

Digital tools, an opportunity in higher education:

A systematic review

Herramientas digitales, una oportunidad en la educación superior: una revisión sistemática

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Abstract

This article presents a systematic review aimed at analyzing the methodological adaptability of new technologies in the academic environment. To this end, 30 review articles focused on the incorporation and adaptation of digital resources in the educational field were selected. The search was conducted in databases such as Scielo, applying a detailed analysis of publications from 2021 to 2025. To optimize the results, Boolean operators such as AND and OR were used, which allowed us to refine the selection and exclude categories that did not meet the established criteria. The findings show that digital tools represent an unprecedented opportunity to improve higher education, making it more accessible, interactive, and personalized. However, it is important to highlight the persistent digital divide faced by developing countries, which hinders their individuals' competitiveness in an increasingly globalized world.

Keywords: competencies, digital tools, technology.

Resumen

Este artículo presenta una revisión sistemática con el propósito de analizar la adaptabilidad metodológica de las nuevas tecnologías en el entorno académico. Para ello, se seleccionaron 30 artículos de revisión centrados en la incorporación y adaptación de recursos digitales en el ámbito educativo. La búsqueda se realizó en bases de datos como Scielo, aplicando un análisis detallado de publicaciones comprendidas entre 2021 y 2025. Con el fin de optimizar los resultados, se emplearon operadores booleanos como *AND* y *OR*, lo que permitió refinar la selección y excluir categorías que no cumplieran con los criterios establecidos. Los hallazgos evidencian que las herramientas digitales representan una oportunidad sin precedentes para mejorar la educación superior, haciéndola más accesible, interactiva y personalizada. No obstante, es importante destacar la persistente brecha digital que enfrentan los países en vías de desarrollo, la cual dificulta la competitividad de sus individuos en un mundo cada vez más globalizado.

Palabras clave: competencias, herramientas digitales, tecnología.

Introduction

The use of innovative educational tools facilitates student engagement; however, many educators lack adequate training or are insufficiently prepared to assertively implement diverse teaching methods that yield a significant impact. Therefore, it is essential that these resources are complemented by accessible virtual platforms, where students can access interactive materials tailored to their educational level and designed to maintain a high degree of motivation and interest in their learning (Duque et al., 2022).

Beyond enhancing interaction and collaborative work among educators, digital platforms serve as a crucial foundation for the development and delivery of innovative teaching resources. Thanks to cloud storage systems, such as Google Drive or Dropbox, educators can immediately distribute documents, presentations, videos, and other educational materials, thereby promoting a collaborative and dynamic teaching approach. This not only expands pedagogical possibilities but also ensures that students have access to updated and diverse content, adjusted to different learning styles (Sosa, 2024).

Nevertheless, uncertainty regarding the actual impact of digital tools in the educational sphere has generated a complex context, affecting not only academic performance but also the acquisition of essential digital skills for students' future careers. The lack of clarity about the effective use of these technologies in specific educational fields can hinder the fulfillment of student expectations, exacerbating the persistent digital divide and negatively impacting educational equity (Navarrete et al., 2024).

In the case of the Ecuadorian educational system, the integration of ICT presents multidimensional challenges that extend beyond the instrumental use of these tools. Adapting the educational process requires profound transformation, primarily involving the pedagogical adaptability of educators, who must reconsider their teaching strategies. Secondly, educational planning must be instrumentalized to effectively incorporate technological resources according to students' needs. An additional obstacle lies in the marked inequalities between educational institutions, many of which lack basic technological infrastructure and qualified teachers with necessary digital competencies. This gap is further widened by the absence of specialized training in the pedagogical use of ICT, limiting educational potential and perpetuating traditional teaching models that do not meet the demands of an increasingly demanding digital society (Franco et al., 2022).

This issue transcends the academic realm and becomes a social challenge, as inadequate implementation of digital resources can deepen educational inequalities. Failing to ensure effective mastery of digital competencies in specific professional areas risks widening the digital divide and compromising the principles of equity in student education, especially affecting those with less access to new technologies (Navarrete et al., 2024).

On the other hand, the incorporation of technological solutions in higher education represents a unique opportunity to strengthen leadership and communication competencies in future professionals. If measures are implemented to minimize inequalities in access to technology and proper guidance is provided, it will be possible to optimize the advantages of these tools and prepare students to thrive in an increasingly digital world, adapting to the emerging needs of contemporary society. Consequently, the primary objective of educators and institutions should be to foster research and continuously improve the application of new technologies, ensuring quality education that is accessible and aligned with the demands of the digital age. This way, relevant, equitable academic training can be ensured, equipping students with the necessary knowledge to face reality (Huamani et al., 2025).

In recent years, various studies have demonstrated that, although educators often express confidence in their abilities to implement ICT in the classroom, they also recognize the need for stronger and more specialized

professional training focused on the demands arising in classrooms and society. In particular, there is a need to strengthen pedagogical methodologies that facilitate effective integration of digital tools. This finding underscores the importance of adopting a flexible educational approach that considers not only the cognitive and emotional differences among students but also maximizes the possibilities offered by digital technologies to enrich learning. A particularly relevant point is that teacher training has been identified as the key factor in the incorporation of ICT. Although educators perceive themselves as possessing technical and disciplinary competencies, pedagogical knowledge — that is, the ability to teach with technology — emerges as the main shortcoming to be addressed. The gap in teacher preparation represents an urgent challenge; without adequate training in innovative teaching strategies, the potential of ICT in education cannot be fully realized, directly impacting the quality of the tools available to students as they confront society. Therefore, it is essential to prioritize continuous professional development for both educators and students, where the key lies in digital pedagogy, ensuring that the integration of technologies is genuinely transformative and has a significant impact on the teaching-learning process (Berrú et al., 2025).

In the current educational context, the challenges arising from rapid technological advancement and its increasing accessibility are evident, especially in developing countries. This implies that teaching processes cannot be limited to traditional curricular content or linear methodologies designed exclusively by the educator; they must respond to the demands that arise outside educational institutions. Thus, it is imperative to implement innovative strategies and technological means specifically tailored to students' needs. The goal is to develop in students advanced competencies for detailed and contextualized analysis, critical interpretation, and rigorous evaluation of various social manifestations and artistic expressions (Castro et al., 2024).

In this way, a proactive and multidisciplinary education is promoted, aligned with the demands of a constantly changing world, where critical thinking and social appreciation skills are fundamental for nurturing productive individuals committed to society.

Methodology

The development of this research is based on a qualitative methodological approach, following the guidelines established by the PRISMA 2020 model. This methodological framework was chosen for its ability to effectively integrate with systematic reviews that include meta-analyses, thus ensuring a structured, meticulous, and completely transparent process at all stages. The rigorous application of the protocol allowed for maintaining high scientific standards during the information search, while also ensuring a clear and systematic presentation of both the procedures and the findings obtained.

After analyzing various review articles related to the implementation of digital tools, their impact in the educational field, and the development of competencies, the bibliographic search focused on publications from the last five years, specifically between 2021 and 2025. SciELO was used as the main platform to optimize the research and ensure the reliability of the consulted sources. The selected documents were incorporated into the study under specific criteria, which required that they be available in Spanish, English, or Portuguese.

Table 1
Inclusion and exclusion criteria

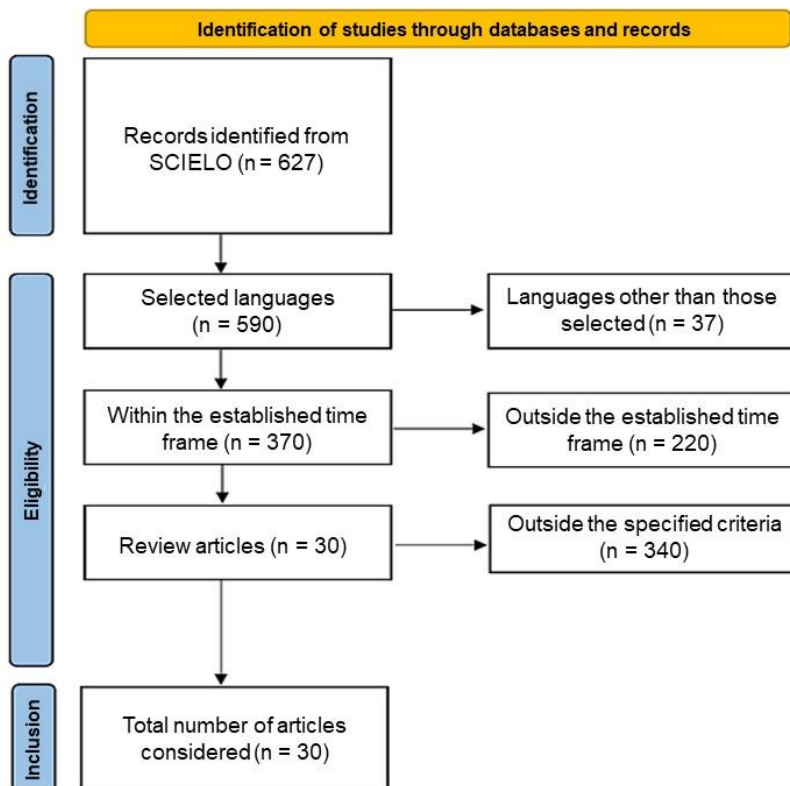
Criterion	Description	Application
Language	Articles published in English, Spanish, or Portuguese	Include only these languages
Publication date	Articles published from 2021 onward	Limit to recent publications
Type of study	Studies addressing the use of digital tools in educational or training contexts	Include studies with clear methodology
Availability of full text	Articles with accessible full text for review	Exclude if full text is not accessible
Database	Articles indexed in SciELO	Limit search to SciELO
Type of article	Review articles	Limit to review articles

The choice of the PRISMA 2020 model proved to be the most suitable option for the development of the study, as it provides specific and updated guidelines for the selection, evaluation, and synthesis of scientific

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evidence obtained from the SciELO database. In this context, thirty (30) articles that met all the detailed guidelines in the research were adapted, thus ensuring a rigorous and transparent procedure in accordance with the international standards established by PRISMA 2020.

Figure 1
PRISMA methodology diagram



To ensure a bibliographic selection that met the research requirements, the study implemented a rigorous search system using SciELO's advanced tools, strategically combining Boolean operators. In this process, the operator "AND" was used to intersect all key terms, while the operator "OR" allowed for broadening the search scope, ensuring a more comprehensive and precise coverage of the relevant literature.

Table 1
Classification of evaluated documents

No.	Author	Title
1	(Barrientos, Caldevilla, & López, 2024)	Promotion of Physical Activity through the Media and Neurocommunication
2	(Castro & Coras, 2024)	Digital Tools in Teacher Performance: Systematic Review
3	(Yalta, 2024)	Vacunagate: A Discursive Analysis of Political Corruption in Peruvian Press
4	(Polonia, Miotto, & Suyo, 2023)	Digital Tools Used in Higher Education: A Systematic Review

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5	(Usart, 2023)	Digital Technologies and Artificial Intelligence: Evidence of Their Effectiveness in Education
6	(Tarrillo, Fiorela Fernández, Moreno, & García, 2023)	Information and Communication Technologies in Education during COVID-19 Lockdown
7	(Quilia, Alfaro, & Riveros, 2023)	Impact of ICT in Basic Education in Latin America
8	(Escalona, Batista, & Mar, 2023)	A Literature Review on Digital Transformation to Address the Paradigm Shift in Health Informatization
9	(Abarca, Quispe, & Quispe, 2023)	Importance of Using Digital Tools in Educational Inclusion
10	(Lucana & Roldan, 2023)	AI-Based Chatbot for School Education
11	(Saldaña & Baluis, 2023)	Social Media and Distance Higher Education during the Pandemic
12	(Candia, 2023)	Digital Competencies in Higher Education
13	(Yataco, Torres, Vásquez, & Lescano, 2023)	Learning English through Digital Tools in Higher Education: Systematic Review
14	(Sifuentes, Ortega, & Oscoco, 2023)	Digital Tools in Formative Assessment during the Pandemic Context
15	(Ronquillo, Bazualdo, & Sánchez, 2023)	Digital Competencies in Peruvian Schoolchildren with Visual Impairments: Analysis and Perspectives
16	(Aguilar & Valverde, 2023)	Use of Hyperspectral and Digital Images in Berries: Anomalies, Diseases, Mechanical Damage, Firmness, Maturity, and Morphometry
17	(Moreira, et al., 2023)	Analysis of Health Podcasts about People with Stomas: Scope Review with Technological Prospection
18	(Aguilar H. , 2023)	Scraping Archaeology: A Methodological Approach from Web Scraping and Text Mining
19	(Amaró, Díaz, & Hernández, 2022)	Digital Imaging as a Didactic Resource in Meaningful Learning of Medical Sciences
20	(Guisvert & Lima, 2022)	Gamification in Mathematics Learning in Regular Basic Education
21	(Castro, Castro, Deustua, & Guzmán, 2022)	Screen Hours and Myopia in Children
22	(Arevalo, 2022)	Systematic Review on Digital Health in Managing Absenteeism and Return to Work
23	(Toledo, Reyes, & Alcántara, 2022)	Challenges of Digital Transformation in Microfinance in Peru
24	(Zurita, Bertolini, & Barroso, 2021)	Social Media in Micro, Small, and Medium Enterprises
25	(Perdigón & Orellana, 2021)	Systems for Intrusion Detection in Data Networks of Health Institutions
26	(Manrique, Motte, Naveja, Sánchez, & Gutiérrez, 2021)	Changes and Strategies in Medical Education in Response to the COVID-19 Pandemic

27	(Apaza & Moscoso, 2021)	Digital Tools as an Informational Ally in Peru for Self-Care during COVID-19
28	(Ricce & Ricce, 2021)	Didactic Games in Mathematics Learning
29	(Renteria, Mayacela, Rojas, Mayacela, & Mayacela, 2021)	Facebook as an Emerging Educational Tool in the Teaching-Learning Process at the Initial Level during the Pandemic
30	(Hernández, Carvajal, Legañoa, & Campillo, 2021)	Challenges and Perspectives of Digital Content Curation in the Continuous Training of University Professors

Discussion

The adaptation process proves particularly effective, as students, being predominantly digital natives, demonstrate greater flexibility in interacting with new technologies integrated into the educational environment. This not only optimizes content comprehension but also fosters a close collaborative work atmosphere between students and teachers, promoting teamwork and the joint construction of knowledge (Morán et al., 2021).

Currently, technological advancement in education has compelled educators to continually enhance their digital skills. In this regard, training workshops play a key role in adopting new pedagogical strategies that respond to students' needs, recognizing emerging technologies as tools that facilitate assertive communication (Castro et al., 2024). Thus, digital literacy in education should be considered mandatory to complement educational objectives, helping students develop both technological and linguistic competencies. Furthermore, educators must master these new technologies to integrate them pedagogically and effectively into their teaching practices (Yataco et al., 2023).

Digitalization has profoundly transformed the educational process. New technologies and the internet enrich training, allowing students to develop various competencies that prepare them for the workforce, supported by continuous personalized assessments (Sifuentes et al., 2023). However, despite these advances, certain deficiencies persist in the educational system, particularly regarding the digital inclusion of individuals with disabilities, who still face limitations in accessing digital tools. Nonetheless, significant efforts are underway to reduce this technological gap (Ronquillo et al., 2023).

On the other hand, ongoing scientific advancements have led to innovative technologies that have revolutionized various fields. Tools such as automation, artificial intelligence, and big data management enable rapid, accurate assessments with enhanced forecasting capabilities, driving new forms of innovation across multiple domains of knowledge (Aguilar et al., 2023).

Digital skills have captured educators' interest due to their increasing presence in the educational landscape. Studies reveal that educators are adopting technological tools that, due to their flexibility, facilitate better connections with students, creating innovative environments for teaching and learning (Guisvert et al., 2022). The evolution of these tools has transformed the educational process; it is no longer just about memorization but rather about fostering active participation among students. Today, students engage directly with problems, developing various skills through the active use of new technologies (Amaró et al., 2022).

No organization can ignore the power of new technologies. As multiple studies demonstrate, digital platforms, along with the internet and mobile technology, have become strategic allies in enhancing business management (Zurita et al., 2021).

Although the internet and digital devices have become ubiquitous, and access to various digital tools continues to grow, it is important to reflect on how these advancements radically transform our world and affect how we manage our health globally. Technological changes redefine our well-being day by day (Castro et al., 2022). From an educational perspective, it is crucial to understand how these digital innovations impact both workers and industries, playing a key role in managing the academic and professional transition (Arévalo, 2022). Digital transformation does not happen by chance; it first requires envisioning a different organization and then realizing that change by fostering teamwork, using data as a guide, and learning from daily practice. It is a process built, step by step (Toledo et al., 2022).

Even universities have had to adapt, migrating from exclusively face-to-face education to virtual and hybrid modalities. In this process, the adoption of platforms and social networks has become a key tool for communication between students and teachers, serving as a fundamental mediating role in online higher education (Saldaña et al., 2023).

Studies show the positive impact of personalized campaigns based on digital media and supported by neuro-communicative data. These strategies demonstrate high effectiveness in tailoring messages to individual preferences, surpassing traditional methods and optimizing engagement through digital tools such as eye tracking and artificial intelligence (Barrientos et al., 2024).

Despite current challenges, Information and Communication Technologies (ICT) have established themselves as fundamental pillars of education, offering valuable opportunities to the entire academic community. These technologies optimize student growth, eliminate spatial and temporal barriers, and strengthen both connection and collaboration in the educational process (Macías et al., 2024). In this sense, educational institutions must focus on carefully evaluating the available digital tools and determining which are most suitable for the academic environment, as ICT play a crucial role in learning. Moreover, it is essential to analyze their impact on educational inclusion and the support they provide to educators (Abarca et al., 2023).

Considering new technologies, digital journals, combined with Critical Discourse Analysis, exemplify how the foundations for narrative construction are established, revealing discursive strategies with a significant impact on public perception (Yalta, 2024). In this context, the digital training of teachers, students, and administrative staff plays an essential role in correctly integrating technology into the activities of all those involved in the educational process. Educators must master professional and ethical competencies aligned with learning objectives, combining them with appropriate methodologies that enhance the holistic development of students (Usart, 2023).

The rapid advancement of artificial intelligence has led to an imminent transformation in the educational field, introducing a wide array of innovative digital tools. Students face a dynamic and challenging context, where new technologies play a fundamental role in adapting to the accelerated changes in the school environment (Lucana et al., 2023). As a result, ICT has been fully integrated into the educational system to ensure competitiveness and pedagogical continuity, becoming indispensable tools today. The constant presence of these technologies in classrooms has driven the need to design and implement new didactic strategies that optimize teaching processes in digital environments (Tarrillo et al., 2023).

It is a priority to incorporate new technologies into teacher training programs, recognizing them as transformative educational resources that promote collaborative learning, the development of innovative content, creativity, and essential digital competencies. Systematic integration would fully leverage their potential to enrich both teaching and learning processes in a contemporary educational context that remains attentive to social demands and optimizes all available resources (Polonia et al., 2023).

The quality of university education significantly influences students' future professional performance. In this regard, digital tools have evolved: once considered exclusively for recreational use, they now play a strategic role in enhancing pedagogical quality and ensuring academic continuity (Quilia et al., 2023). Currently, digital transformations not only involve technology but also modify structures and influence culture, facilitating daily activities in the labor market through a strategic process based on intensive ICT use, along with the systematization and analysis of firsthand data (Escalona et al., 2023).

The development of technological skills has shifted from being optional to becoming a basic requirement for successful job placement. This compels educational institutions to rethink their teaching methodologies, prioritizing the acquisition of digital competencies that allow future professionals to demonstrate competence and performance in dynamic and highly technological work environments. Higher education must function as a bridge connecting academic training with the demands of today's job market, thus facilitating professional self-realization and proper social integration (Candia, 2023).

Online learning has solidified as an indispensable tool thanks to technological evolution. Today, educational platforms, specialized software, and technological devices have naturally integrated into our routines, ensuring that academic training never ceases (Manrique et al., 2021). This is the ideal moment to reinvent education, equipping educational environments with everything necessary to transform face-to-face classes into virtual and interactive models adaptable to any educational level. It presents a perfect opportunity to evolve toward new ways of teaching and learning (Rentería et al., 2021).

Increasingly, educators are opting for innovative methods that combine technology with digital and traditional practices. Technological tools not only motivate students but also help teachers connect better with the new generations of learners (Ricce et al., 2021). The evolution of the educational model is the only way to transform higher education into the main catalyst for an innovative society, ready for the challenges of global digital transformation (Manrique et al., 2021). However, although educational applications and web platforms continue to grow, this surge complicates the measurement of whether they truly fulfill their role in learning, representing a new challenge for educators: assessing whether these digital tools are achieving their purpose (Apaza et al., 2021).

Finally, continuous training is at the heart of teaching. When teachers, in addition to being qualified, maintain ongoing training to update their knowledge and skills in line with the changing demands of society, they renew their educational practice and enhance their resources to effectively respond to students' needs (Hernández et al., 2021).

Conclusion

The integration of ICT into educational systems has revolutionized traditional pedagogical paradigms, generating more enriching and participatory teaching and learning dynamics. In these new scenarios, students actively engage while addressing their specific educational needs and respecting their diverse learning methodologies. Technological tools not only optimize knowledge construction but also foster the creation of collaborative and holistic educational environments, where creativity, content assimilation, and idea generation are part of an agile and dynamic process, thanks to the possibilities offered by new technologies.

Moreover, the transition from analog to digital formats, through resources such as virtual simulations, interactive platforms, and augmented reality, has enabled the development of more introspective and flexible educational models capable of responding to the demands of today's society without losing sight of individual self-knowledge.

However, significant challenges persist, such as the systematic implementation of technologies in face-to-face modalities, teacher training in digital competencies, and the appropriate curricular integration of these tools. These issues are particularly evident in developing countries, such as much of Latin America, where the digital divide limits equitable access to technological resources. Therefore, educational institutions must design and execute strategic policies that transform ICT from mere auxiliary instruments into fundamental elements of the educational process. To achieve this goal, it is essential to allocate adequate budgets and sufficient resources to train both teachers and students, preparing them to meet new social demands while improving productivity and educational quality.

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