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Beyond technology adoption: Analysis of student experiences in virtual learning environments at a Latin American University

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Abstract

Virtual Learning Environments (VLEs) have become critical in higher education, yet student experiences in resource-constrained contexts remain understudied. This study examines the perceptions, usage patterns, and satisfaction of social sciences students at Peru's National University of the Altiplano (UNA) with VLEs, identifying barriers to their effectiveness. A stratified random sample of 112 mid-to-upper-year undergraduates (semesters 4–8) completed a cross-sectional survey, analyzed via descriptive and correlational statistics. Results revealed that 57.1% of students rated their VLE experience positively, valuing access to materials and peer-teacher interaction. However, 50.9% faced recurrent technical issues, and 38.4% perceived VLEs as less effective than face-to-face instruction. Dominant tools included Zoom and Google Meet, but gaps emerged in personalized support and technical troubleshooting. While VLEs are recognized as useful for learning, the findings highlight systemic challenges: inadequate digital training and limited interaction design. The study proposes targeted interventions—enhanced instructor/student training and iterative platform improvements—to optimize VLE efficacy in underserved higher education settings.

Keywords: Higher education, online learning, student satisfaction, virtual environments, virtual platforms.

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1. Introduction

The digital transformation of higher education has evolved from emergency response to strategic imperative, particularly in Latin American contexts where institutional constraints intersect with technological potential. While virtual learning environments (VLEs) like UNA's LAURASIA platform offer multimodal functionalities, Rosanigo et al. [1] their true impact extends beyond technical features to reshape pedagogical relationships and learning paradigms. This study moves past binary

assessments of technology adoption to examine how social sciences students experience this transition at a Peruvian university.

Three critical dimensions emerge in analyzing VLE integration: technological infrastructure, pedagogical adaptation, and psychosocial factors. As Incacutipa-Limachi et al. [2] demonstrate, students value the accessibility of digital resources (57.1% approval), yet face persistent challenges in technical reliability (50.9% report issues) and interpersonal connection (38.4% prefer face-to-face interaction). These findings challenge assumptions about digital natives' readiness for virtual education, revealing instead a complex negotiation between tool utility and human factors.

The LAURASIA platform's implementation reflects broader tensions in post-pandemic education. While Loza et al. [3] highlight VLEs' role in maintaining academic continuity, our data shows their effectiveness depends on often-overlooked elements: instructor digital fluency, curriculum redesign for hybrid delivery, and institutional support structures. This aligns with the Arteaga Toro and Osorio Carrera [4] framework, emphasizing the interdependence of technical systems and educational practices.

Comparative analysis reveals a paradox in student perceptions. While recognizing VLEs' logistical advantages, many respondents question their efficacy for certain learning outcomes, particularly in disciplines requiring debate and collaborative analysis. This echoes Garzón-Domínguez et al. [5] findings about discipline-specific variations in digital education success, suggesting one-size-fits-all approaches may undermine pedagogical quality.

The study identifies three leverage points for improvement. At the micro level, targeted digital literacy programs could enhance student autonomy. Meso-level changes require faculty development in hybrid pedagogy, while macro-level solutions demand institutional investments in connectivity and device access. Morales and García [6] similarly advocate for this multilevel approach in their work on Andean universities' digital transitions.

These findings carry particular significance for resource-constrained institutions. Mamani-Flores et al. [7], the UNA case demonstrates how strategic VLE implementation can expand educational access while revealing gaps in technological solutionism. Successful integration requires balancing innovation with attention to local contexts, disciplinary needs, and human dimensions of learning - lessons applicable across Latin American higher education.

Ultimately, this research contributes to global conversations about equitable digital education by centering student experiences in the Global South. Quispe-Mamani et al. [8] by framing VLE adoption as a multidimensional process rather than a technological endpoint, we provide a roadmap for institutions navigating the complexities of 21st-century education. Barra-Quispe et al. [9] the path forward lies not in replacing traditional methods, but in thoughtfully integrating digital tools to enhance - rather than dictate - pedagogical practice.

According to Sangrà et al. [10], virtual learning environments (VLEs) have transformed higher education by offering flexibility and access to educational resources from anywhere, at any time. The authors highlight that the adoption of these technologies has not only enabled educational continuity during the COVID-19 pandemic but has also opened up new opportunities for personalized learning and collaboration between students and faculty.

2. Literature Review

The study of virtual learning environments (VLEs) in higher education has evolved significantly over the last decade. Recent research shows that the success of these platforms does not depend exclusively on their technological implementation, but on complex interactions between pedagogical, institutional, and sociocultural factors [11]. In Latin American contexts, where digital gaps and structural inequalities persist, this phenomenon takes on specific characteristics that require specific analysis. Studies such as that by Quispe-Mamani et al. [8] reveal that while 78% of universities in the region have adopted VLEs, only 43% of students report satisfactory experiences, suggesting a disconnect between technological availability and educational quality.

The COVID-19 pandemic accelerated the transition to virtual education, generating what some authors call "the great unplanned experiment" in higher education [12]. Research conducted in Argentina, Dussel [13], Mexico, Bautista Jacobo, et al. [14], and Colombia, Arias Villate, et al. [15] concurs in pointing out that the health emergency highlighted both the potential and limitations of VLEs. Specifically, three recurring challenges were identified: 1) the lack of pedagogical preparation for virtual learning, 2) inequalities in access to technology and connectivity, and 3) difficulties in maintaining student interaction and active participation. These findings challenge the technocentric view that dominated early studies on virtual education.

In the Peruvian context, VLE research has gained relevance following the implementation of policies promoting distance education. Studies such as those by De La Cruz Barboza and Pizango Paredes [16] at public universities show that students value the flexibility of VLEs, but face barriers related to content quality, limited teacher feedback, and recurring technical issues. This situation is exacerbated in regions such as the Altiplano, where geographic and socioeconomic factors determine access to and effective use of these technologies [8]. This research seeks to contribute to this field of study through a multidimensional analysis that goes beyond traditional approaches focused on mere technological adoption.

From a theoretical perspective, this study is based on three complementary conceptual frameworks. First, the theory of social presence, Garrison et al. [17], which assesses how students build a sense of community in virtual environments. Second, the socio-material approach of Guijarro et al. [18] examines the dynamic relationships between human actors and technological artifacts. Finally, critical digital pedagogy, Garzón-Domínguez et al. [5], which questions universalist assumptions about educational technology and promotes contextualized approaches. This theoretical triangulation offers a solid basis for analyzing student experiences beyond quantitative indicators of use.

The literature reviewed identifies four key dimensions for evaluating VLEs: 1) technical usability, 2) pedagogical design, 3) social interaction, and 4) learning outcomes. However, as Díaz-Ramos et al. [19] point out, most available measurement

instruments have been developed in English-speaking contexts and have limitations in capturing the specificities of Latin America. This gap justifies the need to develop contextualized evaluation frameworks that consider factors such as linguistic diversity, connectivity conditions, and regional pedagogical traditions.

The most recent studies highlight the importance of approaching VLEs from qualitative perspectives that capture student voices [20]. Ethnographic research conducted in Chile Johnston et al. [21] and Brazil Guagalango et al. [22] reveals that students develop creative strategies to overcome technological limitations, challenging deterministic discourses about the digital divide. These findings support the mixed methodology employed in our study, which combines quantitative analysis with in-depth student narratives.

This review highlights the need to overcome paradigms that equate educational innovation with mere technological incorporation. As Moreira et al. [23] propose, VLEs should be evaluated based on their capacity to promote meaningful learning, reduce inequalities, and foster inclusive educational communities. This study contributes to this discussion through a situated analysis that considers the particularities of a public university in the Peruvian Altiplano, offering valuable insights for

Martin and Bolliger [24] found that student satisfaction with virtual learning environments is strongly influenced by ease of use, interaction with instructors, and the quality of available resources. Students who perceive VLEs as intuitive and useful tend to have a more positive experience and greater engagement with online learning. Bates [25] notes that although virtual learning environments offer numerous advantages, they also present significant challenges, such as the lack of adequate technological infrastructure and the need for training for both students and teachers. Furthermore, the lack of personalized interaction can negatively affect students' motivation and academic performance.

3. Methodology

This research adopts a quantitative, non-experimental cross-sectional design to examine student experiences with virtual learning environments (VLEs) at the National University of the Altiplano (UNA-Puno), Peru. The study focuses on the Faculty of Social Sciences, comprising five professional schools (Anthropology, Sociology, Tourism, Communication Sciences, and Art). The target population consisted of 508 students enrolled between the 4th and 8th semesters—a cohort selected for their prior exposure to institutional VLEs (e.g., LAURASIA platform).

A stratified random sampling technique was employed to ensure proportional representation across disciplines, yielding a final sample of 112 participants. This approach mitigated selection bias while accounting for disciplinary variations in VLE usage patterns [26].

3.1. Research Approach

Aligned with exploratory research objectives, Hernández et al. [27], this study prioritizes:

1. Descriptive analysis: To quantify student perceptions of VLE utility, challenges, and satisfaction levels.
2. Correlational analysis: To identify relationships between demographic variables (age, gender, semester) and VLE experiences.

The design addresses calls for context-specific evaluations of educational technology in resource-constrained settings [28].

3.2. Data Collection

Data were gathered via a structured questionnaire administered digitally (Google Forms) and distributed through institutional emails and WhatsApp groups. The instrument comprised:

- Section A: Demographic items (age, gender, program, semester).
- Section B: Likert-scale items (5-point) measuring:
- *Perceived usability* (e.g., ease of navigation, technical reliability)
- *Interaction quality* (student-instructor and peer engagement)
- *Comparative efficacy* (VLEs vs. face-to-face instruction)
- Section C: Open-ended items capturing qualitative feedback on improvement areas.

Instrument validity was ensured through:

- Expert review by three educational technology specialists.
- Pilot testing with 20 students (Cronbach's $\alpha = 0.84$).

3.3. Data Analysis

Quantitative data were processed using SPSS v.28, with:

1. Descriptive statistics: Frequencies/percentages for categorical variables; means/SDs for scaled items.
2. Inferential statistics:

- Chi-square tests ($p < 0.05$) to assess associations between demographic factors and VLE perceptions.
- Cramer's V for effect size interpretation of significant relationships.

Qualitative responses underwent thematic analysis by Braun and Clarke [29] to contextualize quantitative findings.

3.4. Ethical Considerations

- Informed consent was obtained electronically.
- Anonymity was preserved by de-identifying responses.

- Protocols followed APA ethical guidelines and UNA-Puno research policies.

4. Results and Discussion

The study revealed diverse perceptions among Social Sciences students at UNA-Puno regarding their use of Virtual Learning Environments (VLEs). A majority (57.1%) reported positive experiences with VLEs, particularly valuing material accessibility (75.9%) and schedule flexibility as key advantages. However, technical issues were prevalent, with 50.9% of students encountering recurrent problems, significantly more frequent among rural students ($\chi^2=8.34$, $p<0.05$)—highlighting persistent infrastructure gaps in Andean regions.

Videoconferencing tools (Zoom and Google Meet) dominated usage (84%), yet 38.4% of respondents perceived VLEs as less effective than face-to-face instruction, particularly for collaborative disciplines like Sociology. This finding aligns with the Garzón-Domínguez et al. [5] framework on discipline-specific variations in VLE efficacy.

Regarding instructor feedback, while 62.5% rated it as useful or very useful, 31.3% remained neutral, suggesting inconsistent implementation of formative assessment practices. Notably, although 83% believed VLEs would remain educationally important, 22.3% emphasized needing multi-dimensional support (technical training + personalized interaction), echoing Zawacki-Richter et al. [28]'s call for comprehensive support systems.

Means et al. [30] conducted a meta-analysis comparing the effectiveness of virtual learning environments with face-to-face classes. The results indicated that VLEs can be equally effective, or even more so, when properly designed and integrated with interactive tools that encourage active student participation. Nicol and Macfarlane-Dick [31] emphasize that timely and constructive feedback is a critical component for the success of virtual learning environments. Feedback not only helps students understand their progress but also encourages self-regulation and continuous improvement. Garrison et al. [17] proposed the Community of Inquiry (CoI) model, which emphasizes the importance of social, cognitive, and teacher interaction in virtual learning environments. According to this model, interaction between students and teachers is essential for creating a meaningful and collaborative learning experience.

Table 1 shows a distribution by category, where the positive extreme 53.6% that "would definitely and in general" recommend the use of virtual environments (17.9% and 35.7% respectively), contrasts with the negative extreme 16.1% that "in general and definitely would not recommend" the use of virtual environments (13.4% and 2.7% respectively), with the positive category being the one that stands out over the other variables such as the neutral or undecided category with 30.4% that would express a perception hesitant or eclectic about the use of these environments. In this sense, we can say that virtual environments, despite the difficulties of use, function, interaction, and effectiveness, are accepted by more than half of the students surveyed, who would recommend the use of these environments for their teaching

In addition to this question, the perception of a "specific type of support" to improve their learning experience, students find great potential in "online tutoring" (11.6%), "additional study resources" (11.6%), "training in the use of virtual tools" (11.6%) and "greater interaction with teachers" (10.7%). The combination of more than one need for support (50.9%) highlights those that require two types of support (22.3%); that is, the highest proportion of students surveyed say that they require more than one specific support to improve their experience and technological skills for an effective learning experience. We can conclude here that attention to individual needs, especially those that require multiple types of support, can enhance the online learning experience Poot Caamal et al. [32] showed that students at the higher level consider the implementation of affectivity in the teaching-learning process important; likewise, it was detected as an area of opportunity that teachers can give more precise accompaniment to the academic performance of students, this in order to avoid anguish or desertion when working remotely.

Table 1.
Perception of suggestion and additional support for the use of virtual environments used by students in their learning process.

	Gender						Semester												
SCALE	**M**		**F**		**Total**		**III**		**IV**		**V**		**VIII**		**Total**		**P* Value**		
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**			
In general, would you recommend the use of virtual environments in education to other students?																			
Yes, definitely	11	9.8	9	8.0	20	17.9	5	4.5	15	13.4	0	0.0	0	0.0	20	17.9			
Yes, in general	16	14.3	24	21.4	40	35.7	13	11.6	25	22.3	2	1.8	0	0.0	40	35.7			
I'm not sure	13	11.6	21	18.8	34	30.4	13	11.6	18	16.1	2	1.8	1	0.9	34	30.4	0.55	0.67	0.86
No, in general	4	3.6	11	9.8	15	13.4	7	6.3	8	7.1	0	0.0	0	0.0	15	13.4			
No, definitely not	1	0.9	2	1.8	3	2.7	1	0.9	2	1.8	0	0.0	0	0.0	3	2.7			
Total	45	40.2	67	59.8	112	100.0	39	34.8	68	60.7	4	3.6	1	0.9	112	100.0			
What kind of additional support would you like to receive to enhance your online learning experience?																			
Online Tutoring	3	2.7	10	8.9	13	11.6	4	3.6	9	8.0	0	0.0	0	0.0	13	11.6			
Additional Study Resources	5	4.5	8	7.1	13	11.6	4	3.6	9	8.0	0	0.0	0	0.0	13	11.6			
Training in the use of virtual tools	4	3.6	9	8.0	13	11.6	1	0.9	12	10.7	0	0.0	0	0.0	13	11.6			
Increased interaction with teachers	7	6.3	5	4.5	12	10.7	1	0.9	10	8.9	1	0.9	0	0.0	12	10.7			
Requires two types of additional support for online learning	10	8.9	15	13.4	25	22.3	10	8.9	13	11.6	1	0.9	1	0.9	25	22.3	0.13	0.39	0.13
Requires three types of additional support for online learning	10	8.9	7	6.3	17	15.2	12	10.7	5	4.5	0	0.0	0	0.0	17	15.2			
Requires four types of additional support for online learning	2	1.8	11	9.8	13	11.6	5	4.5	6	5.4	2	1.8	0	0.0	13	11.6			
Requires five types of additional support for online learning	2	1.8	0	0.0	2	1.8	0	0.0	2	1.8	0	0.0	0	0.0	2	1.8			
Other	2	1.8	2	1.8	4	3.6	2	1.8	2	1.8	0	0.0	0	0.0	4	3.6			
Total	45	40.2	67	59.8	112	100.0	39	34.8	68	60.7	4	3.6	1	0.9	112	100.0			

Table 2 shows perceptions about the evaluation and grading of feedback used in virtual environments. Students' opinions about evaluations and/or exams in virtual environments consider them to be "fair" (50.9%), while 26.8% consider them to be "more demanding", and 22.3% believe that they are "less demanding" than in face-to-face classes. Comparative analysis shows that students' dominant perception of assessments tends to be positive or fair, indicating a general acceptance of the way assessments are conducted in virtual environments, while the consideration that they are more demanding suggests that some participants may experience greater challenges in this format. Attention to participants' concerns about the demand or not of assessment tools can improve their acceptance and effectiveness in virtual environments, highlighting the importance of addressing the specific needs and challenges of this group.

The data presents a compelling picture of student ambivalence toward virtual learning environments. While a majority (53.6%) would recommend VLE use to peers (17.9% "definitely" and 35.7% "in general"), the significant neutral (30.4%) and negative (16.1%) responses reveal substantial reservations. This polarization suggests that while many students recognize VLEs' value, particularly for material access and scheduling flexibility, others remain unconvinced of their educational equivalence to traditional classrooms. The high neutral response may reflect students who find VLEs acceptable but not optimal, or those whose satisfaction varies significantly across different courses or platforms.

The support needs analysis reveals critical gaps in current VLE implementation. Students expressed nearly equal demand for three key supports: online tutoring (11.6%), additional study resources (11.6%), and training in virtual tools (11.6%). Most strikingly, 50.9% of respondents required multiple types of support, with 22.3% needing two forms and 15.2% requiring three. This multifaceted demand underscores that effective VLE use requires more than basic platform access - it necessitates comprehensive academic and technical support systems. The findings align with Poot Caamal et al. [32] emphasis on affective elements in virtual education, suggesting students crave both practical assistance and meaningful instructor engagement.

The lack of significant demographic patterns (p-values > 0.05) in these responses indicates that these are institution-wide challenges rather than issues isolated to specific student groups. The correlation between recommendation likelihood and support needs ($r = -0.63$, $p < 0.01$) suggests that addressing these support gaps could substantially improve overall student satisfaction with VLEs. These results paint a clear picture: while UNA-Puno's VLEs have gained student acceptance, their full potential remains unrealized without investment in holistic support structures that address technical, academic, and interpersonal dimensions of virtual learning.

In concurrence with the treatment of this Item, the students also rated the feedback of the teaching in the virtual environments, where the distribution by grade was 20.5% who consider the feedback as very useful, 42.0% rate it as useful, 31.3% have a neutral perception of the feedback, 2.7% find it not very useful and 3.6% rate it as very unhelpful. The comparative analysis considers that the majority of participants perceive the feedback as "useful and very useful" (62.5%), suggesting that teachers are providing valuable information, a significant percentage have a neutral perception of the feedback, and a small group find the feedback "little or very little useful". However, the presence of a significant "neutral" group suggests that there is room for improvement and personalization of teaching feedback to individual needs. HUMANANTE-RAMOS et al. [33] They indicate that, although students have a positive perception, it is necessary to generate proposals aimed at improving the virtual environments of an institution.

Table 2.
Perception of evaluation and feedback on the use of virtual environments used by students in their learning process.

	Gender						Semester												
SCALE	**M**		**F**		**Total**		**III**		**IV**		**V**		**VIII**		**Total**		**P* Value**		
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**			
What do you think about the way assessments and exams are conducted in educational virtual environments?																			
Joust	23	20.5	34	30.4	57	50.9	20	17.9	33	29.5	3	2.7	1	0.9	57	50.9			
More demanding than in face-to-face classes	12	10.7	18	16.1	30	26.8	8	7.1	22	19.6	0	0.0	0	0.0	30	26.8	0.999	0.526	0.562
Less demanding than in face-to-face classes	10	8.9	15	13.4	25	22.3	11	9.8	13	11.6	1	0.9	0	0.0	25	22.3			
Total	45	40.2	67	59.8	112	100.0	39	34.8	68	60.7	4	3.6	1	0.9	112	100.0			
How would you rate the feedback you receive from your teachers in virtual educational environments?																			
Very helpful	11	9.8	12	10.7	23	20.5	5	4.5	18	16.1	0	0.0	0	0.0	23	20.5			
Useful	16	14.3	31	27.7	47	42.0	19	17.0	25	22.3	2	1.8	1	0.9	47	42.0			
Neutral	14	12.5	21	18.8	35	31.3	12	10.7	21	18.8	2	1.8	0	0.0	35	31.3	0.190	0.260	0.890
Not very helpful	3	2.7	0	0.0	3	2.7	1	0.9	2	1.8	0	0.0	0	0.0	3	2.7			
Very unhelpful	1	0.9	3	2.7	4	3.6	2	1.8	2	1.8	0	0.0	0	0.0	4	3.6			
Total	45	40.2	67	59.8	112	100.0	39	34.8	68	60.7	4	3.6	1	0.9	112	100.0			

Table 3 shows the distribution of responses to questions about the future importance of virtual education and accessibility to learning materials. Where 83.0% of participants believe that educational virtual environments "will continue to be an important part of education in the future"; 9.8% think that "no" will be an important part, being skeptical about their future importance; and 7.1% are undecided about the future role of virtual educational environments. The comparative analysis considers that a notable majority of the participants have a general optimistic trend, anticipating that virtual educational environments will be part of education in the future. However, addressing the concerns of those who are skeptical and indecisive could help to understand and overcome possible perceived challenges in educational virtual environments, their acceptance, transition, and successful adaptation towards online education, indicating that virtual education will continue to play a significant role that requires continuous development and improvement of these teaching methods.

The data reveals significant insights about student perceptions of assessment practices in virtual environments. A majority of students (50.9%) considered evaluations in VLEs to be "fair," while notable proportions viewed them as either "more demanding" (26.8%) or "less demanding" (22.3%) compared to face-to-face assessments. This distribution suggests that while most students accept the validity of virtual assessments, there exists substantial variation in how they experience the academic rigor of these evaluations. The perception of increased difficulty among over a quarter of respondents may reflect challenges in adapting to digital assessment formats or differences in instructors' approaches to transitioning traditional evaluation methods online.

Regarding feedback quality, the results present a more nuanced picture. While 62.5% of students rated instructor feedback as "useful" or "very useful," a significant minority (31.3%) remained neutral in their evaluation. This substantial neutral response, combined with the 6.3% who found feedback unhelpful, indicates considerable room for improvement in feedback practices. These findings align with existing literature, emphasizing that the effectiveness of feedback in virtual environments depends heavily on its timeliness, specificity, and relevance to student needs. The presence of this feedback gap may partially explain why some students perceive virtual assessments as more challenging.

The correlation analysis (p-values > 0.05) showing no significant differences by gender or semester suggests these perceptions are widespread across student demographics. This universality underscores the need for institution-wide strategies to improve assessment design and feedback mechanisms in VLEs. The findings particularly highlight the importance of developing more consistent, personalized feedback approaches and ensuring assessment methods are appropriately calibrated for the virtual environment. As HUMANANTE-RAMOS et al. [33] suggest, these improvements could enhance both the perceived fairness and educational value of virtual assessments, potentially reducing student anxiety and improving learning outcomes in online contexts.

Corresponding to the importance of virtual education in the future, the distribution of responses on the accessibility of materials in virtual teaching shows that 75.9% of participants consider online learning materials to be "accessible and easy to find," 14.3% think they are "not accessible or easy to find," and 9.8% are "undecided" about the accessibility and ease of finding online materials. The comparative analysis considers that the majority of participants have a positive perception, indicating that online materials are accessible and easy to find. A smaller percentage finds accessibility and ease of search to be problematic, while a smaller group still does not have a definitive opinion on this aspect. The percentage of those who are unsure or encounter problems suggests that there are areas that need to be improved in the organization and access to online learning materials, which could enrich the experience for all students. Belloch [34] and Mamani-Flores et al. [7] consider that a virtual teaching-learning environment (EVE-A) is a set of computer and telematic facilities for communication and the exchange of information in which teaching-learning processes are developed. In an EVE-A, teachers and students interact fundamentally. However, the nature of the medium imposes the participation of other roles at key moments of the process: computer system administrator, media experts, and support staff. Furthermore, 83.0% of students believe that educational virtual environments "will continue to be an important part of education in the future," while 75.9% consider online learning materials to be "accessible and easy to find." These results indicate that students have an optimistic view about the future of virtual education, although there are still challenges in terms of accessibility and organization of materials.

Table 3.
Perception of the importance of virtual educational environments and accessibility to educational material in the virtual environments used by students in their learning process.

	Gender						Semester												
SCALE	**M**		**F**		**Total**		**III**		**IV**		**V**		**VIII**		**Total**		**P* Value**		
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**			
Do you think that educational virtual environments will continue to be an important part of education in the future?																			
Yes	34	30.4	59	52.7	93	83.0	34	30.4	55	49.1	3	2.7	1	0.9	93	83.0			
No	7	6.3	4	3.6	11	9.8	4	3.6	7	6.3	0	0.0	0	0.0	11	9.8	0.190	0.990	0.680
I'm not sure	4	3.6	4	3.6	8	7.1	1	0.9	6	5.4	1	0.9	0	0.0	8	7.1			
Total	45	40.2	67	59.8	112	100.0	39	34.8	68	60.7	4	3.6	1	0.9	112	100.0			
Are online learning materials accessible and easy to find?																			
Yes	33	29.5	52	46.4	85	75.9	28	25.0	52	46.4	4	3.6	1	0.9	85	75.9			
No	7	6.3	9	8.0	16	14.3	6	5.4	10	8.9	0	0.0	0	0.0	16	14.3	0.870	0.910	0.910
I'm not sure	5	4.5	6	5.4	11	9.8	5	4.5	6	5.4	0	0.0	0	0.0	11	9.8			
Total	45	40.2	67	59.8	112	100.0	39	34.8	68	60.7	4	3.6	1	0.9	112	100.0			

The data reveals overwhelmingly positive student attitudes toward the future role of virtual learning environments, with 83% believing VLEs will remain an important part of education. This strong endorsement suggests students recognize the lasting value of digital learning platforms beyond pandemic-era necessity. However, the presence of skeptics (9.8%) and undecided students (7.1%) indicates persistent concerns about VLE efficacy that institutions must address. These reservations may stem from the technical and pedagogical challenges identified elsewhere in our study, highlighting the need for continuous improvement in virtual education delivery to maintain student confidence in these systems.

Regarding material accessibility, the majority (75.9%) found online learning resources easy to locate and use, demonstrating successful implementation of basic VLE functionalities at UNA-Puno. This positive result likely reflects effective platform design and content organization by instructors. Nevertheless, the 14.3% who reported accessibility difficulties and 9.8% who remained uncertain reveal significant gaps in universal usability. These challenges may be particularly acute for students with limited technological access or digital literacy, emphasizing the importance of inclusive design principles and alternative access options to ensure equitable learning opportunities for all students.

The absence of significant demographic differences (p-values > 0.05) in these perceptions suggests these findings reflect institution-wide trends rather than isolated group experiences. The strong correlation between recognizing VLEs' future importance and finding materials accessible ($r = 0.72$, $p < 0.01$) implies that user-friendly design directly impacts long-term acceptance of virtual education. As Belloch [34] notes, the true potential of VLEs emerges when technical infrastructure aligns with pedagogical purpose. Our results confirm that while UNA-Puno has established a solid foundation for virtual learning, targeted improvements in content organization and accessibility could further enhance student satisfaction and engagement with these platforms.

Kukulska-Hulme and Shield [35] analyzed accessibility and usability challenges in virtual learning environments. The authors found that students particularly value ease of navigation and the availability of online resources, but they also highlighted the need to improve accessibility for students with disabilities or technological limitations. Maslin [36] argues that virtual learning environments will continue to play a crucial role in higher education, especially in an increasingly digital world. However, she cautions that their success will depend on institutions' ability to address technological inequalities and ensure that all students have access to the necessary resources.

5. Conclusions

Regarding the perception of the experience, frequency of use, function, interaction, ease, usefulness, effectiveness, evaluation, importance, and accessibility of the virtual environments used by students for learning, 57.1% consider having positive experiences, 62.5% indicate having a frequency of use of "every day" and "several times a week," 84.0% reveal a strong emphasis on the use of videoconferencing platforms, 45.5% consider that navigation in virtual environments is "easy and very easy," and 22.3% indicate that the most important function is the "ease of navigation and access to materials." However, 50.9% indicate that they have had technical problems or interruptions in the use of virtual environments, while 20.5% and 20.6% consider having communication difficulties with both teachers and classmates. Regarding the most useful communication tools, 26.8% perceive videoconferencing as the most useful tool. Concerning the degree of effectiveness of virtual environments, 42.0% of students consider that virtual environments are almost as effective as face-to-face classes, and 53.6% "would definitely and in general recommend" the use of virtual environments. Regarding the evaluation and grading of feedback, 50.9% consider that these are "fair," while 83.0% believe that virtual educational environments "will continue to be an important part of education in the future," and 75.9% of participants consider that online learning materials are "accessible and easy to find." These perceptions imply that virtual educational environments offer great advantages for students and teachers. The research reveals a diversity of perceptions among the students of the FCS of the UNA Puno in relation to their experience in the use of virtual environments during their learning process. Positive aspects of the experience have been identified, such as ease of access to educational resources and the opportunity to learn at one's own pace. Negative aspects have also been highlighted, such as the lack of personalized interaction with teachers and classmates, which can influence student engagement and motivation.

This study underscores the importance of addressing student experiences in Virtual Learning Environments (VLEs) holistically, considering not only technological adoption but also pedagogical, social, and technical factors influencing their effectiveness. While students value the flexibility and accessibility of VLEs, significant challenges persist, including recurrent technical issues and a perception of lower efficacy compared to face-to-face instruction, particularly in collaborative disciplines. To optimize VLE use in resource-constrained contexts like Peru's National University of the Altiplano, multilevel strategies are recommended: continuous digital training for students and instructors, infrastructure improvements to ensure equitable access, and discipline-specific pedagogical designs that foster interaction and personalized feedback. Future research should explore disciplinary differences in VLE adoption and assess the impact of targeted interventions on satisfaction and academic performance. Ultimately, the success of VLEs hinges on their adaptability to local realities, commitment to equity, and student-centered approaches that enhance learning outcomes in diverse and evolving educational landscapes.

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