



Factors associated with the use of virtual learning environments in anthropology students: Evidence from a Peruvian university

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ABSTRACT

Article History

Received: 13 June 2025

Revised: 2 September 2025

Accepted: 24 September 2025

Published: 21 October 2025

Keywords

Academic performance

Digital tools

Higher education

Learning process

Virtual environments

Virtual learning

Virtual resources.

Virtual education has become an essential component of contemporary university education, particularly in relation to student academic achievement. The objective of the study was to analyze the use of virtual learning environments (VLE) in Anthropology students of the National University of the Altiplano Puno during the year 2024. The method was framed within the quantitative approach with a non-experimental design of a descriptive, correlational type. The sample consisted of 82 students out of a total population of 167, using the structured survey as a data collection instrument. The results showed that VLEs have advantages such as limitations in the educational process, identifying aspects such as the quality of digital content (with a correlation of 0.399), and the effectiveness of interaction with teachers (0.339), which showed a moderate positive influence on academic performance. On the other hand, excess time spent on virtual platforms (-0.321) and participation in collaborative activities (-0.258) showed a negative correlation. The statistical analysis confirmed that the data did not follow a normal distribution ($p < 0.05$), which validated the use of non-parametric methods for the treatment of the information. These findings support the postulates of the theory of self-determination, emphasizing that mere access to technological resources does not ensure improvements in learning if they are not accompanied by adequate pedagogical strategies and student motivation. The study concludes by highlighting the need to optimize the educational components of VLEs, prioritizing the quality of content and meaningful interactions.

Contribution/Originality: This study contributes to the existing literature by examining the impact of Virtual Learning Environments on Anthropology students in a multicultural Andean context. This study uses a new estimation methodology with non-parametric statistical analysis. It is one of the few studies that have investigated digital adaptation in practical-oriented social science education.

1. INTRODUCTION

Virtual education has become an essential pillar of different educational systems in contemporary times, transforming the dynamics of the teaching and learning process at various academic levels. This change was

accelerated by the COVID-19 pandemic, which forced numerous institutions worldwide to adapt quickly to various digital platforms, changing traditional structures and establishing a new educational normality (Murillo-Malagón, Looor-Parraga, Vera-Pisco, & Sornoza-Parralles, 2024). Virtual education is characterized by having technology as a mediator and the constant use of digital resources in the training of future professionals (Cetre-Vásquez, García, Vásquez, & Arévalo, 2024).

Taking into account the social sciences and one of its disciplines, anthropology, it was adapted to this transition, since learning in this area requires a particular approach, combining both theory and practice, especially in a multicultural context, presenting a cultural diversity characteristic of the highland region of Peru (Pástor, Arcos, & Lagunes, 2020).

It also takes into account the structural inequalities and geographical barriers characteristic of the Andean area, which were limiting in this transition, both for teachers and students who were protagonists of this drastic change from the way of communicating to the methods applied, in many cases without having the technological resources and the pedagogical and didactic support necessary to adapt to the rhythm of virtual education (Mestas, 2024). In the face of efforts to properly implement virtual education, there were structural shortcomings that continue to impact the quality of educational processes, such as poor access to and stability of the internet, the lack of adequate devices, limited digital skills, and persistent socioeconomic inequalities. These issues are characterized as constant in the region, generating an unequal educational experience. This situation has created new gaps concerning the academic performance of students, especially those in rural areas or with less access to technology, who face additional obstacles in their training process (Díaz Ramos, Noriega-Ramos, & Jaramillo-Díaz, 2023).

The research area of this study is located in university teaching, whose theme is the planning and didactics of university teaching, belonging to the line of research, strategies, didactics, and innovation in university teaching. The purpose of this research was to analyze the relationship between virtual education and academic performance in students during the academic semesters 2024-I and 2024-II. Thus, it sought to understand how students experienced, perceived, and faced the virtual educational modality. In order to address this problem, the research also considered the authors' theory of social autopoiesis (Maturana & Varela, 2003) those who theorize autopoietic systems understand how educational structures manage to adapt and reorganize themselves in the face of the insertion of new technologies. On the other hand, the concept of "digital natives" of García, Portillo, Romo, and Benito (2007) being a key idea for the analysis of this generation, despite having technology available, there are important barriers such as access and effective use of it.

To address these questions, the study is based on a quantitative methodology with a descriptive and correlational approach. The information is collected through validated questionnaires, supplemented by a detailed analysis of the university's academic records. This combination allows us to identify significant relationships between different factors, such as the quality of internet access, the availability of technological devices, and personal aspects such as digital skills, willingness to learn autonomously, and the ability to adapt to virtual environments.

The methodological approach applied, apart from measuring the real impact of virtual education on the academic performance of students, also offers valuable information to be able to design didactic and pedagogical strategies that are more effective, so it is expected that the results will help guide the actors in this virtual educational process in the creation of new proposals that guarantee quality education without neglecting face-to-face education.

The importance of this research is that it can serve as a guide for institutions in similar contexts, particularly those located in areas characterized by cultural diversity and infrastructural deficiencies. The findings could contribute to the development of educational proposals that consider the specificities of each context, including the implementation of teacher training programs in digital pedagogy and support systems aimed at students. This approach can help reduce technological gaps, as highlighted by (Dávila, Ortiz, & Ricse, 2023), who are committed to building more inclusive education systems at various levels. Technology should not exacerbate existing inequalities but should instead act as a tool to democratize access to knowledge.

Therefore, it was intended to contribute to the construction of an educational model that can integrate technology as a strategic ally, taking into account the cultural, social, and economic particularities of students (Mamani-Flores, Apaza-Ticona, Alanoca-Arocutipa, Calderón-Torres, & Calatayud-Mendoza, 2025). By influencing the understanding of how students perceive and face virtual education, the foundations are laid to be able to design proposals that improve programs and policies in a context that is increasingly digitizing.

The value of this research also lies in how a discipline such as anthropology, characterized by its fieldwork, now needs to adapt and reinvent itself in the digital context. It is not only about incorporating new technologies but also about building an educational model that respects cultural diversity. Offering equal opportunities, maintaining academic rigor, and, at the same time, preserving the experiential dimension that characterizes the training of this professional school.

The transition to technological transformation does not have to translate into a loss of identity or generate greater educational exclusion if it is not taken as an opportunity to strengthen inclusion and enrich the continuous learning experience, inspiring other disciplines in different fields to adapt to virtual environments without losing their essence.

Originality Statement: The study presents empirical findings based on quantitative research with a sample of 82 students from the National University of the Altiplano Puno, using non-parametric methods to analyze the correlation between the use of virtual learning environments and academic performance. The work has not been previously published nor is it under consideration by any other journal, and all cited sources have been properly referenced in accordance with academic standards. The authors take full responsibility for the originality and integrity of the content presented.

2. LITERATURE REVIEW

This study specifically examines the impact of Virtual Learning Environments (VLEs) on the academic performance of Anthropology students, analyzing critical factors such as digital content quality, teacher-student interaction, and excessive platform usage.

The results reveal that while content quality (with a positive correlation of 0.399) and effective teacher interaction (0.339) have a moderate yet significant impact on learning, prolonged time spent on virtual platforms (-0.321) and participation in collaborative activities (-0.258) may negatively affect academic performance. These findings suggest that technology implementation alone is insufficient pedagogical design and time management are key determinants of its effectiveness.

Additionally, the research addresses an understudied aspect in the literature: the adaptation of a highly practical discipline like Anthropology to virtual environments. Unlike other fields where virtualization may be more straightforward, this study highlights the unique challenges students face when combining theory and practice in a digital context (Adderly Mamani-Flores, Apaza-Ticona, Calatayud-Mendoza, Vilca-Apaza, & Villanueva-Alvaro, 2025). The results show that despite technical limitations (such as connectivity issues or inadequate devices), these factors did not significantly influence performance, reinforcing the idea that intrinsic motivation and pedagogical strategies are more decisive than mere technological access.

Finally, the study enriches the theoretical discussion by integrating perspectives such as self-determination theory and educational autopoiesis, proposing that VLEs should be designed as adaptive systems prioritizing resource quality and meaningful interaction (Barra-Quispe et al., 2024). By situating the analysis in a context with structural inequalities (the Andean region of Peru), it provides valuable evidence for institutions in similar environments, emphasizing that digital inclusion should not be limited to infrastructure but must also incorporate methodologies tailored to students' specific cultural and academic needs.

2.1. Virtual Learning Environments (VLEs)

Virtual learning environments (VLE) are a set of specialized technological systems that optimize the educational process, that is, teaching and learning through the combination of virtual resources, which facilitate teachers and students in the learning process through various interaction functionalities. These technological resources are configured with tools that are versatile, promoting communication between those who use them, their access is organized with training resources, and they have the efficient administration of various academic activities that are remote. Bautista, Monge, Obregón, and Moyano (2024) points out that VLEs have become essential alternatives for education in contemporary times, overcoming spatial and temporal barriers, and presenting inherent flexibility. The various existing platforms range from integrated learning management systems (Moodle, Google Classroom) to synchronous applications specialized in collaborative communication (Zoom, Microsoft Teams), offering content distribution and spaces for synchronous dialogue, collaborative work, and continuous assessments. These elements, linked together, have determined the new contemporary educational paradigms by creating more interactive, more inclusive training experiences, and more adaptable to the demands of the actors who use them.

The acceptance of these virtual platforms at the university level responds to the innovation of traditional paradigms, necessitating adaptation to current technological developments and students' expectations. Works such as those by Hernández-Sampieri, Fernández Collado, Baptista Lucio, and Del (2014) demonstrate how higher education institutions are progressively integrating digital environments into their curricula, harnessing the potential of these virtual environments to create flexible, student-centered educational experiences that are adaptable to individual needs. These virtual environments facilitate access to study materials from any location, promoting independent learning and overcoming physical and temporal barriers.

2.2. Impact of VLEs on the Learning Process

Some studies have analyzed how virtual learning environments affect the educational process. Sangrà (2001) and González, Berdugo, and Rubio (2017). They highlight that when virtual environments are implemented correctly, they enhance content use, facilitate collaborative work, and enrich pedagogical dynamics through interactive virtual resources. However, their adoption also presents challenges such as limited access to technology and the reduction of face-to-face contact traditionally present in educational interactions.

The digital transition acquires particular nuances since professionals who are more related to the social sciences depend to a large extent on the development of practical skills through fieldwork with direct contact and coexistence with the populations studied. Even though Martínez, Torres, and Segobia (2020), they recognize that virtual environments provoke valuable capacities for autonomy and self-regulation on the part of the students themselves, they also show some limitations that occur in those training activities where greater cultural immersion and participant observation in situ are required. These fundamental elements are part of anthropological work, thus generating a unique pedagogical paradox that would have to be balanced with the advantages of virtuality and the methodological demands of this discipline.

2.3. Factors Affecting EVA Use

The correct implementation of virtual environments in university education depends on multiple interconnected elements. One critical aspect is the availability of appropriate technological equipment and a stable internet connection, which presents significant limitations in regions such as Puno. This directly affects students' participation and their academic performance. Bermúdez Rodríguez, Lapaz Castillo, and Fueyo Gutiérrez (2016) consider that this digital divide is one of the greatest obstacles to achieving inclusive virtual education. However, at the same time, teachers and students require ongoing training to master these digital tools; according to Hidalgo and Franco (2021), this factor is crucial for the effective use of digital platforms in learning environments. They emphasize that the relational dimension is essential, as Cavadía, Payares, Lemus, Mellado, and Meza (2019) demonstrate, when well-

designed pedagogical strategies are implemented such as online collaborative spaces and synchronous communication these can foster significantly more enriching formative interactions compared to in-person activities, thereby helping to sustain motivation and academic engagement within virtual environments.

2.4. Effectiveness of Virtual Teaching Strategies

The impact of the effectiveness of pedagogical methods on student performance continues to be a central focus in contemporary educational studies. [Alfonzo, Enríquez, and Alcívar \(2020\)](#) demonstrate how the appropriate selection of teaching techniques influences academic achievement. From the constructivist approach, authors such as [Henao and Zapata \(2002\)](#) emphasize that true learning occurs when learners connect new knowledge with what they already know, thereby creating more solid and permanent knowledge networks. In practice, innovative methodologies such as project-based learning ([Luque, 2021](#)) or cooperative work ([Johnson, Johnson, & Smith, 2014](#)) have demonstrated their value by transforming students into protagonists of their own learning, fostering collaboration and the application of acquired knowledge. Thus, the panorama is further enriched by the integration of digital tools: as revealed by [Means, Toyama, Murphy, Bakia, and Jones \(2009\)](#), these technologies, apart from energizing classes, allow content to be adapted to each learning pace. This also offers much more constant feedback, where processes are reinforced. It is clear that the key to academic success lies in implementing good strategies that, beyond transmitting information, can activate conscious participation, helping to build knowledge with meaning and application in a concrete way.

3. METHODOLOGY

The research adopted a quantitative approach, as it seeks to objectively measure and analyze the impact of the use of virtual learning environments (VLE) on Anthropology students at the National University of the Altiplano Puno (UNA Puno) during the year 2024. The quantitative approach allows the collection of numerical data that will be subjected to statistical analysis to identify patterns, correlations, and trends in relation to students' perceptions and performance regarding the VLE. The research design was non-experimental, of a descriptive and correlational type, since the study variables were not manipulated. On the other hand, the use of virtual environments in the learning process was observed and described to analyze the relationship between the use of these tools and academic performance, as well as the level of student satisfaction.

To ensure that all academic levels were represented, a layered approach was chosen that allowed participants to be selected proportionally according to their career progression. The final size of the study group (82 students) was determined by applying standard statistical criteria that balance accuracy and feasibility, maintaining an acceptable margin of confidence for the purposes of the research.

The research was based on the analysis of various documents that facilitated the selection of key aspects related to virtual training and its influence on student results. As a main instrument, a digital survey was designed using Google Forms, strategically distributed to students of different levels of the Anthropology program through channels such as WhatsApp and institutional email. This approach made it possible to achieve meaningful participation with minimal deployment of resources.

The processing of the information collected focused on multiple relevant dimensions: from technical conditions (such as connection stability and the use of educational platforms) to study habits, class participation, use of online academic resources, communication with teachers and peers, as well as the general assessment of the training experience. Each of these elements was carefully considered for its potential impact on the educational process.

To understand how these factors related to academic performance, statistical techniques were applied that included normal distribution checks before establishing correlations. This methodological approach, supported by previous work such as that of [López and Luna \(2022\)](#) and [Pérez-López, Atochero, and Rivero \(2021\)](#) offered an integrated vision of how technological and didactic aspects configure learning dynamics in virtual contexts.

To ensure methodological rigor, this study implemented stratified sampling to proportionally represent students across different academic levels ($N=82$ from a population of 167), enhancing the validity of findings for the target population. The research design explicitly documented all procedures from data collection via structured Google Forms surveys to the application of non-parametric Spearman's Rho tests in alignment with the non-normal distribution of data ($p<0.05$ in Kolmogorov-Smirnov tests). Raw datasets, survey instruments, and detailed statistical protocols were systematically archived, enabling independent verification. This transparency in sampling, analytical methods, and data management not only strengthens the reliability of conclusions but also provides a replicable framework for future studies in comparable educational contexts, particularly where technological and socioeconomic disparities may influence outcomes.

The survey instrument, developed in Google Forms, consisted of 52 items organized into four key sections: (1) sociodemographic and technological data (10 items on device type, internet connection quality, and frequency of technical issues); (2) use of VLEs and digital tools (15 items on platforms used, weekly hours dedicated, and forum participation); (3) pedagogical interaction (12 items evaluating the effectiveness of communication with instructors and access to academic resources); and (4) perception of academic impact (15 Likert-scale items on performance and satisfaction). The questionnaire was validated through a pilot study with 20 students, showing a reliability of $\alpha=0.82$ (Cronbach's alpha), and was distributed through institutional channels to ensure sample representativeness.

4. RESULTS

4.1. Virtual Media used in their Learning Process by Students of the Professional School of Anthropology - FCS – UNA Puno

To study the link between the digital media used and the academic performance of students at the Professional School of Anthropology, the Kolmogorov-Smirnov normality test was performed. This test allowed us to establish that, with a significance level of $\alpha = 0.05$ or a confidence level of 95%, the data collected through surveys do not follow a normal distribution, since the P-value achieved in all the cases studied was less than 0.05. Given this finding, the use of Spearman's Rho correlation coefficient was carried out to evaluate the level of dependence between the categorical variables.

Table 1 presents the results of the correlation analysis between the frequency of use of virtual platforms and the academic performance of students. The data show that the P-value (P-value) obtained was $p = 0.905$, higher than the established significance level of $\alpha = 0.05$. This result leads to the rejection of the alternative hypothesis (H_1) and the acceptance of the null hypothesis (H_0), which indicates that there is no significant correlation or dependency relationship between the use of virtual platforms (such as Zoom, Moodle, Google Classroom, Microsoft Teams, among others) and the academic performance of the students of the Professional School of Anthropology.

Table 1. Correlation between the use of virtual platforms and improvements in the academic performance of EPA-FCS-UNA Puno students.

Spearman's rho		What virtual platforms do you use most frequently in your learning process? (Check all that apply)	Do you think that eLearning as a tool for learning has improved your academic performance?
What virtual platforms do you use most frequently in your learning process?	Correlation coefficient	1.000	0.013
	Sig. (Two-tailed)		0.905
	N	82	82
Do you think that eLearning as a tool for learning has improved your academic performance?	Correlation coefficient	0.013	1.000
	Sig. (Two-tailed)	0.905	
	N	82	82

Table 2 shows the findings of the correlation study between the type of device used to access online classes and the increase in students' academic performance. The statistical study reveals a P-value (P-value) of $p = 0.776$ that exceeds the set significance level of $\alpha = 0.05$. This finding leads to the denial of the alternative hypothesis (H1) and the acceptance of the null hypothesis (H0), which indicates that there is no relevant relationship between the type of device used (such as desktop computers, laptops, tablets, smartphones, among others) and the academic performance of the students of the Professional School of Anthropology.

Table 2. Correlation between the type of device used and improvements in the academic performance of EPA-FCS-UNA Puno students.

Spearman's rho		What device do you mainly use to access virtual classes?	Do you think that eLearning as a tool for learning has improved your academic performance?
What device do you mainly use to access virtual classes?	Correlation coefficient	1.000	0.032
	Sig. (Two-tailed)		0.776
	N	82	82
Do you think that eLearning as a tool for learning has improved your academic performance?	Correlation coefficient	0.032	1.000
	Sig. (Two-tailed)	0.776	
	N	82	82

Table 3 shows the conclusions of the correlation study between the quality of internet access, data search, and students' academic performance. The obtained P value (P-value) was $p = 0.484$, which exceeded the significance level of $\alpha = 0.05$. This finding leads to the rejection of the alternative hypothesis (H1) and the acceptance of the null hypothesis (H0), indicating that there is no significant relationship between the quality of the internet connection and the academic performance of students at the Professional School of Anthropology.

Table 3. Correlation between the quality of internet connection for learning, search for information, and improvements in the academic performance of EPA-FCS-UNA Puno students.

Spearman's rho		What is the quality of your Internet connection for learning and searching for information?	Do you think that eLearning as a tool for learning has improved your academic performance?
What is the quality of your Internet connection for learning and searching for information?	Correlation coefficient	1.000	0.078
	Sig. (Two-tailed)		0.484
	N	82	82
Do you think that eLearning as a tool for learning has improved your academic performance?	Correlation coefficient	0.078	1.000
	Sig. (Two-tailed)	0.484	
	N	82	82

Table 4 shows the findings of the study on the correlation between difficulties in internet connection, data search, and students' academic performance. The study shows a P-value (P-value) of $p = 0.988$ that exceeds the set significance level of $\alpha = 0.05$. This finding leads to the denial of the alternative hypothesis (H1) and the confirmation of the null hypothesis (H0), indicating that there is no relevant relationship or dependence between academic performance and internet connection problems during the learning process and the search for information in students of the Professional School of Anthropology.

Table 4. Correlation between Internet connection problems for learning, information search and improvements in the academic performance of EPA-FCS-UNA Puno students.

Spearman's rho		How often do you experience connection problems while learning and searching for information?	Do you think that eLearning as a tool for learning has improved your academic performance?
How often do you experience connection problems while learning and searching for information?	Correlation coefficient	1.000	0.002
	Sig. (Two-tailed)		0.988
	N	82	82
Do you think that eLearning as a tool for learning has improved your academic performance?	Correlation coefficient	0.002	1.000
	Sig. (Two-tailed)	0.988	
	N	82	82

4.2. Relationship of the Virtual Environment in the Learning Process in Students of the EPA - UNA Puno

To determine the relationship between the incidence of virtual environments in the learning process and the academic performance of EPA students, the Kolmogorov-Smirnov normality test was performed. It was determined that, at a significance level of $\alpha = 0.05$ or 95% confidence level, the new data group from the student survey, like the previous one, does not follow a normal distribution. The P-value or significance value was less than 0.05 in all cases analyzed. Considering this, a non-parametric test was used to measure the degree of correlation between categorical variables, specifically Spearman's Rho correlation coefficient, to assess the dependence between the variables: hours of virtual environment use, participation in group activities, ease of access to websites or specialized search engines, and effective interaction with teachers through virtual environments (independent variables) and the improvement in academic performance (dependent variable) of EPA students.

Table 5 shows the correlation between the number of hours assigned weekly to the use of virtual learning environments and the academic performance of the students. The findings indicate a P value (P-value) of $p = 0.03$, which is lower than the significance level $\alpha = 0.05$. Therefore, the null hypothesis (H_0) is discarded, and the alternative hypothesis (H_1) is adopted, indicating that there is a relevant correlation between the two variables. This finding, with a confidence level of 99%, suggests that the time spent learning in virtual environments does not have a significant negative correlation with academic performance. In conclusion, the more hours invested in the use of these environments, the lower the academic performance observed in Anthropology students.

Table 5. Correlation between hours dedicated weekly to the use of virtual learning environments and improvements in the academic performance of EPA-FCS-UNA Puno students.

Spearman's rho		How many hours do you spend per week using virtual learning environments?	Do you think that eLearning as a tool for learning has improved your academic performance?
How many hours do you spend per week using virtual learning environments?	Correlation coefficient	1.000	-0.321**
	Sig. (Two-tailed)		0.003
	N	82	82
Do you think that eLearning as a tool for learning has improved your academic performance?	Correlation coefficient	-0.321**	1.000
	Sig. (Two-tailed)	0.003	
	N	82	82

Note: **. The correlation is significant at the 0.01 level (2 tails).

Table 6 shows the findings of the correlation between regularity in participation in group activities, forums, or online platforms and the increase in students' academic performance. The study reveals a P value of $p = 0.019$, which is below the significance level $\alpha = 0.05$. Thus, the null hypothesis (H_0) is discarded, and the alternative hypothesis (H_1) is adopted, indicating that there is a significant correlation between academic performance and the regularity of participation in collective activities and online forums among students of the Professional School of Anthropology.

Table 6. Correlation between frequency of participation in group activities, forums or virtual platforms and improvements in the academic performance of EPA-FCS-UNA Puno students.

Spearman's rho		How often do you participate in group activities or forums on virtual platforms?	Do you think that eLearning as a tool for learning has improved your academic performance?
How often do you participate in group activities or forums on virtual platforms?	Correlation coefficient	1.000	-0.258*
	Sig. (Two-tailed)		0.019
	N	82	82
Do you think that eLearning as a tool for learning has improved your academic performance?	Correlation coefficient	-0.258*	1.000
	Sig. (Two-tailed)	0.019	
	N	82	82

Note: **. The correlation is significant at the 0.01 level (2 tails).

Table 7 shows the conclusions of the correlation between the ease of accessing the website of specialized academic search engines and the increase in students' academic performance. The findings indicate a P value (P-value) of $p = 0.000$, which is lower than the significance level $\alpha = 0.05$. Therefore, the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_1) is accepted, indicating a significant correlation between academic performance and the ease of access to specialized academic search engines used by EPA students for tasks such as abstracts, exhibitions, data analysis, and scientific publications.

Table 7. Correlation between ease of access to the Web of specialized academic search engines and improvements in the academic performance of EPA-FCS-UNA Puno students.

Spearman's rho		How easy is it for you to access the Web or specialized search engines to carry out your academic tasks (assignments, abstracts, presentations, data analysis, scientific articles)?	Do you think that eLearning as a tool for learning has improved your academic performance?
How easy is it for you to access the Web or specialized search engines to carry out your academic tasks (assignments, abstracts, presentations, data analysis, scientific articles)?	Correlation coefficient	1.000	0.379**
	Sig. (Two-tailed)		0.000
	N	82	82
Do you think that eLearning as a tool for learning has improved your academic performance?	Correlation coefficient	0.379**	1.000
	Sig. (Two-tailed)	0.000	
	N	82	82

Note: **. The correlation is significant at the 0.01 level (2 tails).

Table 8 shows the findings of the relationship between interaction with teachers through virtual environments and the increase in students' academic performance. The findings obtained indicate a P-value of $p = 0.002$, which is

lower than the significance level $\alpha = 0.05$. Therefore, the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_1) is accepted. This suggests that there is a significant correlation between academic performance and students' interaction with their teachers in virtual environments in the EPA.

Table 8. Correlation between interaction with teachers through virtual environments and improvements in the academic performance of students of the EPA-FCS-UNA Puno.

Spearman's rho		Do you feel that interaction with your teachers through virtual environments is effective?	Do you think that eLearning as a tool for learning has improved your academic performance?
Do you feel that interaction with your teachers through virtual environments is effective?	Correlation coefficient	1.000	0.339**
	Sig. (Two-tailed)		0.002
	N	82	82
Do you think that eLearning as a tool for learning has improved your academic performance?	Correlation coefficient	0.339**	1.000
	Sig. (Two-tailed)	0.002	
	N	82	82

Note: **. The correlation is significant at the 0.01 level (2 tails).

5. DISCUSSION

5.1. Virtual Environments used in the Learning Process by Anthropology Students

The study took into account independent factors such as the use of digital platforms, the type of device used, the quality of the internet connection, and problems associated with access during academic tasks. Improvement in academic performance was considered a dependent variable. The selection of these analytical instruments and techniques is based on their relevance in educational studies, particularly in online teaching environments, as highlighted by recent research emphasizing the efficacy of Spearman's Rho for non-parametric correlations (García-Rotger & Morales, 2024; Lecarnaqué Rojas, Del Castillo Miranda, Gonzales Nacarino, & Guillén-López, 2024; Romero-Argueta, Severino-González, Coreas-Flores, & Sarmiento-Peralta, 2024).

The results suggest that digital tools, while useful, do not by themselves determine academic success. Students demonstrate a remarkable ability to adapt to any available platform, modifying its use according to the specific requirements of each subject. This observation coincides with previous findings by Ponce-Domínguez, Erazo-Moreno, Nina-Cuchillo, and Colichón-Chiscul (2024); Sastoque, González-Rubio, Correa, and Valencia-Arias (2024) and Soletto et al. (2017), who argue that educational technology functions more as a logistical support than as a decisive variable in student performance.

Up-to-date research reveals consistent patterns: factors such as time organization, effective study strategies, and basic equipment availability influence results much more than the choice of specific platforms. Experts such as (Arteaga & Osorio, 2024; Nolasco-Mamani, Choque-Salcedo, Choque-Salcedo, & Villalba-Condori, 2024), they emphasize that the true competitive advantage in higher education arises from metacognitive habits and minimum access conditions, not from technological sophistication.

This discovery supports the notion that the technological devices used in the teaching-learning process are not a crucial element in the optimization of academic performance. This could be a result of increased student access to mid-range or high-end mobile devices, which provide adequate functionalities to meet academic needs in virtual environments. Current research corroborates this statement by indicating that academic performance in online education is more linked to self-administration skills, inherent motivation, and access to digital resources than to the type of device used (Deroncele, 2024; Rodríguez-Armas & Zambrano-Santos, 2024). Likewise, previous studies have indicated that, despite the fact that mobile devices such as smartphones are frequently used by students in areas with

more limited technological infrastructure, they have the ability to offer an academic experience comparable to that of other devices that are more technically sound (Cruz, 2024; Loaiz & Salas, 2024).

This discovery indicates that, although common problems related to internet connection may arise, they do not directly impact the academic performance of students. One possible reason lies in the pedagogical strategies implemented by teachers, who can set flexible deadlines for assignments, making it easier for students to overcome technological constraints (Floriano-Rodríguez, Horna, Placido, & Barbuda, 2024; Velastegui-Hernández, Tagua-Moyolema, Miranda-López, & Muyulema-Muyulema, 2024).

Previous studies have indicated that, despite being crucial for access to educational resources, the quality of the internet connection does not necessarily influence academic performance. This is because students often find options to carry out their academic tasks, such as using public networks or downloading resources in advance (Esther & Alchundia-Mendoza, 2016; Nuñovero, Tascua, Rodas, & Abarca, 2024). In addition, it has been highlighted that elements such as self-management, inherent motivation, and learning tactics play a more significant role in virtuous education contexts (Gallegos, Maza, Carpio, & Díaz, 2024; Orozco & García, 2024).

Previous research reveals a paradoxical fact: although essential for accessing digital materials, internet speed does not make a difference in final grades. Students develop creative strategies to overcome this limitation, either by connecting to public networks or downloading content when they have the opportunity, as they demonstrated in Esther and Alchundia-Mendoza (2016) and Nuñovero et al. (2024) in their jobs.

What really makes the difference are internal factors: from how they organize their time to the ability to stay focused and apply effective study methods. Gallegos et al. (2024) and Orozco and García (2024) agree that these personal skills outweigh any technological variable in distance education.

5.2. Correlation Between Internet Connection Problems for Learning, Information Search and Improvements in the Academic Performance of EPA-FCS-UNA Puno Students

The results demonstrate how students develop skills to overcome technical difficulties, implementing practical solutions that compensate for connection failures. This situation reveals the flexibility of online educational platforms, which, combined with student ingenuity, manage to maintain a stable academic level despite technological barriers, as they have recently observed Guijarro et al. (2024) and Pallo, Ases, Del Salto, and Fiallos (2024) in their research.

Recent research shows how students circumvent connection failures through ingenious strategies: they download materials in advance, use platforms that do not require a constant internet connection, or reorganize their study schedules. This capacity for self-management, combined with their resilience, explains why many maintain good academic results despite technical limitations, as evidenced by the Garzón-Domínguez, Montesdeoca-Salazar, García-Calle, and Estrella-Romero (2024) and Panchana and Chica (2024). However, the other key component lies in the flexibility of virtual environments; when teachers adjust their evaluation methods and adapt the activities to the real technological context of their students, as they propose Montenegro et al. (2024) and Zambrano-Cedeño, Intriago-Delgado, and Carrión-Cano (2024), an educational ecosystem is created that compensates for digital inequalities.

Several elements could explain these results: when students accumulate too much information without processing it properly, lack methods to organize their learning, or spend hours on irrelevant tasks, their performance inevitably suffers (Alchundi & Cortez, 2024; Lozano, 2024) agree that simply increasing digital resources does not guarantee better results, especially if they are not well designed to stimulate deep understanding, as they also point out (Píriz & González, 2024; Salas, Moran, Muñoz, & Barrera, 2024). In fact, the abuse of online platforms can generate mental fatigue and dispersion, making it difficult to retain and apply knowledge, they warn (De Miguel, Bernárdez-Gómez, & Salmerón Aroca, 2024; Huancapaza, 2024).

The solution seems to lie in balance: current research such as that of Hernández-Suárez, Gamboa-Suárez, and Prada-Núñez (2024) and Vilchez, Linares, and Ferrer (2024) propose wisely mixing hours in front of the screen with

participatory methodologies that encourage constant dialogue with teachers and practical work. The real challenge is to find that sweet spot where technology complements without dominating fundamental educational processes.

The data reveals an interesting pattern: although students actively participate in forums and digital group work, this interaction does not necessarily translate into better grades. Interestingly, the greater the dedication to these activities, the lower the academic improvement observed, suggesting that the time invested in virtual platforms may not be generating the expected educational benefits. [Alchundi and Cortez \(2024\)](#) had already warned about this phenomenon, pointing out how the saturation of digital tasks can fragment attention and make it difficult to focus on the fundamental contents of each subject.

Research such as that of [Viloria Matheus and Hamburger \(2019\)](#) explains this paradox: while collaborative online spaces foster social skills, their impact on direct academic performance is limited when they are not part of a well-articulated pedagogical strategy. [Lozano \(2024\)](#) adds another key factor when these activities are not aligned with training objectives or are accumulated without moderation, they tend to generate more stress than meaningful learning.

This scenario forces us to rethink how we design virtual interactions. As proposed [Curay \(2023\)](#) the challenge is to create group dynamics that truly enrich the training process, avoiding turning them into mere digital procedures that consume energy without providing educational value. The solution could lie in integrating qualitatively not quantitatively these tools into the learning process.

The results show a clear connection: when students can easily access digital academic resources, their performance tends to improve. This direct relationship suggests that accessibility to specialized materials acts as a catalyst for learning, enabling students to explore topics more deeply and prepare more effectively for assessments. As he pointed out ([Rodríguez, 2021](#)) the quality and availability of digital content directly influence students' ability to analyze and understand.

The university experience is transformed when the right digital tools are incorporated. [Maldonado Amezquita \(2019\)](#). It explains how academic search engines open doors to a universe of scientific publications and specialized databases, stimulating intellectual curiosity and autonomy in learning [Arteaga and Osorio \(2024\)](#). They add that mastering these platforms allows students to produce more rigorous and better-grounded work, which is naturally reflected in their grades.

This evidence highlights a fundamental aspect of today's higher education: academic information technologies are not simple complements but pillars of the training process [Campos and Brito \(2024\)](#). They express it clearly when institutions strategically integrate these resources, they create the conditions for knowledge to flow more organically and effectively, benefiting both students and teachers.

The data reveal an unexpected reality: the connection between teachers and students on digital platforms shows little influence on final academic results. Contrary to what might be assumed, increasing the frequency of these virtual interactions does not necessarily translate into better ratings. Research such as that of [Arias-Avilés \(2024\)](#) and [González et al. \(2017\)](#) states that regular contact is essential, as it allows doubts to be clarified, individualized feedback is offered, and the training process is supported.

However, other studies highlight distinct benefits of these digital interactions. [Pérez \(2012\)](#) and [Rosanigo, Bramati, López de Munain, Bramati, and Cotti \(2016\)](#) found that constant dialogue with teachers in virtual environments does strengthen student engagement and autonomy in learning, particularly in higher education. [Garzón-Domínguez et al. \(2024\)](#) add that this permanent guidance helps to develop critical thinking, a valuable skill although not always directly reflected in grades.

The real challenge appears to be in designing these interactions effectively. As [Hernández-Herrera \(2024\)](#) suggests, it is not merely about increasing the number of contacts but about creating virtual spaces where the exchange is genuinely meaningful and enhances students' analytical skills, beyond its immediate impact on academic performance.

6. CONCLUSION

The results show a clear pattern: the data collected reveal an irregular distribution that reflects the actual diversity of educational contexts and inequalities in access to technology. This finding, consistent with previous research, led to the adoption of alternative statistical methods better suited for this type of data. Interestingly, the analysis did not identify significant links between academic performance and factors such as the type of devices used, the frequency of technical failures, or the quality of the internet connection. This supports the idea that merely having digital tools is insufficient to enhance learning; what truly makes a difference are elements such as students' personal motivation, the design of the classes, and the specific circumstances of each student.

The study shows that digital environments affect student achievement in different ways. On the one hand, tools such as academic databases and fluid communication with professors show a moderate favorable effect, coinciding with theories that emphasize the importance of expert guidance in learning. On the other hand, spending too many hours on virtual activities or participating excessively in forums seems to have the opposite effect, probably because it saturates students or because these activities are not always well designed. The key seems to be to focus on quality materials and meaningful teaching accompaniment, avoiding overloading students with unnecessary digital tasks.

Funding: This study received no specific financial support.

Institutional Review Board Statement: The Ethical Committee of the Anthropology of the National University of the Altiplano, Peru has granted approval for this study on 15 April 2024 (Ref. No. CE-001-2024).

Transparency: The authors state that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.

Competing Interests: The authors declare that they have no competing interests.

Authors' Contributions: All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.

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