

REVIEW ARTICLE

Virtual learning environments as a support tool in the teaching-learning process

Entornos virtuales de aprendizaje como herramienta de apoyo en el proceso enseñanza aprendizaje

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Abstract

In recent years, learning models have increasingly integrated technologies into educational centers, responding to emerging demands and needs in education and facing the challenges of new generations of students. This research aimed to analyze the use and evolution of the incorporation of technologies in education to improve the teaching-learning process of university students. An exhaustive literature review was carried out on the topic, including research by several authors on the evolution of virtual learning environments and their benefits for students. The results show a favorable impact on both teachers and students, since the use of learning platforms significantly helps in the design of self-regulatory activities. The information obtained in this research serves as motivation to continue studying how technologies improve the educational process and provide teachers with new tools that support face-to-face classes and improve autonomous and regulated learning.

Keywords: virtual environments; learning; teaching; students; technologies

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Resumen

En los últimos años, los modelos de aprendizaje han integrado cada vez más tecnologías en los centros educativos, respondiendo a las demandas y necesidades emergentes en la educación y enfrentando los desafíos de las nuevas generaciones de estudiantes. Esta investigación tuvo como objetivo analizar el uso y evolución de la incorporación de tecnologías en la educación para mejorar el proceso enseñanza aprendizaje de los estudiantes universitarios. Se llevó a cabo una revisión bibliográfica exhaustiva sobre el tema, incluyendo investigaciones de varios autores sobre la evolución de los entornos virtuales de aprendizaje y sus beneficios para los alumnos. Los resultados muestran un impacto favorable tanto en los docentes como en los estudiantes, ya que el uso de plataformas de aprendizaje ayuda significativamente en el diseño de actividades autorregulatorias. La información obtenida en esta investigación sirve como motivación para continuar estudiando cómo las tecnologías mejoran el proceso educativo y proporcionan a los docentes nuevas herramientas que apoyan las clases presenciales y mejoran el aprendizaje autónomo y regulado.

Palabras clave: entornos virtuales; aprendizaje; enseñanza; estudiantes; tecnologías



INTRODUCTION

Talking about learning environments involves approaching different definitions proposed by several authors. According to Juanes, Munévar & Cándelo (2020), a learning environment should include a student and a workspace where they can interact with tools and devices. From a constructivist perspective, this learning space should also allow interaction between students to work and support each other, facilitating problem solving and learning (Farfán et al., 2023).

Along the same lines, Sanchez (2021) offers a more formal definition, describing a learning environment as a space that provides the necessary conditions for students to discover and appropriate knowledge. Obermeier (2023), on his side, suggests that the learning environment is related to work organization, structure, authority, and time management.

Today, these learning environments pose pedagogical and technical challenges for both teachers and institutions of higher education, as the role of the teacher and student is constantly evolving to adapt to these new educational contexts (Medina, 2021).

Nieto (2022) reinforces this idea by considering that the classroom environment is fundamental to the physical, social, and cognitive development of students, highlighting the importance of the integral development from the people involved in the educational process, promoting their critical social integration. Lahera & Perez (2021) argue that the learning environment should not only be limited to

the classroom but should include all the elements that currently allow interaction between teachers and students, encouraging strategic or heuristic learning through them.

Digion & Alvarez (2022) mention that the learning environment is a socio-psychological environment where an interaction of knowledge between students and teachers is produced; these interactions set up a network of social, psychological, cultural and institutional variables, which allows the personalization of the learning environment by both actors, teachers and students. In this context, Hernandez, Mendez & Fernandez (2021) believe that a learning environment should incorporate certain key principles:

- It should promote interaction between the teacher and the students, as well as amongst students, with the goal of aligning common learning goals.
- It must have enough material to enable meaningful cognitive learning.
- It must be creative and diverse, in order to encourage the development and fluency of the cognitive processes from students.
- It should offer different scenarios, allowing the student to move comfortably between them.
- It should be developed by all participants in the learning process, helping students to feel included and comfortable working in it.

Derived from the preceding, Cámac et al. (2023) state that, in these settings, students not only learn content from various disciplines, but also develop other cognitive and intellectual skills related to these

learnings, such as reasoning, inventing, solving diverse types of problems, representing reality and making value judgments, encouraging in turn the development of communication skills, allowing greater interaction between them and their environment. For this reason, pedagogical design is essential when designing these environments, being necessary to consider all ongoing factors that currently influence knowledge and not leave the creation of learning environments at random or exclusively to technology (Largo et al., 2022).

For Gamarra et al. (2023), in schools with a single classroom per grade, teachers face a great challenge, since the communication channels and their frequency are diverse and high, it is also common to observe multiple children chatting simultaneously, which can be further complicated in large groups, significantly increasing the number of students requiring attention (Cruz et al., 2023). Due to this reason, teachers often try to motivate students by offering rewards for both individual and group progress, with the goal of keeping children always motivated (Pascual, Lopez & Velasco, 2023).

González (2022) proposes that the quality of classroom instruction is directly related to the competence of the teacher, however, disinterest, discouragement and lack of commitment on the part of some teachers is currently observed, largely attributable to external factors that affect their performance; this situation significantly influences learning development, which may result in some

students receiving a better instruction than others depending on their teacher (Mamani, 2024). However, as Freire (1994) mentions, it cannot be affirmed that a student under the tutelage of an incompetent teacher is necessarily incapable and lacks responsibility, nor that a student with a competent and serious teacher is automatically responsible and capable (Arrillaga, 2021).

Tigua & Bracno (2023) make a big impact by comparing current education to bringing students to the best restaurant in the world and forcing them to consume only the daily special; this analogy is shared by Pastora & Fountain (2021), who suggest that ideal schools should serve as buffet tables where each student can select what they want in the quantities and at the pace they prefer, even starting with dessert if they want.

Villagómez et al. (2020) have been considering for more than two decades the need to integrate technologies into education to improve learning environments through computer and telecommunications systems, gaining even more relevance today with the advancement of Information and Communication Technologies (ICTs). According to Perez & Lopez (2020), human beings use all their senses to interact with their environment, meaning teachers can take advantage of technological tools to develop new ways of transmitting information, encouraging more effective feedback, and enhancing the learning process.

Marimon et al. (2022) identified more than two decades ago the main problems of the current educational model, which remain relevant today; those are: difficulty to customize the teaching-learning process, an almost exclusive focus on teaching rather than learning, lack of clear objectives, and in many explicit cases, prioritize the end result as the main value, neglecting the learning process, encouraging dependency by setting aside self-learning, among others. In addition, advances in ICT have shown the lack of preparation of many teachers to adapt their knowledge to the needs of students, as the increase in information available on the web has created a gap in pedagogical knowledge, leading some teachers to continue using obsolete teaching methods in the face of advances in social sciences and technologies (Wheel & Soriano, 2024).

Castro (2022) maintains that the use of ICT will radically transform learning environments, altering the role of the teacher from being a mere knowledge transmitter, to act more as a guide or mediator of learning; this transition should be encouraged by manipulating certain didactic elements that facilitate the creation of habits in students, allowing them to develop skills to search, select and process information (Tenorio & Deroncele, 2023). Students, on their side, will benefit from being in more open and flexible learning environments, which will allow them to develop new competences, moving from being passive subjects and memorizers in the learning process to having more active control of their own learning resources (Aguilar, Padilla & Loop, 2022).

VIRTUAL LEARNING ENVIROMENTS

Defining a virtual learning environment presents some challenges due to the diversity of interpretations among authors (Ramos & Talero, 2023). While some definitions are too broad, others are limited; a fairly appropriate proposal is the one mentioned by Cruz et al. (2020), describing virtual learning environments as a new form of educational technology that offers diverse teaching opportunities; similarly, Cruz et al. (2020) conceptualize virtual learning environments as a set of information sharing and communication computing tools, that integrate a wide range of materials and resources designed to improve the learning process.

Zangara & Sanz (2020) describe these environments as technology-mediated spaces for personal or group inquiries, where students perform activities that enable them to achieve meaningful learning. In these settings, both the student and the teacher control learning activities, using information sources and knowledge-building tools to solve problems (Nieto, 2022).

As mentioned above, different criteria and concepts can be found around the definition of virtual learning environments (Parra & Molina, 2023); for some authors, such as Aparicio & Ostos (2021) these environments are simply communities of human interrelationships. On the other hand, Garcet et al. (2024) define them as virtual spaces based on the use of information and communication tools, considering them only technological systems. Other authors prefer to use the expression learning

environments (Candela & Benavides, 2020), classrooms without walls (Anriquez, 2021), or even computer environments of human learning (Veitz, 2022) and hyper interactive learning environments (Muguercia et al., 2022).

DEVELOPMENT OF VIRTUAL LEARNING ENVIRONMENTS

The meaningful advances in information and communication technologies have promoted an exponential growth in the use of technological tools in education, especially in the field of virtual learning (Guerrero, Sandoval & Velez, 2024). It has become increasingly common to witness the development of tools ranging from simple content distribution to comprehensive learning management and administration, for several years, virtual learning environments have been discussed as a natural evolution in this context (De la Iglesia, 2020).

Regarding the aforementioned, Quintero (2020) states that each of these tools fulfills specific functions; content distribution systems, known as Content Management System (CMS), are responsible for document creation and organization. At the same time, Learning Management Systems (LMS) are used to create, manage, distribute, monitor, and evaluate online courses, and also include tools to ease the communication and collaborative work (Sánchez & Peñarreta, 2023). Lastly, Learning Content Management Systems (LCMS), go beyond by including the publication of results and a section for the integrated content management (Spanish & Rocha, 2020).

Quispe et al. (2023) note that the use of these tools in the learning processes has expanded, not only because of the ability to shorten distances, which is now a fundamental reason, but also because of the possibility they offer teachers to create new forms to work. More tools are emerging in both the payment market and open access environment, according to Losada, Cardenas & Vasquez (2020), every virtual learning environment consists of five main elements: student, teacher, environment, content, and communication tools.

Crespo, Santamaria & Hernández (2021) emphasize the importance of using technologies that are not only appropriate but also mediate. These technologies allow both synchronous and asynchronous communication, establishing a link between educational-technological cooperation, and social interactions between the teacher and the student, or between peers, better aligning with contemporary learning processes. These authors identify three essential components from different points of view:

- Technological: Technologies should be best suited to improve the connection between the pedagogical model and the tool.
- Cultural: It is critical to consider the social organization of the process, including aspects like time and space.

- Learning: This refers to the activities, learning materials, support and evaluation that make up the educational process.

According to Pastora & Sources (2021), social interaction is fundamental in today's learning environments, as it favors the acquisition, administration, transformation, and dissemination of knowledge, this is related to the proliferation of virtual learning environments, which makes it necessary to innovate to increase their use and appeal. Today, there are numerous environments, including the Modular Object Oriented Dynamic Learning Environment (MOODLE), created by Martin Dougiamas in 2002, known for its easy handling and adaptability; also, another notable environment is Google Classroom, launched in 2012 (Baquerizo et al., 2022).

VIRTUAL LEARNING

The use of information and communication technologies to promote teaching is showing notable results, highlighting their educational and pedagogical value such as the one required by meaningful learning (Torres et al., 2025). These technologies, in some cases, become essential tools that guide and encourage new methods of self-study in students (Muñoz et al., 2024). According to Marrufo & Spine (2021), these e-learning methodologies are as effective as traditional class lecture methods, making students learn more interactively.

In the context of virtual learning, Alfonso (2015) points out that there must be a harmonious

relationship between all the factors involved, especially the relationship between teachers, technology, and students, without forgetting the macro-social context and the teaching-learning process (Cazan & Maican, 2023). This interaction promotes the development of knowledge through virtual environments, where the data and information provided by the teacher are organized and stored by students through their own cognitive processes (Muñoz & Gutierrez, 2024).

Virtual learning has numerous advantages, as it only requires an electronic mean to start the learning process at any moment or place and also allows simultaneous peer-to-peer interaction (Nuñez et al., 2024). This flexibility allows learning to be customized to the needs and availability of the student, and if teachers take advantage of the versatility of online platforms, they can advance content in digital format for students to review before attending classes, currently known as Flipped Classroom (Chávez, 2024).

METHODS, TECHNIQUES, AND INSTRUMENTS

A comprehensive literature review of articles on virtual learning environments in higher education was carried out using specialized databases in thesis, scientific articles and indexed journals search engines, selected for their high impact and relevance in the educational field. The scientific content collected is essential to support and consolidate scientific theories and concepts, with the aim of transforming society into a globally competitive landscape.

The research took a qualitative approach with a non-experimental and descriptive design. The study was characterized as descriptive-analytical, based on objective verifications of primary studies extracted from both national and international scientific articles, which were selected through a rigorous process that included inclusion and exclusion criteria clearly defined. The inclusion criteria included studies published in the last five years, articles that directly addressed the theme of virtual learning environments in higher education, and that came from journals with a high impact factor; in addition, the exclusion criteria ruled out studies with insufficiently developed methodological approaches, those that did not offer clear empirical results or that focused on educational levels other than higher education.

Inquiry was used as the main technique, and systematic analysis of literature was used as the methodological tool; the method used began with the identification of particular facts using an inductive analytical procedure, which allowed general conclusions to be drawn through global observations.

RESULTS AND DISCUSSION

In the bibliographic review and descriptive analytics, information about virtual learning environments was searched for in the main databases, such as Scopus, WoS, Scielo and Dialnet. Also, thesis, scientific articles and indexed journals search engines databases were also consulted, considering only publications from the last five years. The results of these searches retrieved 2,970 documents on Google Academic, 547

on Redalyc, 645 on Dialnet, 66 on Web of Science and 1,149 on Scopus. This allowed for a thorough review, analysis, comparison, and synthesis of the results of the selected publications in relation to the virtual classrooms (Table 1).

CONCLUSIONS

One of the main findings is that virtual learning environments facilitate greater interaction and collaboration among participants, as tools such as forums, video conferencing, and messaging platforms enable constant, two-way communication, enriching the educational process and promoting a sense of community among students, this interaction not only improves content understanding, but also builds social and teamwork skills.

Flexibility and accessibility are other notable advantages of these environments, allowing learning to occur anytime and anywhere, overcoming geographic and temporal limitations, this feature being especially useful for students with varied schedules or residing in remote areas, thus democratizing access to education and providing equal opportunities for all.

Virtual environments also promote learning personalization, adapting content and activities to the individual needs of each student; systems such as Learning Management Systems (LMS) and Learning Content Management Systems (LCMS) facilitate continuous tracking and evaluation of student progress, enabling customized adjustments that optimize learning. The role of the teacher in these

settings is crucial: far from being replaced by technology, teachers act as facilitators and guides, helping students make the most of technological tools and develop their own learning strategies, apart from her or his guidance, critical to ensure their effectiveness.

The integration of ICT into education has driven the adoption of new pedagogical methods, such as the flipped classroom and project-based learning; these approaches promote greater active student engagement and the development of skills essential for the 21st century, such as critical thinking and problem solving. However, research also identifies important challenges that need to be addressed to maximize the potential of virtual learning environments, including the need for adequate technology infrastructure, the persistent digital gap in

many regions, and resistance to change by some teachers and students, considering that overcoming these challenges requires technology investments, as well as policies and programs for ongoing training and support.

Virtual learning environments have been consolidated as a powerful and versatile tool in the teaching-learning process, since, by promoting interaction, flexibility and customization, these environments have the potential to significantly improve the quality of education. However, in order to fully realize these benefits, it is essential to address existing challenges and ensure that both teachers and students are equipped with the necessary skills and resources, and with an appropriate approach they can decisively contribute to better preparing students for the challenges of the future.

Virtual learning environments as a support tool in the teaching-learning process

Table 1. *Systematization of articles on virtual learning environments*

Author	Contribution	Results
Recio Saucedo, M. A., & Cabero Almenara, J. (2005)	Study the relationship between virtual learning environments and student satisfaction levels	Elevated levels of student satisfaction due to flexible learning schedules and access to various resources.
Arturo, R. Z., Yajaira, A. M., & Reyes, K. A. D. (2020)	Surveys students' perceptions and attitudes toward using virtual learning environments in their educational experience	Positive insights and greater comfort with technology-enhanced learning
Monroy Vásquez, J. O. M. V., & Moreno, P. A. (2020)	Studies how the use of virtual learning environments affects student retention and persistence in their studies	Higher retention rates and lower dropout rates due to attractive and flexible learning environments
de Souza Godinho, S., Rivela, C. V., Medrado, S. O., Marmo, J., & Lanuque, A. (2021)	Examines the role of virtual learning environments in promoting inclusive education for students with diverse learning needs	Improved accessibility and inclusion, enabling students with disabilities to participate more effectively
Higuera, A., & Rivera, E. (2021).	Examines the effect of virtual learning environments on student academic outcomes	Better academic performance and greater participation in coursework.
Murcia, N. M. M., Mayorga, D. A. C., & Contreras, J. L. G. (2021)	Compares traditional classroom environments to virtual classrooms in terms of student learning outcomes	Comparable or higher learning outcomes in virtual classrooms compared to traditional environments
Ponce, J. K. M. (2021)	Analyzes various digital tools used in virtual environments and their effectiveness in improving learning	Significant improvement in learning outcomes, particularly in understanding and retention
Real-Loor, C. M., & Marcillo-García, C. E. (2021)	Discusses transition to digital learning environments and their integration into higher education	Successfully adapting to digital learning environments that lead to improved educational experiences
Padilla, H. A. S., Perera, J. J. D., Amezcua, C. D. A., & Fernández, M. S. (2022)	Focus on how virtual learning environments affect student motivation and interest in course material	Increased motivation and proactive learning behaviors among students using virtual learning environments
Palacios-Núñez, M., Deroncele-Acosta, A., & Cruz, F. F. G. (2022)	Explores the benefits of collaborative learning activities facilitated through virtual learning environments	Improved critical thinking skills and improved performance on group projects.
Ramírez, L. E. L., Vega, M. I. P., Gutiérrez, P. T. V., Villa-Cruz, V., López, J. O. O., & Reyes, L. J. L. (2022)	Discusses the use of virtual labs in science and engineering careers	Enhanced practical skills and understanding of complex concepts through virtual experimentation
Arango-Vásquez, S. I., & Manrique-Losada, B. (2023).	Case study on the effectiveness of virtual learning environments to foster collaboration among students	Improved collaboration skills and improved group project outcomes
Lecca, S. V. (2023)	Researches the use of gamification in virtual learning environments and its impact on student engagement and academic success	Increased student participation and academic performance due to interactive and motivating elements
Navarro-Dolmestch, R. (2023)	Studies the challenges of maintaining academic integrity in virtual learning environments	Developing new strategies to maintain academic integrity while using virtual learning environments
Vera, S. T., & Vargas, O. L. (2023)	Investigates the impact of virtual learning environments on students' confidence in their academic skills	Increased self-efficacy and confidence in managing academic tasks through virtual learning environments

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