I. (2020). *Digital Literacy Abilities of Students in Distance Learning*. <https://doi.org/10.2991/assehr.k.201215.092>
- Samaniego Erazo, G. N., Esteve-González, V., & Vaca, B. (2015). *Teaching and Learning in digital worlds: Strategies and issues in higher education* (pp. 129–136).
- Sengupta, R., Chavan, Bai, M., Mr, Midhun, M., Wadhwa, R., & Kofi Anane, J. (2024). *Re-imagining Education A Framework for Educational Transformation Vol. I Editors* (p. 30).
- Singh, B., Gupta, V. K., Jain, A., Vashishth, T., & Sharma, S. (2023). *TRANSFORMING EDUCATION IN THE DIGITAL AGE: A COMPREHENSIVE STUDY ON THE EFFECTIVENESS OF ONLINE LEARNING*. 7, 1–11. <https://doi.org/10.55041/IJSREM24405>
- Smith, S., Smith, S., & Boone, R. (2000). Increasing Access to Teacher Preparation: The Effectiveness of Traditional Instructional Methods in an Online Learning Environment. *Journal of Special Education Technology*, 15. <https://doi.org/10.1177/016264340001500204>
- Stoian, C. E., Fărcașiu, M. A., Dragomir, G.-M., & Gherheș, V. (2022). Transition from Online to Face-to-Face Education after COVID-19: The Benefits of Online Education from Students' Perspective. *Sustainability*, 14(19), 12812. <https://doi.org/10.3390/su141912812>

Gonçalves et al.: Educational practices in the post-COVID era

- Taylor, K. J. (2023). A hidden benefit in the COVID-19 pandemic: Rethinking physical geography pedagogy in higher education using a flipped classroom approach. *Irish Journal of Technology Enhanced Learning*, 7(1), Artigo 1. <https://doi.org/10.22554/ijtel.v7i1.105>
- Vedechkina, M., & Borgonovi, F. (2021). A Review of Evidence on the Role of Digital Technology in Shaping Attention and Cognitive Control in Children. *Frontiers in Psychology*, 12, 611155. <https://doi.org/10.3389/fpsyg.2021.611155>
- Verma, R., Purushottam, A., Petare, H., Shamim, M., Gupta, T., & Singh, G. (2023). *Exploring The Impact of Virtual Learning Environments on Student Engagement and Academic Achievement*. <https://doi.org/10.13140/RG.2.2.23223.91040>
- Vishwakarma, A., & Tyagi, N. (2023). Strategies for Promoting Self-Regulation in online Learning Environment: An Analytical Review. *Journal of Positive School Psychology*, 6, 4258–4271.
- Volery, T., & Lord, D. (2000). Critical success factors in online education. *International Journal of Educational Management*, 14, 216–223. <https://doi.org/10.1108/09513540010344731>
- Wolffsohn, J. S., Lingham, G., Downie, L. E., Huntjens, B., Inomata, T., Jivraj, S., Kobia-Acquah, E., Muntz, A., Mohamed-Noriega, K., Plainis, S., Read, M., Sayegh, R. R., Singh, S., Utheim, T. P., & Craig, J. P. (2023). TFOS Lifestyle: Impact of the digital environment on the ocular surface. *The Ocular Surface*, 28, 213–252. <https://doi.org/10.1016/j.jtos.2023.04.004>
- Wong, S. W. L., Lin, C. C. Y., Wong, I. S. Y., & Cheung, A. (2020). The Differential Effects of Subtitles on the Comprehension of Native English Connected Speech Varying in Types and Word Familiarity. *Sage Open*, 10(2), 2158244020924378. <https://doi.org/10.1177/2158244020924378>
- Xie, Y., & Zhang, M. (2024). Synergy of higher education resources and digital infrastructure construction in China: Regional differences, dynamic evolution and trend forecasting. *PLOS ONE*, 19(6), e0304613. <https://doi.org/10.1371/journal.pone.0304613>
- Zuo, M., Kong, S., Ma, Y., Hu, Y., & Xiao, M. (2023). The Effects of Using Scaffolding in Online Learning: A Meta-Analysis. *Education Sciences*, 13(7), Artigo 7. <https://doi.org/10.3390/educsci13070705>

Author's Notes

Sara Gonçalves
ORCID: 0000-0002-8287-1357
University of Trás-os-Montes and Alto Douro
sgoncalves@utad.pt

Bárbara Longa
ORCID: 0009-0005-8583-7452
University of Trás-os-Montes and Alto Douro
barbaralonga2009@hotmail.com

Gonçalves et al.: Educational practices in the post-COVID era

Isabel Barroso

ORCID: 0000-0001-5112-6015

University of Trás-os-Montes and Alto Douro and University of Porto

imbarroso@utad.pt

Conceição Rainho

ORCID: 0000-0002-3162-2086

University of Trás-os-Montes and Alto Douro and University of Porto

crainho@utad.pt

Vítor Rodrigues

ORCID: 0000-0002-2795-685X

University of Trás-os-Montes and Alto Douro and University of Porto

vmcpr@utad.pt

Funding: This work was supported by the Project “POCH-02-5312-FSE-000049 - Skills 4 Pós-COVID - Skills for the future in Higher Education”, financed by the Human Capital Operational Program (POCH), with co-financing from Portugal 2020 and the European Social Fund.

Credit Author Statement: VR, IB and CR Conceptualization, Funding and Supervision; SG Methodology, Project administration, Visualisation and Writing – Original Draft; SG and BL Formal analysis, Investigation, Resources and Data Curation; SG, BL, IB, CR and VR Writing – Review & Editing; BL Validaton.



More details of this Creative Commons license are available at <https://creativecommons.org/licenses/by-sa/4.0/>. **Current Issues in Education** is published by the Mary Lou Fulton Institute and Graduate School of Education at Arizona State University.

ASU Mary Lou Fulton
Teachers College
Arizona State University