Virtual Environments for Learning: A Systematic Review

Entornos virtuales para el aprendizaje: una revisión sistemática

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Abstract

The objective of this study was to analyze the implications of virtual environments for learning. A systematic review methodology was used, compiling articles related to virtual environments in the educational field. The PRISMA method was used, following criteria suitable for this type of study. The search included keywords such as: "virtual environments" AND "learning". The inclusion criteria considered articles published between 2020 and 2025, in open access, in English or Spanish, available in databases such as Scopus and Scielo, using Boolean AND operators. As exclusion criteria, articles published before 2020 were discarded. In the results, 414 articles were initially identified in Scopus and 192 in Scielo. After applying the selection criteria, 10 articles from Scopus and 11 from Scielo were chosen, obtaining a total of 21 articles analyzed. The study concludes that virtual environments have established themselves as key tools in educational transformation, favoring the development of creative thinking by offering interactive digital spaces. These environments promote hybrid educational models that combine face-to-face and virtual classes, allowing greater flexibility. Emerging technologies such as the metaverse, virtual reality and augmented reality are emerging as resources with great potential to revolutionize educational environments. In addition, virtual environments have proven to be useful in promoting school coexistence, by allowing the evaluation of situations of violence and training for non-violence in digital contexts.

Finally, gamification and virtual platforms emerge as effective strategies to increase students' motivation and academic performance.

Keywords: virtual environments, strategies, learning.

Resumen

El objetivo del presente estudio fue analizar las implicancias de los entornos virtuales para el aprendizaje. Se empleó una metodología de revisión sistemática, recopilando artículos relacionados con los entornos virtuales en el ámbito educativo. Se utilizó el método PRISMA, siguiendo criterios adecuados para este tipo de estudios. La búsqueda incluyó palabras clave en inglés como: "virtual environments" AND "learning". Los criterios de inclusión consideraron artículos publicados entre 2020 y 2025, en acceso abierto, en inglés o español, disponibles en bases de datos como Scopus y Scielo, utilizando operadores booleanos AND. Como criterio de exclusión, se descartaron artículos publicados antes del año 2020. En los resultados, se identificaron inicialmente 414 artículos en Scopus y 192 en Scielo. Tras aplicar los criterios de selección, se eligieron 10 artículos de Scopus y 11 de Scielo, obteniendo un total de 21 artículos analizados. El estudio concluye que los entornos virtuales se han consolidado como herramientas clave en la transformación educativa, favoreciendo el desarrollo del pensamiento creativo al ofrecer espacios digitales interactivos. Estos entornos impulsan modelos educativos híbridos que combinan clases presenciales y virtuales, permitiendo una mayor flexibilidad. Tecnologías emergentes como el metaverso, la realidad virtual y la realidad aumentada se perfilan como recursos con gran potencial para revolucionar los entornos educativos. Además, los entornos virtuales han demostrado ser útiles para promover la convivencia escolar, al permitir la evaluación de situaciones de violencia y la formación para la no violencia en contextos digitales. Finalmente, la gamificación y las plataformas virtuales emergen como estrategias efectivas para aumentar la motivación y el rendimiento académico del estudiantado.

Palabras clave: entornos virtuales, estrategias, aprendizaje.

Introduction

The time and travel limitations faced by many educators, particularly in extensive geographic contexts, hinder their access to continuous training opportunities. In light of this reality, there is a pressing need to evaluate the effectiveness of self-managed virtual proposals, such as workshops delivered through digital platforms, to ensure sustainable and equitable teacher training. This process must consider scientific education as a fundamental right (Lorenzo et al., 2025).

The rapid expansion of virtual reality has prompted various educational institutions to explore its use as a tool to enhance learning and motivation. However, the need to systematize evidence regarding its effectiveness remains, especially when comparing immersive experiences—requiring specialized devices and offering enveloping environments—with non-immersive, more traditional approaches that are limited in scope (De Back et al., 2021).

School education in South America, like in other regions, underwent an abrupt transformation with the shift to remote learning. This change generated significant uncertainty among educators regarding pedagogical interaction with their students, as well as a persistent nostalgia for in-person teaching. In this context, it is urgent to systematically review the effects of remote learning on educational relationships (Palma-Troncos et al., 2024).

Despite advancements in information and communication technologies (ICT) as innovative tools to facilitate access to knowledge—whether in in-person, distance, or blended (b-learning) modalities—it remains essential to deeply understand how these technologies effectively impact teaching and learning processes within hybrid educational contexts (Sánchez et al., 2024).

The implementation of the "Aprendo en casa" program in Peru, in response to the health emergency, highlighted significant digital divides between urban and rural areas, limiting equitable access to educational resources, especially in highland regions such as Puno (Mamani-Hilasaca et al., 2024). This presents the challenge of ensuring that, in virtual or e-learning environments, students can autonomously develop knowledge and skills, guided by educators who act as facilitators. To achieve this, adequate motivation, pedagogical support, and effective use of technological resources are fundamental (Vásquez Sánchez et al., 2023).

In this regard, the objective of the present study was to analyze the implications of virtual environments for learning.

Methodology

This study employed a systematic review methodology focused on the collection and analysis of scientific articles related to virtual learning environments. The PRISMA protocol was utilized to ensure the rigor, transparency, and replicability of the source selection process. For the literature search, keywords in English were employed, specifically: "virtual environments" AND "learning," integrated using Boolean operators. This strategy was applied in the scientific databases Scopus and Scielo, prioritizing open-access articles in both English and Spanish, published between 2020 and 2025.

The inclusion criteria were as follows: articles indexed in the Scopus and Scielo databases; publications in English or Spanish; studies available in open access; and articles published between 2020 and 2025. The exclusion criteria eliminated articles published before 2020, as well as those that did not directly address the topic of virtual environments for learning.

As a result of the search process, a total of 606 articles were initially identified: 414 from the Scopus database and 192 from Scielo. After applying the relevant filters, 10 articles from Scopus and 11 from Scielo were selected, yielding a total of 21 articles that formed the final sample for analysis (see Table 1).

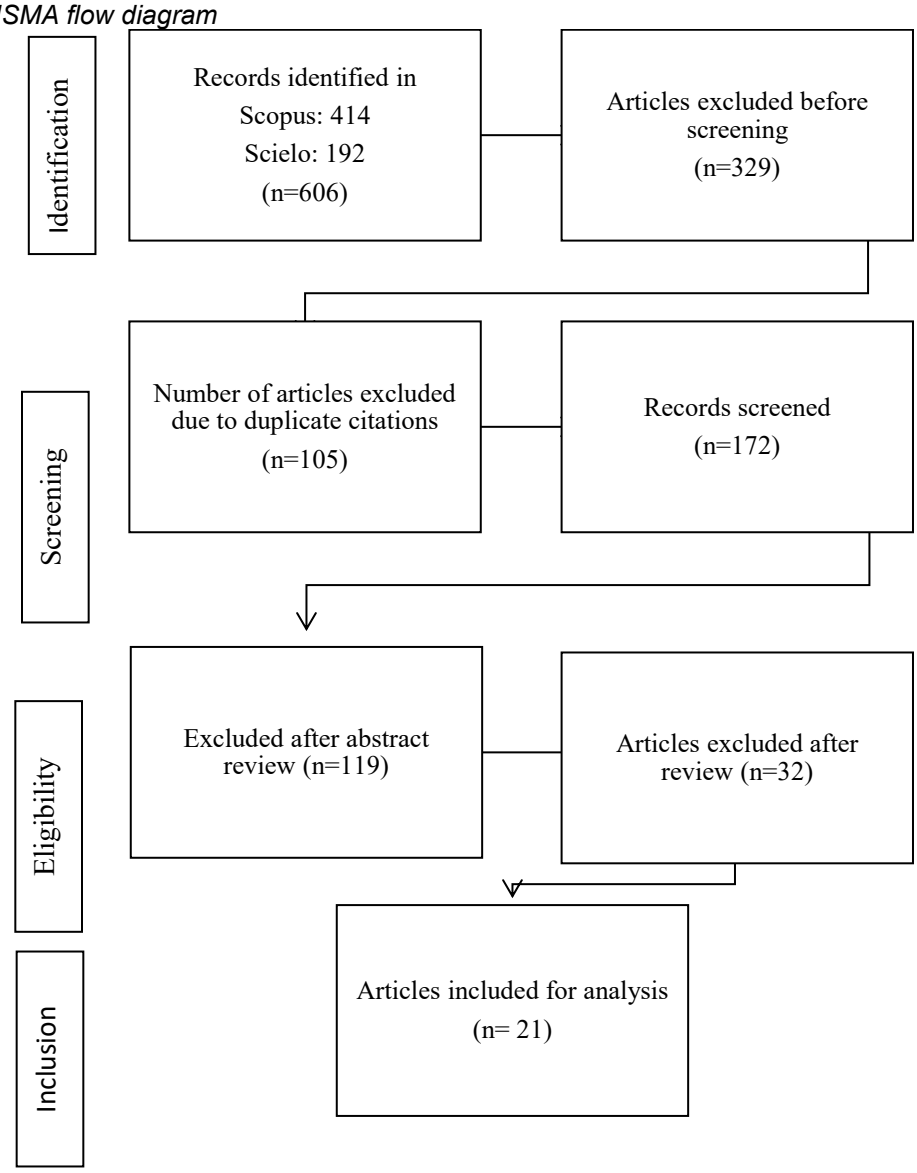
Table 1

Search terms in database articles

Database	Search term	Results	Selected
Scopus	"virual environments" AND "learning"	414	10
Scielo	"virual environments" AND "learning"	192	11
	Total	606	21

Figure 1

PRISMA flow diagram



* Table formatted according to the PRISMA standard with original data

Results

Table 2

Implications of virtual environments for learning

N	Author	Implications of virtual environments for learning
1	Sánchez & Calderón, (2025).	Virtual environments foster the development of creative thinking by providing interactive digital spaces that stimulate exploration, collaboration, and the generation of new ideas. These resources promote innovative approaches to solving complex problems, facilitating access to global tools and encouraging active learning.
2	Lorenzo, et al. (2025)	A more inclusive and accessible scientific education must be promoted in Latin America, using virtual environments for continuous teacher training, especially on gender issues. An online

		self-managed course overcomes geographic barriers and fosters the creation of communities of practice with a socio-scientific focus.
3	Añazco (2024)	Collaborative teaching promotes the interdisciplinary use of educational technologies for innovative learning experiences. Using active methodologies such as Project-Based Learning (PBL) and formative assessment, an interdisciplinary project based on the Olympic Games was developed, with Physical Education as the main subject. Tools like Google Meet® and Google Drive® were used for planning and sharing activities, along with feedback.
4	Granda et al. (2024).	Teaching practices in virtual higher education environments are key to supporting students during their professional practice. A mixed approach identified fundamental categories such as "support, follow-up, and communication," which facilitate effective articulation between traditional and virtual teaching practices.
5	Gort-Hernández et al. (2024)	Through synchronous and asynchronous communications, students were able to interact dynamically, share information, and construct their own knowledge. Participants' feedback was largely positive, although some expressed dissatisfaction. This approach reinforced cooperation among students and teachers, highlighting the importance of empathy and creativity in teaching. The results indicate that communication technologies, such as mobile devices and WhatsApp, are essential tools in modern education.
6	Lago et al. (2024).	There are benefits to learning in virtual environments and the potential for hybrid classes. However, the dominance of the traditional educational model persists, leading to ongoing debate about the transformation of universities and their future challenges.
7	Aties et al. (2024).	Health Technology educators face significant challenges implementing cooperative learning in virtual environments, particularly regarding virtualization and technology use. This underscores the need to develop continuous training programs that strengthen educators' technological and pedagogical competencies to improve the orientation of cooperative learning in these environments.
8	Granillo-Macías (2023)	Google platforms, WhatsApp, and Moodle were key technological tools used by engineering educators during the pandemic to facilitate remote teaching. These tools played a crucial role in adapting instruction to a virtual environment, emphasizing the importance of effective tools for communication, storage, and interaction in teaching knowledge areas like engineering, which require more specific practices.
9	Medel-San Elías et al. (2023).	The implementation of gamification in virtual teaching-learning environments in higher education is an effective strategy to increase student motivation and academic performance. However, its success depends on careful activity design and the appropriate integration of educational objectives.
10	Benítez (2023).	The use of mobile applications and simulators in virtual environments is an effective tool for improving training in SMEs, strengthening their administrative and financial capacities. The DCIERC methodology, which integrates theory and practice, facilitates learning and contributes to the success of businesses by allowing continuous evaluation and improvement in the practical application of acquired knowledge.
11	Paredes & Vega (2023).	The School Coexistence Questionnaire in Virtual Environments (CEEV) is a valid and reliable tool for assessing school coexistence

		in virtual modalities among secondary students. This allows for effective measurement of aspects of violence and non-violence training in virtual educational contexts.
12	Francksen (2024).	Virtual environments for creation and performance presentation are redefining the skills and knowledge required of performers, who must incorporate technological competencies in addition to artistic ones. This highlights the need for more studies that document and systematize these learnings from practical experience.
13	Hegazy et al. (2020).	The use of immersive virtual environments with a gamified approach effectively integrates user perception of natural lighting in the early stages of architectural design, offering a valuable complement to traditional technical simulations.
14	Zisch et al. (2024).	Human spatial representations in response to changes in environmental boundaries remain consistent in both virtual and physical environments, validating the use of virtual reality as an effective strategy for studying and training spatial memory in educational or cognitive research contexts.
15	Teoh et al. (2025)	Results suggest that while overall engagement in hybrid environments remains similar, the in-person setting fosters greater involvement in academic performance. Interaction between types of engagement varies by environment, emphasizing the need to adapt specific pedagogical strategies to enhance learning according to the medium.
16	Best et al. (2024).	Immersive simulations like Branch-VR represent an effective strategy for strengthening professional training in social work, allowing students to experience realistic scenarios, develop confidence, and apply knowledge in a controlled environment. Their implementation in educational contexts can significantly enrich the practical preparation of future professionals.
17	Mäkinen et al. (2020).	Virtual reality, especially through immersive devices, represents an effective educational strategy in healthcare, enhancing practical learning, accessibility to training, and the quality of professional performance. However, further research focusing on user experience within these environments is needed to optimize their educational implementation.
18	Guillén-Yparrea et al. (2023).	The use of virtual platforms and simulations has emerged as a relevant strategy for learning and skill development, with sustained growth driven by their effectiveness and accessibility. This trend marks a structural shift in higher education, integrating technological solutions that complement and, in many cases, surpass traditional models.
19	Wang (2025)	Peer learning experiences in informal contexts demonstrate that communities of practice can be formed and sustained in virtual environments, although with characteristics different from those of the physical environment. This shows that collaborative learning among students transcends formal boundaries and the limitations of physical space, adapting to new digital interaction strategies.
20	Bryant et al. (2024).	Immersive VR shows high potential as an educational and rehabilitation strategy, facilitating meaningful interactions in safe simulated environments. Validated protocols allow for precise evaluation of user behavior, opening new possibilities for designing inclusive and personalized experiences.
21	Westmattelmann et al. (2025)	Perceptions of fairness and transparency are fundamental for the adoption and continued participation in meta-sport platforms within

the Metaverse. The study suggests that to maximize the effectiveness of these platforms, it is essential to design virtual environments that offer clarity and equity in the competition structure.

Virtual environments have established themselves as a key tool for educational transformation, fostering the development of creative thinking by offering interactive digital spaces. These environments stimulate exploration, collaboration, and the generation of new ideas, promoting innovative approaches to solving complex problems. Additionally, they provide access to global tools that facilitate active learning (Sánchez et al., 2025). As these methodologies are adopted, virtual environments support the creation of hybrid educational models that combine in-person and virtual classes, allowing for greater flexibility. However, the dominance of the traditional educational model persists, generating ongoing debate about the challenges and transformations necessary for the universities of the future (Lago et al., 2024).

In this context, the metaverse and associated technologies, such as virtual reality and augmented reality, are emerging as tools with significant potential to revolutionize educational environments. Although research on their use in education is still in its early stages, it is essential for the scientific community to continue exploring and strengthening the theoretical foundations that ensure their effective implementation (Meléndez et al., 2024). These technologies are not only redefining educational methodologies but also the skills that students must develop, as seen in virtual environments for creation and performance presentation. In these spaces, performers must incorporate technological competencies in addition to artistic ones, highlighting the need for more studies based on practical experience (Francksen, 2024).

The benefits of virtual environments also extend to school coexistence, as they have proven to be valid and reliable tools for assessing aspects of violence and training for non-violence in digital educational contexts. This evaluation contributes to the well-being and comprehensive development of students in virtual modalities (Paredes et al., 2023).

Furthermore, advancements in virtual reality support its use as an effective strategy for training cognitive skills such as spatial memory. It has been demonstrated that human spatial representations in response to changes in environmental boundaries remain consistent in both virtual and physical spaces, validating their application in educational and cognitive research contexts (Zisch et al., 2024).

Strategies based on virtual environments have positioned themselves as key to promoting inclusive, accessible, and quality education, especially in higher education. In Latin America, there is a highlighted need to promote inclusive scientific education through self-managed online courses, which overcome geographic barriers and foster communities of practice with a socio-scientific and gender-focused approach (Lorenzo et al., 2025). This approach also facilitates the implementation of active methodologies such as Project-Based Learning (PBL), supported by tools like Google Meet® and Google Drive®, enhancing collaboration and teacher feedback (Añazco, 2024).

With the expansion of virtual education, teaching practices in these environments are crucial for supporting students. A mixed approach, combining synchronous and asynchronous communication, facilitates dynamic interaction that enhances knowledge construction and reinforces cooperation between teachers and students. Tools like WhatsApp and the use of mobile devices have proven essential in this process, emphasizing the importance of empathy and creativity in teaching (Gort-Hernández et al., 2024). However, educators in areas like Health Technology still face challenges in implementing cooperative learning in virtual environments, underscoring the need for continuous training in pedagogical and technological competencies (Aties et al., 2024).

Gamification and virtual platforms also emerge as effective strategies for increasing motivation and academic performance. Their implementation, when aligned with specific educational objectives, has shown to be beneficial (Medel-San Elías et al., 2023). Additionally, the use of mobile applications and simulators has demonstrated improvements in the training of small and medium-sized enterprises, strengthening administrative and financial competencies (Benítez et al., 2023).

In higher education, immersive virtual environments allow for realistic simulations that enhance professional training, as in the case of social work (Best et al., 2024). These simulations also enable the evaluation of technical aspects such as natural lighting in architecture, complementing traditional simulations (Hegazy et al., 2020).

Recent research indicates that while student engagement in hybrid environments is similar to in-person settings, the latter still fosters greater academic performance. Therefore, it is necessary to adapt pedagogical

strategies to the specific environment (Teoh et al., 2025). In health training, the use of virtual reality through immersive devices has proven effective in improving practical learning and the quality of professional performance (Mäkinen et al., 2020).

The growth in the use of virtual platforms and simulations reflects a structural transformation of the educational model. These technological solutions not only complement but often surpass traditional teaching methods (Guillén et al., 2023). Communities of practice in digital spaces demonstrate how collaborative learning can thrive in virtual environments (Wang, 2025).

Finally, platforms used in meta-sports within the Metaverse must ensure perceptions of fairness and transparency to maintain active student participation. A clear and equitable design is essential to maximize their effectiveness (Westmattelmann et al., 2025). Additionally, immersive virtual reality has shown great potential for education and rehabilitation, facilitating safe, personalized, and inclusive experiences in simulated environments (Bryant et al., 2025).

Conclusions

The study concluded that virtual environments have solidified as a key tool for educational transformation, as they foster the development of creative thinking by providing interactive digital spaces. These environments enable exploration, collaboration, and innovation, driving more dynamic and personalized teaching and learning processes.

Moreover, virtual environments facilitate the creation of hybrid educational models by combining in-person and virtual classes, allowing for greater pedagogical flexibility. Emerging technologies such as the metaverse, virtual reality, and augmented reality are poised to revolutionize current educational scenarios.

Additionally, the benefits of virtual environments extend to school coexistence, serving as valid and reliable instruments for evaluating aspects related to violence and training for non-violence in digital educational contexts. In this regard, they represent an opportunity to strengthen social ties and promote safer and more inclusive school climates.

The strategies implemented in virtual environments have also proven effective in fostering a more inclusive, accessible, and quality higher education, particularly through continuous teacher training and the use of active methodologies. Finally, gamification and virtual platforms emerge as key resources for increasing student motivation and academic performance, solidifying their role as fundamental elements in designing meaningful educational experiences in the digital age.

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