Original article

University online education: a systematic review of the literature from 2019 to 2023

Educación en línea universitaria: una revisión sistemática de la literatura de 2019 a 2023

Educação universitária online: uma revisão sistemática da literatura de 2019 a 2023

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ABSTRACT

This article reviews the literature on online education in universities from 2019 to 2023, highlighting both advances and persistent challenges in this field. Through a systematic review, emerging trends and institutional responses to the dramatic shift toward digital education, exacerbated by the COVID-19 pandemic, are explored. Numerous studies are examined, reflecting a diversity of pedagogical approaches, technological challenges, and adaptation strategies. The findings indicate that while online education has improved in terms of accessibility and flexibility, it faces significant challenges in teaching quality and equity of access. The study underscores the need for a holistic approach that considers not only technological infrastructure but also pedagogical methodologies to ensure inclusive and effective education.

Translated from the original in Spanish

RESUMEN

Este artículo revisa la literatura sobre educación en línea en universidades de 2019 a 2023, destacando tanto los avances como los desafíos persistentes en este campo. A través de una revisión sistemática se exploran las tendencias emergentes y las respuestas institucionales al cambio dramático hacia la educación digital, exacerbado por la pandemia por COVID-19. Se examinan numerosos estudios que reflejan una diversidad de enfoques pedagógicos, desafíos tecnológicos y estrategias de adaptación. Los hallazgos indican que, mientras la educación en línea ha mejorado en términos de accesibilidad y flexibilidad, enfrenta desafíos significativos en la calidad de la enseñanza y en la equidad del acceso. El estudio subraya la necesidad de un enfoque holístico que no solo considere la infraestructura tecnológica, sino también las metodologías pedagógicas para garantizar una educación inclusiva y efectiva.

Palabras clave: educación en línea; educación universitaria; enseñanza en línea; transformación digital; revisión sistemática.

RESUMO

Este artigo analisa a literatura sobre educação online em universidades de 2019 a 2023, destacando tanto os avanços quanto os desafios persistentes neste campo. Por meio de uma revisão sistemática, são exploradas as tendências emergentes e as respostas institucionais à mudança dramática em direção à educação digital, exacerbada pela pandemia da COVID-19. São examinados numerosos estudos que refletem uma diversidade de abordagens pedagógicas, desafios tecnológicos e estratégias de adaptação. As conclusões indicam que, embora a educação online tenha melhorado em termos de acessibilidade e flexibilidade, enfrenta desafios significativos na qualidade do ensino e na equidade do acesso. O estudo destaca a necessidade de uma abordagem holística que considere não apenas a infraestrutura tecnológica, mas também as metodologias pedagógicas para garantir uma educação inclusiva e eficaz.

Palavras-chave: educação online; educação universitária; ensino online; transformação digital; revisão sistemática.

INTRODUCTION

Global education is currently undergoing a radical transformation, driven largely by technological advances and the growing demand for accessibility and personalization in learning. This paradigm shift is evident in the way educational institutions around the world are adopting new technologies and pedagogical approaches to respond to the challenges posed by a knowledge-based economy and a society that increasingly values the importance of continuous and flexible education (Bates, 2019; Siemens, 2004).

Educational institutions around the world are faced with the need to prepare students not only with field-specific knowledge but also with critical skills and adaptability. They are reevaluating their curricula and delivery methods to include more dynamic and accessible learning modalities. The integration of digital platforms, open educational resources, and blended learning strategies is at the heart of this evolution, highlighting the commitment of various institutions around the world to creating inclusive and adaptive learning environments that can serve a diverse student population.

In this dynamic environment, higher education takes on unprecedented relevance, positioning itself as a key link between the changing demands of the labor market and the development of qualified professionals equipped with the skills necessary to thrive in a globalized, knowledge-based economy.

In an environment dominated by Information and Communication Technologies (ICTs), these technologies inevitably impact the educational field through their integration into training processes, facilitating opportunities for more interactive and collaborative learning. In this context, digitalization emerges as a catalyst that is radically transforming traditional teaching and learning methods. This transformation is driving universities to reflect and adapt their programs and pedagogical approaches to meet the expectations of an increasingly interconnected world. The transition toward more innovative and technologically advanced educational practices emphasizes the importance of preparing students to be critical thinkers and efficient problem solvers, as well as lifelong learners, capable of contributing significantly to the digital society of the 21st century (Bates, 2019).

The evolution of distance education, facilitated by ICTs, has been fundamental in this process of educational transformation, allowing for greater interaction and adaptability in teaching methods. Beginning with the earliest instances of distance education through written correspondence, education has undergone a significant transformation with the advent of ICTs. This historical journey culminates in online education, where the Internet and various digital platforms have revolutionized access to and delivery of higher education programs, marking a before and after in teaching modalities.

As ICTs have become more deeply integrated into the fabric of online education, they have enabled not only greater accessibility for students around the world, but also the implementation of more interactive and personalized teaching methods, fundamentally transforming the learning experience and expanding the reach of Higher Education to a broader spectrum of the global population (Bates, 2019; Siemens, 2004). This advancement has decisively contributed to democratizing access to education, offering flexible and diverse alternatives to meet the needs of an increasingly diverse and geographically dispersed student population.

Online education stands out for its remarkable flexibility, accessibility, and ability to offer highly personalized learning experiences through digital media, thus adapting to the diverse educational needs of the global student population. This pedagogical approach is based on a robust framework that incorporates various didactic strategies and components, allowing for the optimization of the features and advantages of multiple educational technologies while addressing their inherent challenges. These challenges include the digital divide, the imperative to maintain meaningful human interactions, and the crucial task of ensuring the quality and effectiveness of learning.

The strategic implementation of online education in universities has emerged as an innovative and effective solution to the growing demand for accessibility in Higher Education, allowing educational institutions to expand access to their programs, offer more inclusive and versatile educational offerings, and adapt quickly to the changing dynamics and demands of the labor market and current social structures. Such adaptation not only reflects universities' commitment to the democratization of knowledge, but also underscores the crucial role of technology in shaping future educational paradigms.

Before the global emergency caused by the COVID-19 pandemic, online education was already on an upward trajectory, experiencing sustained growth with many universities exploring and expanding

their digital educational offerings. However, this modality was often perceived as complementary or an alternative to in-person teaching, rather than as the primary means of educational delivery. The onset of the pandemic significantly accelerated the adoption of online education, prompting universities to massively migrate their operations to digital platforms. This unexpected period revealed both challenges and opportunities, highlighting the need for rapid technological adaptation, change management in teaching methodologies, and a profound re-evaluation of the effectiveness and quality of online education (Hodges *et al.*, 2020). Despite the stigmas previously associated with this modality, the forced implementation of online education during the pandemic contributed to a more positive perception of its value and effectiveness, challenging preconceptions and paving the way for broader acceptance.

In the post-pandemic era, online education has established itself as an essential and integral component of Higher Education. Recognizing the added value and flexibility this modality offers, educational institutions continue to explore the potential of emerging educational technologies to enrich and enhance the learning experience. Strategies are also being adapted and pedagogical models developed that combine the best of in-person and online teaching in hybrid or bimodal formats. This integrated approach is recognized for its effectiveness in meeting the educational needs of a diverse and technologically connected student population.

This study arose from the need to understand how online education in the university context has adapted and responded to the aforementioned changing dynamics. Despite widespread adoption and significant advances in educational technology, crucial challenges related to the quality, equity, and effectiveness of online education persist. These challenges require a systematic literature review that examines current trends, implemented strategies, and perceptions of online education outcomes. This approach will provide a framework for future improvements and adaptations in educational policies and practices.

By analyzing the literature, this article seeks to offer a retrospective perspective on the challenges and opportunities of online education, thus providing a relevant resource for researchers, educators, and policymakers interested in the future of higher education. Through a systematic review, it explores how institutions have navigated this change and how they can continue to evolve to meet the needs of a global and technologically competent student population in a rapidly changing context.

MATERIALS AND METHODS

This study was developed through a systematic literature review on university online education, with the aim of analyzing its current dynamics and trends between 2019 and 2023. Following the guidelines of the PRISMA protocol, a comprehensive search was conducted in the ERIC and EBSCOhost databases to ensure the reproducibility of the study. Searches were conducted between January 8 and February 21, 2024, in ERIC, and from February 22 to March 10, 2024, in EBSCOhost, using the keywords "online education" and " *online education"* in both databases. Filters were applied to limit the results to peer-reviewed journal articles published between 2019 and 2023, in English and Spanish, resulting in a total of 29 documents in ERIC and 17 in EBSCOhost.

The inclusion criteria for this study focused on documents specifically addressing online education in the university context and that were within the established date range. Studies that were not peer-reviewed or that were outside this time range were excluded. Study selection was conducted through a detailed process following the PRISMA flowchart (Figure 1), with two reviewers applying inclusion and exclusion criteria to minimize bias and ensure consistency in selection.
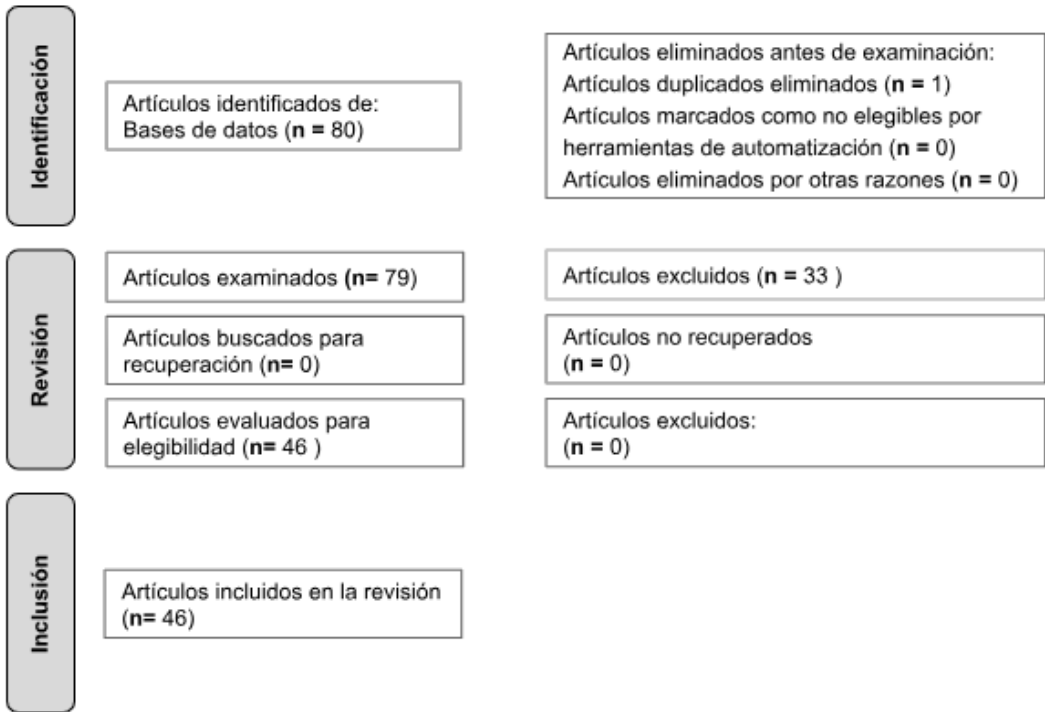

Figure 1. PRISMA diagram of the search and selection of studies

Note: Prepared based on the PRISMA 2020 flowchart for new systematic reviews, which included database and registry searches only

To synthesize and analyze the key information from each selected study, a data extraction matrix was designed, including aspects such as objectives, methodology, participants, main findings, and conclusions. The specific objectives of this systematic literature review were to evaluate the most recent contributions in the field of online university education and identify emerging trends, innovations, and challenges; and to offer evidence-based recommendations for education professionals and policymakers. This methodological approach allowed us not only to review the existing literature but also to generate an updated overview of online university education, with the expectation of contributing to both theory and practice in this field.

It is important to highlight that the systematic literature review was conducted in compliance with relevant ethical considerations, although, given the bibliographic focus of the research, informed consent from direct participants was not required. This review adheres to the standards for bibliographic research and evidence synthesis established by PRISMA. In addition to aligning with the proposed type of research, it also aims to facilitate future research in the field of online university education.

RESULTS

A total of 46 studies on online university education were identified between 2019 and 2023. The distribution of published studies by year (Figure 2) begins in 2019 with a single study. In 2020, the number of studies increased to four, reflecting moderate growth in online education research. 2021 marked a turning point with 10 published studies, reflecting a significant increase that coincided with the global restrictions imposed by the COVID-19 pandemic, which contributed to the widespread adoption of online education. In 2022, the upward trend continued with 19 studies, evidencing a rapid expansion and adaptation of online teaching methods. Strong interest continued in 2023 with 12 published studies, indicating that adaptation to online education remains relevant in the current educational context. The distribution of studies by language revealed a predominance of English with 43 articles, compared to only three in Spanish.
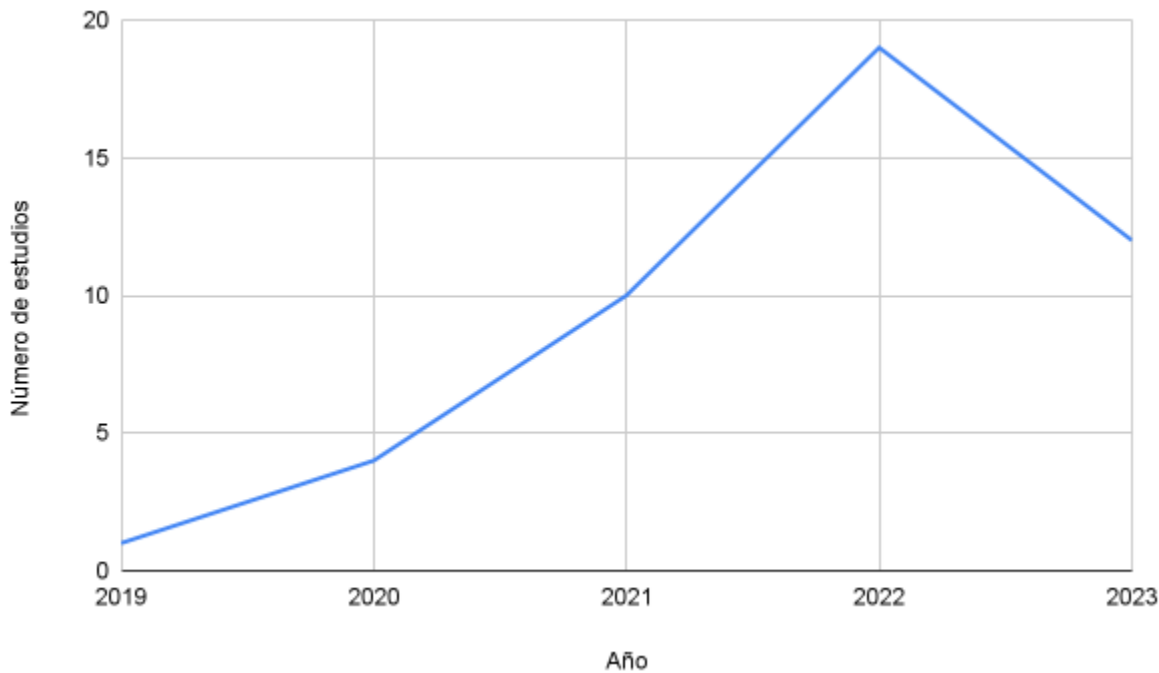
Figure 2. Number of online education studies per year

The findings of this study were organized into six thematic areas that reflect both the advances and challenges faced in the field of online university education during the period analyzed. Table 1 provides a summary of these thematic areas and the key findings associated with each.

Table 1. Thematic areas and main findings of studies on university online education

Thematic area	Description	Main findings
Transition and adaptation to online education.	The transition from face-to-face to virtual education is examined due to disruptive factors.	The transition to online education highlights the importance of technical support, effective communication, and appropriate assessments. Faculty collaboration and training are key to improving online learning environments.
Pedagogical effectiveness in online education.	Technological strategies and tools are evaluated to improve online teaching.	Effective online teaching depends on strategies that enhance teaching and learning. Factors such as self-regulation, accessibility, use of ICTs, and

		techniques like microlearning are essential for student satisfaction and achievement.
Student experiences and perceptions.	The satisfaction and emotional experiences of students in virtual education are investigated.	Student experiences and perceptions of online education require adaptation to cultural and communicative needs. Student satisfaction and adaptability, influenced by interaction and technical support, require continuous improvement.
Challenges and barriers in online education.	Technical and emotional challenges are identified in online education.	Challenges in online education include technical, pedagogical, emotional, and accessibility barriers. The need to manage digital tools and overcome deficiencies in teacher training is critical to improving online education.
Impact and digital transformation.	The impact of digital transformation on Higher Education is analyzed.	The digital transformation has structurally changed Higher Education, driving the need to understand motivations, improve crisis management, and adapt technological support. Online education facilitates international collaboration and expands educational access.
Assessment and performance in online education	Methods of assessment and academic performance in virtual environments are discussed.	Studies on assessment and performance in online education demonstrate the need to adapt assessment methodologies to ensure effectiveness and equity. Ethical challenges and the need for assessments that foster integrity and social skills are key.

To further explore the results, it can be noted that the transition to online education, driven by the pandemic, has highlighted the importance of factors such as technical support, effective communication, and appropriate assessments for its success. Collaboration between universities and program providers, along with a robust technological infrastructure and teacher training, are crucial to adapting and improving online learning environments.

Studies on pedagogical effectiveness in online education highlight the importance of strategies that improve teaching and learning. Factors such as student self-regulation, accessibility for individuals with disabilities, the effective use of ICTs, and techniques such as microlearning significantly improve student satisfaction and performance. Furthermore, formative assessments, the adoption of socially influenced educational platforms, and the integration of advanced technologies for immersive experiences are crucial to educational effectiveness.

Studies on student experiences and perceptions of online education highlight the importance of adapting teaching to diverse cultural and communicative needs, highlighting challenges such as a lack of communication skills and the need for personalized pedagogical methods. Student satisfaction and adaptability vary over time, influenced by interaction, technical support, and accessibility, underscoring the need to continually improve online education to meet their expectations and changing conditions.

Challenges in online education include technical, pedagogical, emotional, and accessibility barriers, affecting both students and educators. Studies highlight the need to properly manage digital tools to improve performance, address increases in emotional challenges, overcome deficiencies in teacher training, resistance to technology adoption, diverse student perceptions, challenges in medical evaluations, and personal and environmental barriers, underscoring the importance of strengthening infrastructure and pedagogical strategies to improve online education.

The digital transformation in Higher Education, driven by online education, has led to significant structural changes in educational delivery. Research underscores the importance of understanding motivational factors, improving crisis management, and adapting methodologies and technological support to respond to health emergencies. Furthermore, it highlights how online education facilitates international collaboration and expands educational access, while the rapid integration of technologies demonstrates the acceleration of digital adoption due to the pandemic. These studies indicate that digitalization is both a necessary response and an opportunity to improve education in the long term.

Studies on assessment and performance in online education highlight the need to adapt and improve assessment methodologies. The preference for multiple-choice exams is evident, necessitating fairer and more effective assessment strategies. Similarly, ethical challenges and the need for assessments that promote integrity and social skills are discussed, and solutions to assessment challenges in

online medical education are proposed, underscoring the importance of accurately reflecting student learning in low-resource settings. These findings highlight the importance of reforming assessment practices to ensure quality and equitable online education.

DISCUSSION

From 2019 to 2023, the topics of study and concerns in online education at universities have evolved significantly, reflecting the emerging challenges and opportunities in the global educational context. Initially, in 2019, the predominant focus on online education centered on exploring the possibilities and limitations of digital platforms for online learning. Studies were oriented toward improving technological infrastructure and integrating digital tools that could replicate or even enhance face-to-face educational interaction and experience. This initial interest laid the groundwork for the accelerated expansion that would follow (Aranyi *et al.*, 2022; Das *et al.*, 2021).

With the arrival of the COVID-19 pandemic in 2020, online education shifted from being a complementary or alternative modality to becoming the primary form of educational delivery in many universities around the world. This led to a dramatic shift in research priorities, with an urgent focus on the adaptability and effectiveness of remote teaching and learning. Studies during this period addressed critical issues such as accessibility, equity in access to technological resources, and strategies for maintaining academic quality and rigor in a fully virtual environment. Furthermore, student mental health and challenges to student engagement became central concerns, motivating research on how to support student well-being in non-traditional learning contexts (Sudakova *et al.*, 2022; Hartwell *et al.*, 2023).

Towards 2023, research on online education began to stabilize, with a focus on integrating lessons learned during the pandemic and exploring hybrid or bimodal formats that combine the best of in-person and online teaching. Studies examined how innovations contribute to personalizing education to meet individual students' needs, while addressing long-term issues of equity and accessibility. Furthermore, there is renewed interest in improving online assessment methodologies to ensure they are fair, effective, and capable of accurately measuring student learning across diverse educational settings. In this context, accessibility remains a relevant barrier, with notable differences in access to appropriate technologies and the need to address factors specific to the digital environment and students' unique circumstances (Romero *et al.*, 2022).

On the other hand, online assessment requires the development of fair and reliable methods that truly reflect student learning, while technical issues such as unstable internet connections and poor platforms impact the learning experience (Fatima *et al.*, 2021). Furthermore, other research has shown that emotional and evaluative challenges require innovative approaches: the impact of emotional factors on student engagement is highlighted (Suleymanova *et al.*, 2023); the limitations of traditional assessment methods in digital environments are noted; and the urgency of reforming assessment practices to incorporate academic integrity and promote social skills is underscored (Milliken *et al.*, 2023).

Studies on online university education from 2019 to 2023 have identified multiple challenges, ranging from accessibility and equity to pedagogical and emotional aspects. While ICTs and digital platforms have expanded access and pedagogically transformed the delivery of education (Bates, 2019; Siemens, 2004), challenges such as teaching quality, personal interaction, and student engagement remain, which need to be better aligned with educational objectives. Furthermore, although digitalization promises to connect labor market needs with academic training, the rapid transition to online education has sometimes revealed a hasty execution, which could compromise the effectiveness and depth of learning (Hodges *et al.,* 2020). Likewise, it is essential to continue working to close equity and accessibility gaps. In this sense, other findings that highlight the need for a review in project management and institutional strategies to face emergencies must be integrated, as evidenced by studies that analyze response approaches in crisis situations (He and Wei, 2021).

The review of studies illustrates that, while online education has evolved significantly in response to technological demand and accessibility, critical challenges persist in pedagogical and emotional aspects. Pedagogical adaptation and teaching quality also present challenges, as teachers struggle to transform traditional practices into effective strategies for virtual environments (Husain *et al.,* 2023). Furthermore, student motivation and engagement are difficult to maintain without face-to-face interaction, which directly affects their performance and perceived satisfaction (Le *et al.,* 2021).

This compendium of research offers insight into the transitional state of online education, highlighting the rapid adaptation to virtual modalities but also underscoring structural and strategic shortcomings. By explicitly addressing the limitations of online education, these studies provide a critical framework for assessing current and future policies and practices, providing a basis for reflection on how universities can enhance the integration of technology in ways that enhance, and not merely replace, the traditional learning experience.

The results indicate crucial areas for future research and development, such as the need to create more robust and representative online assessments of student learning and to further explore how pedagogical practices can be optimized to foster deeper and more meaningful online learning; and to investigate how emerging technologies such as artificial intelligence and personalized and adaptive learning approaches can be effectively applied to large student populations. Furthermore, the development of strategies to address students' emotional and mental well-being is critical, given the impact of isolation and the online environment on their psychological health.

The findings challenge all stakeholders involved in online university education to reconsider not only the technological infrastructure but also the pedagogical methodologies. The transition to online education should not be viewed merely as a change of tools, but as an opportunity to rethink the approach to teaching and learning. Academic leaders and policymakers must ensure that technological adoption goes hand in hand with sound pedagogical strategies that promote not only educational efficiency but also effectiveness. Furthermore, it is crucial to implement policies to reduce disparities in access and ensure that every student, regardless of their economic or geographic background, can equitably benefit from the opportunities offered by online education.

REFERENCES

Aranyi, G., Tóth, Á. N., & Veisz, H. (2022). Transitioning to emergency online university education: An analysis of key factors. *International Journal of Instruction, 15(2)*, 917-936. https://doi.org/10.29333/iji.2022.15250a

Bates, A. W. (2019). *Teaching in a Digital Age: Guidelines for Designing Teaching and Learning*. Tony Bates Associates Ltd.

Das, R., International University of Business Agriculture and Technology, Bangladesh, Meredith, D., & Webster University, Thailand. (2021). Factors affecting effective online teaching transition in Asian universities during COVID-19. *Journal of university teaching & learning practice, 18(8)*. https://doi.org/10.53761/1.18.8.8

Fatima, S. S., Idrees, R., Jabeen, K., Sabzwari, S., & Khan, S. (2021). Online assessment in undergraduate medical education: Challenges and solutions from a LMIC university. *Pakistan Journal of Medical Sciences, 37(4)*, 945-951. https://doi-org.e-revistas.ugto.mx/10.12669/pjms.37.4.3948

Hartwell, A., Thomas, C., Brown, B., & Nogueira, B. (2023). Designing Group Work in Online Courses to Develop Preservice Teachers' Professional Collaboration Skills. *Journal of Educators Online*, 21(1). https://doi.org/10.9743/JEO.2024.21.1.20

He, W., & Wei, G. (2021). Higher education in China, a paradigm shift from conventional to online teaching. *Higher education studies, 11(2)*, 30. https://doi.org/10.5539/hes.v11n2p30

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). The Difference Between Emergency Remote Teaching and Online Learning. *EDUCAUSE Review*. https://revistascientificas.una.py/index.php/REPED/article/view/3277

Husain, S., Ali, M. A., Saifi, M. A., Habib, S., & Khan, M. A. (2023). Teachers' readiness and usage of online teaching practices in the Kingdom of Saudi Arabia: An empirical investigation. *Journal of Education and E-Learning Research, 10(4)*, 855-867. https://doi.org/10.20448/jeelr.v10i4.5270

Le, D.-L., Giang, T.-V., & Ho, D.-K. (2021). The impact of the COVID-19 pandemic on online learning in higher education: A Vietnamese case. *European journal of educational research, 10(4)*, 1683-1695. https://doi.org/10.12973/eu-jer.10.4.1683

Milliken, M., Winter, R., & Or, J. (2023). A Qualitative Analysis of Ethicality and Interpersonal Skills in Online Higher Education. *Journal of Educators Online*, 20(4). https://doi.org/10.9743/JEO.2023.20.4.17

Romero Rodrigo, M., Peirats Chacón, J., & Martín Alonso, Á. S. (2022). Estrategias de aprendizaje según ramas de conocimiento en estudiantes universitarios en modalidad online. *Educatio Siglo XXI, 40(2)*, 147-167. https://doi-org.e-revistas.ugto.mx/10.6018/educatio.471651

Siemens, G. (2004). Connectivism: A Learning Theory for the Digital Age. International *Journal of Instructional Technology and Distance Learning*.

Sudakova, N. E., Savina, T. N., Masalimova, A. R., Mikhaylovsky, M. N., Karandeeva, L. G., & Zhdanov, S. P. (2022). Online formative assessment in Higher Education: Bibliometric analysis. *Education Sciences, 12(3)*, 209. https://doi.org/10.3390/educsci12030209

Suleymanova, S., Gawanmeh, A., & Al-Alami, S. (2023). A comparative study for mental health challenges of students: Online versus on-campus education. *Contemporary Educational Technology, 15(3)*, ep441. https://doi.org/10.30935/cedtech/13337

Conflict of interest

Authors declare no conflict of interests.

Authors' contribution

The authors participated in the design and writing of the article, in the search and analysis of the information contained in the consulted bibliography.