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Learning management in virtual environments in the context of the COVID-19 post-pandemic in Callao educational institutions

La gestión del aprendizaje en entornos virtuales en el contexto de la pospandemia COVID-19 en las instituciones educativas del Callao

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Abstract

The health crises that have hit the world require accurate diagnoses for timely decision-making in different areas, including the economic, social, educational, and industrial sectors. The objective of this article was to determine the relationship between virtual environments for teaching-learning and learning management in educational institutions in the constitutional province of Callao. It was a relational study with a sample of 180 participants selected from educational institutions in Callao. In terms of results, the virtual environments obtained 81.11% of High-level evaluations, 17.78% of Average level evaluations, and 1.11% of Low-level evaluations. On the other hand, learning management reached 86.1% of Good level evaluations, 12.22% at the Regular level, and 1.57% at the Poor level. A moderate positive relationship was found between the variables virtual environments for teaching-learning and learning management in educational institutions in Callao. This correlation was evidenced by Spearman's Rho correlation coefficient of r = 0.796.Keywords: Virtual environments, learning management, COVID-19.

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Resumen

Las crisis sanitarias que han azotado al mundo exigen diagnósticos precisos para la toma de decisiones oportunas en diversos sectores, incluyendo el económico, social, educativo y productivo. Este artículo buscó determinar la relación entre los entornos virtuales para la enseñanza-aprendizaje y la gestión del aprendizaje en las instituciones educativas de la provincia constitucional del Callao. Fue un estudio relacional con una muestra de 180 participantes seleccionados en instituciones educativas de Callao. En cuanto a los resultados, los entornos virtuales obtuvieron un 81,11% de evaluaciones en el nivel Alto, un 17,78% en el nivel Medio y un 1,11% en el nivel Bajo. Por otro lado, la gestión del aprendizaje alcanzó un 86,1% de evaluaciones en el nivel Bueno, un 12,22% en el nivel Regular y un 1,57% en el nivel Malo. Se determinó la existencia de una relación positiva moderada entre las variables entornos virtuales para la enseñanza-aprendizaje y gestión del aprendizaje en las instituciones educativas del Callao. Esta correlación se evidenció al obtener un coeficiente de correlación Rho de Spearman de r = 0,796.

Palabras clave: Entornos virtuales, gestión del aprendizaje, COVID-19.

Introduction

In recent years, health crises have had a profound impact on public health and have generated significant challenges in several sectors, including education. These emergencies resulted in the closure of educational institutions and required quick adaptations to online and distance learning modalities, testing the capacity of institutional management to ensure educational continuity and student well-being. These modifications brought a transformative effect on all educational degrees and academic levels, including university educational management (Aroquipa et al., 2019; Acosta, 2022; Barari et al., 2020). An example of this is the COVID-19 pandemic, which caused an unprecedented disruption in education, affecting 70% of the student population worldwide. Social isolation, the undefined closure of educational institutions, and the sudden transition to virtuality marked a radical change in the way of teaching, making a significant difference from the one used in 2019 (Mendoza et al., 2023; Berrocal & Ruiz, 2022).

Educational institutions faced a challenging scenario with the arrival of the COVID-19 pandemic. Most teachers, with no previous experience in remote work or virtual interaction with students, were forced to adapt quickly to the new reality. The available virtual platforms had shortcomings and limitations, which made the transition to online teaching even more difficult. This situation highlighted the need to strengthen teachers' digital skills to ensure quality education in virtual environments (Cedeño, 2019).

The pandemic also highlighted the importance of learning management in virtual environments to improve educational quality in government systems. Several studies have pointed out that the effective management of educational processes, in line with technological advances, is essential to respond to the demands of a globalized society (Castells, 2014; Riffo, 2019). School planning, in this context, plays a crucial role in providing resources, establishing accountability mechanisms, promoting equity, optimizing pedagogical processes, and facilitating a new structure and management of resources and activities in educational institutions (Coello et al., 2019) By implementing innovative strategies and applying decentralization techniques, institutions can optimize their organization, establish strategic activities and improve the quality of the education provided (Zorrilla, 2013; Chiavenato, 2004).

The Peruvian education system faces serious challenges in terms of educational quality due to the deficient implementation of virtual teaching during the COVID-19 pandemic. The lack of appropriate equipment, lack of teacher training and improvisation in some curricular areas have generated a clear dissatisfaction among students and teachers. The teaching-learning processes, both asynchronous and synchronous, are insufficient to ensure quality education, and institutional management has not demonstrated progressive progress in the implementation and management of virtual platforms, limiting new learning expectations and the effective use of these technological tools (Cajandilay et al., 2021; Carrasco et al., 2022; Durand, 2016).

The boom of virtual environments and digital tools has boosted their use not only in ICT, but also in social networks, opening new educational alternatives that foster communication and interaction between teachers and students, becoming a key factor for successful learning (Corica, 2013; Prado, 2017). In this sense, the relationship between these two elements is an essential indicator of online curricular experiences. Multiple studies, from experimental, empirical approaches and systematic reviews, have provided new evidence on the effective use of social networks to favor specific learning through interactive elements in pedagogical actions (Han, 2022; Muntane, 2010).

The integration of web 2.0 interface and virtual environments is compatible with educational approaches grounded in constructivist and social theories of learning. These theories are complemented by the argument that knowledge is socially constructed in a visible and tangible way through collaborative learning, providing opportunities for the creation and co-creation of new content (Zapata, 2018; Mayne & Mayorga, 2018). In this context, the present study aims to determine the existing relationship between virtual teaching-learning environments and learning management in educational institutions in Callao during the year 2023.

Method

The study responds to a quantitative approach, hypothetical-deductive method, basic type, that which contributes to the academy and is related to each of the study variables. The study was descriptive, since it sought to describe the observed phenomenon without influencing the facts present in the study population. The type of design was relational and sought to measure the level of relationship between variables, quantifying and analyzing their interdependent nexus. On the other hand, Hernandez & Mendoza (2018) mention that the population refers to a group that comprises certain similar characteristics, these become an object of research and can be: subjects or objects. A non-probabilistic sampling was chosen. The data collection technique chosen was the survey, through the

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application of a questionnaire to a sample of 180 participants from various educational institutions in Callao.

The instruments used for data collection were based on Rama (2021) proposal and were validated by a panel of judges. The validation yielded a high average Aiken's V (0.81) and a reliability index of 0.957, indicating the robustness and reliability of the instruments for measuring the study variables.

Results and Discussion

Table 1

Relationship of the variables Virtual environments for teaching-learning and learning management in educational institutions in Callao.

			Virtual environments	Learning management
Spearman's Rho	Virtual environments	Correlation coefficient	1	.796**
		Significance (bilateral)	.	0
		N	180	180
	Learning management	Correlation coefficient	.796**	1
		Significance (bilateral)	0	.
		N	180	180

**. The correlation is significant at the 0.01 level (bilateral).

According to Table 1, Spearman's Rho correlation coefficient between the variables "Virtual environments for teaching-learning" and "Learning management" is 0.796, indicating a moderate and significant positive correlation. The bilateral significance (p < 0.05) confirms the existence of a statistically significant relationship between both variables in the educational institutions of Callao. In other words, it is determined that the greater the teachers' management and knowledge of virtual environments, the better the results of learning management in the educational institutions of Callao.

Table 2

Relationship between the variables Virtual environments and the dimensions of the learning management variable in educational institutions in network 3 of Callao.

			Virtual environments	Leadership
Spearman's Rho	Virtual environments	Correlation coefficient	1	.648 *
		Significance (bilateral)	.	0
	Leadership	Correlation coefficient	.648 *	1
		Significance (bilateral)	0	.
				Address
	Virtual environments	Correlation coefficient	1	.700 **
		Significance (bilateral)	.	0
	Address	Correlation coefficient	.700 **	1
		Significance (bilateral)	0	.
				Collaborative learning
	Virtual environments	Correlation coefficient	1	.730 **
		Significance (bilateral)	.	0
	Collaborative learning	Correlation coefficient	.730 **	1
		Significance (bilateral)	0	.
		N	180	180

**. The correlation is significant at the 0.01 level (bilateral).

According to Table 2, there is a moderate significant positive correlation between virtual environments for teaching-learning and the two dimensions of leadership evaluated: leadership (r = 0.648) and management (r = 0.700). In both cases, the bilateral significance (p) is less than the statistically accepted level of significance (alpha = 0.05), which confirms the existence of a statistically significant relationship between the variables.

These results suggest that the greater the use and knowledge of virtual environments by teachers, the better the results in the dimensions of leadership and management

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in educational institutions in Callao. This implies that the effective implementation of virtual teaching-learning environments can contribute to the strengthening of educational leadership and management in these institutions.

Likewise, a Spearman's Rho correlation coefficient can be observed, with r = 0.730 between the variable virtual environments for teaching-learning and the collaborative learning dimension, which results in a moderate significant positive correlation, thus, the significance (bilateral) is less than the average alpha 0.05 (0.000). Therefore, it is determined that there is a relationship between virtual teaching-learning environments and collaborative learning in the educational institutions of Callao.

Discussion

The study analyzed the relationship between virtual environments for teaching-learning and learning management in educational institutions in Callao. Virtual environments are considered to be those that facilitate multiple interactions, and offer advanced digital resources, interfaces adapted to new computer technologies, and applications for self-learning. These environments allow interaction between teachers and students through both asynchronous and synchronous dynamics on the Internet (Moreno et al., 2021; Matos & Maguiña, 2022; Mahmood et al., 2018). In addition, the importance of mega diversity, connectivity, broadband and Cloud storage capacity is highlighted in this context (Rama, 2021; Perisic et al., 2023).

Furthermore, the management of learning by teachers involves diverse conceptions, processes and social dynamics. This includes the interaction between teachers and students within a cognitive process framework. In short, constant improvement is sought in educational practices and in the optimization of student learning (Avalos, 2011; Quiñones et al., 2021).

Regarding the descriptive results, it was observed that 81.11% (equivalent to 146 participants) of the teachers surveyed in the educational institutions of Callao are in the High level of management of virtual environments for teaching-learning. This means that most teachers have good knowledge and skills to use these environments in their teaching practice. These results coincide with the research of Kliziene et al. (2021), who found that the use of virtual teaching-learning platforms, such as "EDUKA", had a positive impact on the learning outcomes of elementary school students in the subject of mathematics. In their study, seven-year-old children, both male and female, obtained satisfactory results in the seven tasks evaluated.

The results of the dimension of educational virtualization for teaching-learning revealed that 76.11% (137 participants) of the teachers surveyed in the educational institutions of Callao have a High level of knowledge in the management of educational virtualization. Twenty percent (36 participants) are at the Average level and 3.89% (7 participants) are at the Low level. These results coincide with the proposal of Taherdoost & Madanchian (2022), who designed engaging, easy-to-follow, and interactive courses to keep the audience captivated in the absence of personal communication between the instructor and the learner. The use of creative approaches incorporates online training strategies that seek to make learning more interactive for students in the context of educational virtualization (Valladares et al., 2022; Lévano et al., 2019; Llamacponca, 2018; García & Maguiña, 2022). In this sense, Rama (2021) states that digital disruption comprises the transformation derived from digitalization and the various forms of accessibility to services through the cloud, especially in terms of knowledge, information, culture and education.

Undoubtedly, digital education, implemented through electronic devices such as cell phones and wireless networks, has transformed the educational landscape. Access to greater knowledge and information on networks has accelerated the life cycles of products and services, reducing costs and increasing quality. This, in turn, has driven exponential consumer growth, facilitating the cycle of virtuality and increasing production on networks at lower costs (Sanchez et al., 2020; Toro, 2021). However, the COVID-19 pandemic forced a rapid adoption of a virtual pedagogical model, leading to widespread dissatisfaction among students. The sudden change in school procedures and the lack of preparation of teachers for virtual teaching caused difficulties in the learning process (Torres et al., 2021; Vértiz et al., 2020; Guizado et al., 2019).

Regarding the dimension of practical and theoretical education for teaching-learning, the results indicated that the majority of the teachers surveyed (70.56% or 127 participants) have a High level of use of this methodology. The 27.22% (49 participants) are at the Average level and only 2.22% (4 participants) at the Low level. These results coincide with what was stated by Peláez et al. (2020), who points out that science and technology have promoted the development of various strategies to improve teaching and learning, which has made virtual teaching-learning environments increasingly attractive. However, Kingsley & Patience (2019) warn that simply learning ICT skills is not enough. Instead, the effective use of Information and Communication Technologies (ICT) has transformed the teaching and learning paradigm, improving the understanding and application of this methodology.

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Regarding the dimension of educational innovation for teaching-learning, the results reveal that 65% (117 participants) of the teachers of the educational institutions of network 3 of Callao are at the High level, 32.78% (59 participants) at the Average level and 2.22% (4 participants) in the Low level. These data indicate that most of the surveyed teachers apply educational innovation using digital tools in their classrooms. These results coincide with the findings of Cedeño (2019), who highlights the constant need to implement innovative strategies that promote the development of critical and reflective competencies in students in various educational fields. They also agree with the proposal of Peláez et al. (2018), who analyzed the use of ICTs and the use of EVEA in educational institutions.

The EVEAs offer support to students in academic training, as well as a better performance of teachers in the management of ICTs in schools, also, it was very useful in the professional training stage for students over 40 years of age, although with certain limitations and complexity. The results showed that technological advances are complex, especially in the management of teachers who were digital migrants in the computer era of those over 50 years of age. Aspects that coincide with other studies that described the sources of the findings in three types of teaching-learning environments (face-to-face, online and hybrid) and provide practices and implications to counteract problems that do not add value (Khandan & Shannon, 2021; Bossolasco et al., 2021; Arrellanos, 2022).

Thus, it was also evident in the results of the virtual platforms for teaching-learning, that 67.78% equivalent to 122 participants of the educational institutions of Callao are in the high level, 30% corresponding to 54 participants, are in the Average level, and 2.22% corresponding to 4 participants, are in the low level. This means that most of the surveyed teachers apply virtual platforms with the use of digital tools in the educational institutions of Callao. Results that agree with Gallego et al. (2021) in accepting that students go in search of online processes adopted by educational institutions in the face of the COVID-19 scenario. Although this study is based on a Technology Acceptance Model, it also considers other factors, such as perceived efficiency and satisfaction, indicating that 30.7% of the students improved their view of distance education by using online systems. However, 49.9% of students do not believe that face-to-face teaching-learning will be replaced by virtual teaching-learning education in the long term.

Finally, the results of the Learning Management variable showed that 86.1%, equivalent to 156 participants from the educational institutions of Callao are in the Good level, 12.22%, corresponding to 22 participants, are in the Fair level, and 1.57%, corresponding to 3 participants, are in the Bad level. This means that most of the teachers surveyed know learning management. Hassan et al. (2020) studied how the teacher applies the perspective about the online teaching-learning method, problems and challenges faced when migrating to an online platform, experience about the online tools employed for instructional delivery, and recommendations to improve the processes of effective teaching. The results obtained, could be an eye-opener to improve the implementation of online teaching-learning among students and teachers.

Now, about the inferential results, a Spearman's Rho correlation coefficient can be observed, with $r = 0.796$ between the variables Virtual environments for teaching-learning and Learning management, which results in a moderately significant positive correlation, thus, the significance (bilateral) is less than the average alpha 0.05 (0.000). It is very likely that the greater the management and knowledge of virtual environments, the better the results of learning management in the educational institutions of Callao. In this regard, Khandan & Shannon, (2021) described the sources of the findings in three types of teaching-learning environments (face-to-face, online and hybrid) and provided practices and implications to counteract the problems that do not add value. It highlights key Lean program issues within online hybrids and face-to-face teaching and provides key examples within the stated Lean program to provide solutions for student engagement. This online learning already exists and is used in blended form at a substantial level in developed countries, where teachers are not familiar with online platforms/tools, and lack of knowledge and skills to manage this ICT infrastructure, becomes a challenging situation.

On the other hand, a Spearman's Rho correlation coefficient was observed, with $r = 0.648$ between the variable Virtual environments for teaching-learning and the leadership dimension, which results in a moderate significant positive correlation, thus, the significance (bilateral) is less than the average alpha 0.05 (0.000). Determining that the greater the management and knowledge of virtual environments, the better the performance of leadership in the educational institutions of Callao. In this aspect, Guzzetti (2020), described negative and also positive elements in the implementation of virtual platforms as didactic tools in teaching/learning processes. It was highlighted that virtual platforms are didactic resources legitimized in the educational field, which allowed for autonomous work, greater communication with teachers, innovation, better motivation and innovation and creativity. However, difficulties still persist in the implementation, be it in Internet connectivity, higher costs, and also in the administration of resources for better

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effects. Therefore, it is necessary to work on encouraging a culture towards the teacher and the student, in order to improve the insertion of the digital era. This is an aspect that should be emphasized more to be a leader in education. Similarly, Barari et al. (2020), developed and validated educational standards and indicators of e-learning environments. As a result of this study, two educational standards and 18 indispensable indicators based on Bloom-Anderson Taxonomy were developed and validated. These findings contribute to e-learning by highlighting the pedagogical standards that must be met to get the best out of learning technologies.

Regarding the correlation between the variable virtual environments and management, a Spearman's Rho correlation coefficient can be observed, with r = 0.700 between the variable Virtual environments for teaching-learning and the management dimension, which results in a moderately significant positive correlation, thus, the significance (bilateral) is less than the average alpha 0.05 (0.000). Determining that the greater the management and knowledge of virtual environments, the better the management of management in the educational institutions of Callao. These results are consistent with the proposal of Gallego et al. (2021) when analyzing that 49.9% of students do not believe that face-to-face teaching-learning will be replaced by virtual teaching-learning education in the long term. The findings confirmed that the model constructed provides a useful theoretical approach to understand and explain user acceptance of remote learning environments when there is a need to migrate quickly from face-to-face to online mode and adapt to the teaching-learning processes. In this regard, teachers and managers should use leadership in a positive sense of learning, always with a view to improving virtual education. Finally, the relationship between the variable virtual environments for teaching-learning and collaborative learning in educational institutions in Callao was examined. A Spearman's Rho correlation coefficient of r = 0.730 was observed, indicating a significant moderate positive correlation between both variables. The bilateral significance was less than the standard alpha level of 0.05 (p = 0.000), suggesting that a greater mastery of virtual environments is associated with an improvement in collaborative learning in educational institutions in Callao.

Meanwhile, Morales et al. (2019) developed an instrument to evaluate virtual platforms and create a pleasant virtual environment for learning (AVA), obtaining optimal results. This instrument focused on four dimensions: computing spaces, interaction spaces, instructional design, and exhibition spaces. Its purpose was to identify areas for improvement in curricular experiences aimed at promoting virtual learning environments.

In contrast, the study by Torres et al. (2021) explored students' perception of the pedagogical model during confinement. The results revealed widespread dissatisfaction among students, leading to changes in school procedures and teacher training. Although the usefulness of e-mails and virtual platforms for learning was highlighted, a lack of knowledge in editing images, videos, infographics and in the use of synchronous response and matching tools was identified.

Conclusions

The relationship between virtual environments for teaching-learning and learning management in educational institutions in the constitutional province of Callao was explored. A Spearman's Rho correlation coefficient of r = 0.796 was found between these variables, indicating a moderate significant positive correlation. In addition, the bilateral significance was less than the standard alpha level of 0.05 (p = 0.000).

In the dimensions of the dependent variable "Learning management", similar behaviors were observed. A Spearman's Rho correlation of r = 0.648 with the "leadership" dimension, r = 0.700 with the "management" dimension and r = 0.730 with the "collaborative learning" dimension, all with a bilateral significance less than the standard alpha of 0.05 (p = 0.000).

This determines that a greater mastery of virtual environments is associated with an improvement in teaching-learning strategies, leadership and collaborative learning in educational institutions in Callao.

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