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Perception of virtual educational environments in students of a Peruvian national university

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Abstract

It is important to know the perceptions of students about the virtual environments used in their learning process. The study was carried out in 2023 and aimed to find out how students perceive and experience the use of virtual environments in their academic training. The research was based on a quantitative methodology where surveys were applied to students of the professional schools of anthropology, sociology, tourism, social communication, and art of the Faculty of Social Sciences. Data were collected on various aspects, such as accessibility, interactivity, content quality, improvement proposals, and overall satisfaction with virtual educational environments. The results revealed a variety of perceptions among students regarding virtual environments. Some students highlighted the flexibility and convenience these environments offer to access educational resources and learn at their own pace. The study provided a detailed view of how students perceive and use virtual environments in their academic training process. These findings can serve as a basis to improve the implementation of virtual environments and adapt educational practices to the needs and expectations of students. The conclusions reached were that the greatest preference of students in terms of advantages for teaching in virtual education is videoconferencing interoperability platforms. Most students consider having positive experiences, and most of them show a fairly acceptable level of satisfaction with the use of virtual environments.

Keywords: Behaviors, Digital environments, Perception, students, Technology.

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1. Introduction

Education is currently in constant transformation due to the impact of emerging technologies [1].The use of digital media in educational environments has acquired significant relevance, posing challenges and opportunities for students,

teachers, and educational managers. In this context, this study focuses on exploring the perception of the use of educational digital media by students of the Faculty of Social Sciences of the National University of the Altiplano (UNA Puno) in 2023. The Faculty of Social Sciences, as an integral part of UNA Puno, plays a fundamental role in the training of professionals in various disciplines such as Art, Sociology, Anthropology, Communication Sciences, Tourism, and a department of humanities. In the current context, access to digital technologies has transformed the dynamics of learning, presenting new opportunities and challenges in the educational process. This study seeks to analyze students' perceptions of the effectiveness, usefulness, and challenges associated with the use of digital media in their academic experiences, as mentioned by Chalela Naffah, et al. [2]. Those who believe that virtual platforms allow students to feel more efficient in their learning process still face significant challenges regarding the implementation of new technologies as mediation strategies for the teaching-learning process. Through the research, it is intended to obtain a deep understanding of how students of the Faculty of Social Sciences of UNA Puno perceive the integration of digital media in their learning process, examining factors that can influence their acceptance and adaptation to these technological tools [3]. They consider that the majority of students are in favor of the use of virtual classrooms, and previous experience favors a better perception of the tools for online learning. In addition, possible recommendations will be explored to improve the implementation of digital media with the aim of enhancing the educational quality and satisfaction of students in this institution. Ultimately, this study will contribute to the growing body of knowledge on the intersection between university education, digital technologies, and student experiences in a specific context such as the Faculty of Social Sciences of UNA Puno in the year 2023. The growing adoption of virtual educational environments in higher education institutions, such as the National University of the Altiplano (UNA Puno), has changed the dynamics of learning, providing flexibility and accessibility to access digital resources. However, students' perceptions of the effectiveness and quality of these virtual environments are important aspects that require special attention. In the year 2023, the need arises to deeply understand how the students of the Faculty of Social Sciences of UNA Puno perceive and evaluate these virtual environments, since currently (ICTs), information and communication technologies, are revolutionizing the way we see and act in the world, influencing various designs, strategies, and educational methodologies. It has been four years since the implementation of this virtual environment at UNA Puno, and this is how the need arises to know the perceptions of students regarding this virtual environment, both internal and external to the university, which is being used within the teaching-learning process, in order to provide valuable information for the improvement of learning experiences. This includes adapting pedagogical strategies that are more appropriate, identifying needs and difficulties, and finally evaluating the quality of virtual education, leading to a more effective and satisfactory educational process for students in the virtual environment. The perceptions about virtual educational environments among students of the Faculty of Social Sciences of UNA Puno in 2023 raise an important issue that requires research to devise educational strategies and improve the quality of online education. This study aims to address this issue and contribute to improving students' educational experiences in virtual environments, considering the motivational factors that determine student satisfaction with the use of virtual environments that are used in the institution, together with the activities carried out according to the tools used and their learning outcomes.

2. Literature Review

2.1. Student Perception

It is a "cognitive process of consciousness, which consists of the recognition, interpretation and meaning for the elaboration of judgments about the sensations obtained from the physical and social environment, in which other psychic processes intervene, including learning, memory and symbolization"[4].

But Allport [5] thinks that perceptions come to be the understanding of the perceptions of the complex circumstances in the social, cultural and environmental environment of each object around us. This is an inclination to consider cognitions as perceptions, and we must understand that both processes are intimately related because it is not feasible to consider them separately, especially from the theoretical and practical approach.

2.2. Perceptual Phases

Perception is structured by a series of phases. Thus, we take into account [6] which explains it as follows:

a) Early perception: it is a set of internal processes in which the perceptual system creates initial representations with basic sensory properties such as perceiving colors, movements, depth, and location of the object; that is, its orientation, volume, distance, and others in relation to the observer. It is essential to obtain information about the structure and identity of the object.

b) Perceptual organization: here we consider a series of mechanisms by which a perceptual persistence of various elements of the information obtained in early perception is achieved, detailing the way in which an integrity of elements is organized. In this way, the relationship to the various objects and spaces that constitute a perceptual image is generated.

c) Recognition phase: Here, it is possible to obtain information about the equivalence, significance, and function of various elements that are around us. In this way, it is considered that perceptual recognition is based on the establishment and relationship of the perceptual information achieved at each moment, generating long-term accumulated knowledge about the perception of objects. This process is consciously aware of the different characters and aspects, objects, and entities that are around us. However, in certain circumstances, these results of the processing of perceptual information take place in the unconscious; that is, the observer considers that he has not been able to discover and experience a certain aspect within his perceptual medium.

2.3. The Process of Perception

Rivas [7] conceptualizes perception as a process that has three phases specifically: the first is selection, the second is organization, and finally, the third is interpretation. The first phase begins when we start to perceive aspects related to our interests; in this selective perception, the subject discovers messages with codes related to his or her own activities, interests, values, and needs. The next phase is organizational, where, once selected, individuals classify, generate, and give meanings, then analyze and group them through their characteristics. In the third phase, the individual tries to give content through the stimuli that were previously chosen and structured; thus, the interpretation of these stimuli varies according to experience, expectation, and interest.

Robbins, et al. [8] theorize about the factors that affect the perceptions residing in the perceivers. When an individual observes an object, they attempt to generate an interpretation, influenced by its peculiarities in a personal way. Among the elements that influence perceptions are attitude, motivations, regressive experiential practices, and finally, expectations.

3. Method

The National University of the Puno Highlands (UNA-Puno) is located in the Department of Puno, Province and District of Puno, specifically on Av. Sesquicentenario No. 1150 in the city of Puno. The Faculty of Social Sciences is one of the largest in the university, having five professional schools: Sociology, Anthropology, Social Communication Sciences, Tourism, Art, and an Academic Department of Humanities, which was constituted in 1983 by the disposition and approval of the university assembly. The university is located at the following coordinates: west longitude: 15° 50' 15" and south latitude: 70° 01' 18".

The duration of the study is one year, as the perception of students of the faculty of social sciences during 2023 is being evaluated and this encompasses the academic year 2023-I and 2023-II.

The total population of students considered, between men and women who belong to the Faculty of Social Sciences, consists of 508 students who are dispersed in each of the 5 professional schools that make it up, in turn students who are between the 4th and 8th semester were chosen, since it is a population that already has an experience of using the virtual environments of the UNA-Puno. according to the following detail (Table 1):

Table 1.
Distribution of the population by professional school of the Faculty of Social Sciences.

Faculty	Career School	Number of students
Social sciences	Anthropology	108
	Art	93
	Sociology	110
	Tourism	92
	Social Communication Sciences	105
Total		508

3.1. Sample

The size of our sample represents part of the total population, it is a stratified random sample, in which respondents are chosen completely at random from our target population.

The calculation of our sample required the application of the following formula:

$$\text{Tamaño de la muestra} = \frac{\frac{z^2 \times p\,(1-p)}{e^2}}{1 + \left(\frac{z^2 \times p\,(1-p)}{e^2 N}\right)}$$

Where

- N = Population size.
- e = Margin of error (Percentage expressed in decimals).
- z = z score.

The result of our sample size is 112 students, who will make up the research sample, see Table 2.

Table 2.
Sample Details.

Gender	Quantity	Age Groups	Quantity	Semesters	Quantity
Male	45	[17-22>	93	III	39
Female	67	[22-26>	10	IV	68
		[26-30>	6	V	4
		[34-38>	1	VIII	1
		[38-42>	1		
		[46-50>	1		
Total	**112**		**112**		**112**

The level of complexity of this work demanded that it be approached from a quantitative perspective. The design was non-experimental and cross-sectional, as data was collected at a specific point in time. The type of research is exploratory since we intend to provide a general overview, addressing a certain reality. This type of study will serve to increase the degree of familiarity with the perceptions of students regarding the virtual media used in their learning process. The survey technique was applied to 112 students from the five professional schools that make up the Faculty of Social Sciences.

This is the case of our type and procedure of sampling according to the design of quantitative research. As they say [9], "Studies that are carried out without the deliberate manipulation of variables and in which phenomena are only observed in their natural environment and then analyzed" (p. 149). Our sample size has a confidence level of 95% with a margin of error of 5%. Therefore, the result of the application of this formula consists of a total of 75 students who are dispersed across the semesters between the 4th and 8th of the professional schools that make up this faculty.

4. Results and Discussion

4.1. Students' Perception of Virtual Environments in Their Learning Process

To determine the perception of students of the Faculty of Social Sciences of the National University of the Altiplano – Puno regarding the knowledge of the virtual environments used in the teaching-learning process, we have grouped this perception into three (3) types of platforms whose use offers different elements, such as interoperability, flexibility, and ease of use. In this way, we can classify: unique integrated systems (Laurassia, Moodle, etc.), interoperability platforms for videoconferencing (Cisco Webex, Zoom, Google Meet, Microsoft Teams, etc.), and instant messaging tools (WhatsApp, Telegram, etc.) as well as educational tools included within interoperability platforms (Classroom, JamTable, Google Documents, etc.). According to Humanante, et al. [10], when there is a positive perception, proposals can be generated aimed at improving virtual environments in an institution.

Table 3 shows the distribution by evaluation category of the integrated platforms Laurassia and Moodle, where FCS students have a positive perception of acceptance between excellent and good, which exceeds 15% on average for both platforms (11.6% Laurassia and 17.9% Moodle), compared to the negative perception between bad and very bad that does not exceed 10% on average in both cases (10.7% Laurassia and 8.9% Moodle). In contrast to both extremes, the perception that qualifies the use of both platforms as regular represents 32% (33.9% Laurassia and 29.5% Moodle). These values indicate that despite their rapid adoption and adaptation to these virtual environments, students had no alternative but to progressively adopt these platforms, one with greater difficulty than the other according to their implementation period, as can be seen in the percentage difference among the Moodle platform, which was implemented before Laurassia and is currently being used, whose comparison does not show dominant preferences. This neutral perception compared to the category "Don't know/Don't think," which represents 43.8% in both cases, confirms the high degree of difficulty for students to access the use and mastery of virtual environments. This, as we will see later, leads us to suppose limited access to the platforms due to restrictions on the technological requirements of the devices used by students, a lack of knowledge of their use due to insufficient technological contact in teaching, or their restricted use in relation to the coverage and quality of service of operators due to the remoteness and diversity of geographical environments in which they were used by students, which influenced their perception of the full satisfaction of users. However, the trend toward neutral opinions could also indicate potential areas for improvement or exploration in future surveys. As for the other variables analyzed, a greater predominance is noted in the female gender and semesters IV and V, being indifferent in the fluctuation of ages, whose degree of significance is more representative with respect to the other two variables. In view of this [11], it is considered that students perceive that the virtual classroom increases very little interest in the topics proposed in the classes; the activities that teachers propose are very unmotivating; they do not consider it useful as a complement to better understand the classes, and although there are very few resources that the teacher uses, it has helped them to improve their grades.

Table 3.
Perception of the unique integrated systems (Laurassia and Moodle) 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 is your perception of the Laurassia virtual environment?																			
Excellent	2	1.8	3	2.7	5	4.5	0	0.0	5	4.5	0	0.0	0	0.0	5	4.5			
Good	4	3.6	4	3.6	8	7.1	2	1.8	3	2.7	2	1.8	1	0.9	8	7.1			
Regular	12	10.7	26	23.2	38	33.9	14	12.5	23	20.5	1	0.9	0	0.0	38	33.9	0.764	0.030	0.012
Suitcase	4	3.6	5	4.5	9	8.0	4	3.6	5	4.5	0	0.0	0	0.0	9	8.0			
Very bad	2	1.8	1	0.9	3	2.7	2	1.8	1	0.9	0	0.0	0	0.0	3	2.7			
No know/No opinion	21	18.8	28	25.0	49	43.8	17	15.2	31	27.7	1	0.9	0	0.0	49	43.8			
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			
What is your perception of the Moodle virtual environment?																			
Excellent	3	2.7	1	0.9	4	3.6	1	0.9	3	2.7	0	0.0	0	0.0	4	3.6			
Good	4	3.6	12	10.7	16	14.3	4	3.6	9	8.0	2	1.8	1	0.9	16	14.3			
Regular	13	11.6	20	17.9	33	29.5	11	9.8	22	19.6	0	0.0	0	0.0	33	29.5			
Suitcase	4	3.6	4	3.6	8	7.1	3	2.7	5	4.5	0	0.0	0	0.0	8	7.1	0.554	0.552	0.383
Very bad	1	0.9	1	0.9	2	1.8	2	1.8	0	0.0	0	0.0	0	0.0	2	1.8			
No know/No opinion	20	17.9	29	25.9	49	43.8	18	16.1	29	25.9	2	1.8	0	0.0	49	43.8			
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			

Note: The table presents data on participants' perceptions in six categories (Excellent, Good, Fair, Poor, Very Bad, Don't Know/Don't Think).

Table 4.
Perception of interoperability platforms for videoconferencing (Cisco Webex, Google Meet, Zoom, Microsoft Teams) 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 is your perception of the Cisco Webex virtual environment?																			
Excellent	4	3.6	4	3.6	8	7.1	0	0.0	8	7.1	0	0.0	0	0.0	8	7.1			
Good	6	5.4	11	9.8	17	15.2	5	4.5	10	8.9	2	1.8	0	0.0	17	15.2			
Regular	16	14.3	25	22.3	41	36.6	15	13.4	26	23.2	0	0.0	0	0.0	41	36.6	0.245	0.718	0.000
Suitcase	0	0.0	2	1.8	2	1.8	1	0.9	0	0.0	0	0.0	1	0.9	2	1.8			
Very bad	5	4.5	1	0.9	6	5.4	2	1.8	4	3.6	0	0.0	0	0.0	6	5.4			
No know/No opinion	14	12.5	24	21.4	38	33.9	16	14.3	20	17.9	2	1.8	0	0.0	38	33.9			
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 is your perception of the virtual environment Google meet?																			
Excellent	16	14.3	13	11.6	29	25.9	7	6.3	22	19.6	0	0.0	0	0.0	29	25.9			
Good	17	15.2	37	33.0	54	48.2	22	19.6	27	24.1	4	3.6	1	0.9	54	48.2			
Regular	9	8.0	15	13.4	24	21.4	9	8.0	15	13.4	0	0.0	0	0.0	24	21.4			

Suitcase	2	1.8	1	0.9	3	2.7	0	0.0	3	2.7	0	0.0	0	0.0	3	2.7	0.185	0.997	0.581
Very bad	0	0.0	1	0.9	1	0.9	1	0.9	0	0.0	0	0.0	0	0.0	1	0.9			
No know/No opinion	1	0.9	0	0.0	1	0.9	0	0.0	1	0.9	0	0.0	0	0.0	1	0.9			
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 is your perception of the Zoom virtual environment?																			
Excellent	8	7.1	5	4.5	13	11.6	0	0.0	13	11.6	0	0.0	0	0.0	13	11.6			
Good	12	10.7	24	21.4	36	32.1	15	13.4	19	17.0	2	1.8	0	0.0	36	32.1			
Regular	20	17.9	28	25.0	48	42.9	18	16.1	28	25.0	2	1.8	0	0.0	48	42.9			
Suitcase	0	0.0	7	6.3	7	6.3	1	0.9	5	4.5	0	0.0	1	0.9	7	6.3	0.046	0.729	0.017
Very bad	1	0.9	2	1.8	3	2.7	2	1.8	1	0.9	0	0.0	0	0.0	3	2.7			
No know/No opinion	4	3.6	1	0.9	5	4.5	3	2.7	2	1.8	0	0.0	0	0.0	5	4.5			
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 is your perception of the Microsoft Team virtual environment?																			
Excellent	5	4.5	3	2.7	8	7.1	0	0.0	8	7.1	0	0.0	0	0.0	8	7.1			
Good	4	3.6	10	8.9	14	12.5	4	3.6	7	6.3	3	2.7	0	0.0	14	12.5			
Regular	21	18.8	33	29.5	54	48.2	18	16.1	34	30.4	1	0.9	1	0.9	54	48.2			
Suitcase	3	2.7	4	3.6	7	6.3	2	1.8	5	4.5	0	0.0	0	0.0	7	6.3	0.308	0.017	0.056
Very bad	5	4.5	2	1.8	7	6.3	3	2.7	4	3.6	0	0.0	0	0.0	7	6.3			
No know/No opinion	7	6.3	15	13.4	22	19.6	12	10.7	10	8.9	0	0.0	0	0.0	22	19.6			
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			

Note: The table presents data on participants' perceptions in six categories (Excellent, Good, Fair, Poor, Very Bad, Don't Know/Don't Think).

Table 4 shows the distribution by evaluation category of the Cisco Webex, Google Meet, Zoom, and Microsoft Teams videoconferencing interoperability platforms, presenting the following comparative results. The average acceptance between excellent and good for the four platforms is 39.9%, with the highest acceptance being Google Meet (74.1%) and Zoom (43.7%). These platforms obtained significantly lower results in negative perception, with an average of 8.1% in relation to the other platforms, Cisco Webex and Microsoft Teams. In contrast to both extremes, a comparison between the perception that considers it fair and those who do not know or do not have an opinion presents equally significant disparity results, with an average of 37.3% among those who consider it fair and an average of 14.7% of those who do not know or do not have an opinion. This leads us to define that the digital educational media most used by teachers and students of the FCS were the interoperability platforms for videoconferences, whose knowledge, use, and mastery by students are reflected in the results presented. These mostly expository media do not necessarily have a positive perception, as we will develop later, since they have to be complemented with tools included in the same platforms, where many teachers and students were unaware of their use or simply did not apply them due to the complexity of constructing new templates for educational sessions designed previously and the time spent interacting with students in real time due to the difficulties mentioned above. We can conclude that the platforms most accepted by students, based on the effective fulfillment of user expectations and experience, were Google Meet and Zoom, which have lower negative values in terms of the perception of their use and lack of knowledge. As for the crossing of variables analyzed, the fluctuation between gender, age, and academic semester has a high degree of significance in most of the categories analyzed [12]. In his study, he states that there is a direct and significant relationship between the perception of a virtual field and student satisfaction.

Table 5 shows the perception of the use of educational tools in interoperability platforms, where 12.5% of the participants consider Classroom to be an excellent tool, 35.7% have a positive perception, rating Classroom as good, and 38.4% perceive it in a neutral or regular way. The categories Bad and Very Bad together represent a moderate percentage of 5.4%, indicating that there are negative opinions, but they are not dominant. The category Don't know/Don't have an opinion has 8.0% of students who did not express a clear opinion. Their comparative analysis considers that Classroom has an equal distribution of responses between 'Regular' and 'Good', indicating a mostly positive perception. Thus, of the total responses from the 112 participants, the perception of Classroom leans towards a majority use of the tool, in a diverse way among the participants. Pino [13] in his study shows that there is an improvement in the use of virtual classrooms in the pedagogical development of teachers and students by making a constant practice of these platforms. According to Ortiz and Nuñez [14], the perception of teachers and students regarding virtual environments and the teaching-learning process shows the importance that should exist in the foundation of praxis, aiming to build more dynamic and collaborative training processes.

Table 5.
Perception of the tools for educational use included within the interoperability platforms (classroom) 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 is your perception of the Cisco Webex virtual environment?																			
Excellent	5	4.5	9	8.0	**14**	**12.5**	2	1.8	12	10.7	0	0.0	0	0.0	14	12.5			
Good	13	11.6	27	24.1	**40**	**35.7**	17	15.2	21	18.8	2	1.8	0	0.0	40	35.7			
Regular	20	17.9	23	20.5	**43**	**38.4**	16	14.3	25	22.3	1	0.9	1	0.9	43	38.4	0.643	0.998	0.569
Suitcase	2	1.8	3	2.7	**5**	**4.5**	0	0.0	5	4.5	0	0.0	0	0.0	5	4.5			
Very bad	0	0.0	1	0.9	**1**	**0.9**	1	0.9	0	0.0	0	0.0	0	0.0	1	0.9			
No know/No opinion	5	4.5	4	3.6	9	8.0	3	2.7	5	4.5	1	0.9	0	0.0	9	8.0			
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			

Note: The table presents data on participants' perceptions in six categories (Excellent, Good, Fair, Poor, Very Bad, Don't Know/Don't Think).

Table 6.
Perception of other tools for educational use 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 is your perception of the virtual environment WhatsApp?																			
Excellent	14	12.5	21	18.8	35	31.3	8	7.1	27	24.1	0	0.0	0	0.0	35	31.3			
Good	19	17.0	34	30.4	53	47.3	24	21.4	25	22.3	3	2.7	1	0.9	53	47.3			
Regular	11	9.8	10	8.9	21	18.8	6	5.4	14	12.5	1	0.9	0	0.0	21	18.8	0.474	0.997	0.614
Suitcase	0	0.0	1	0.9	1	0.9	0	0.0	1	0.9	0	0.0	0	0.0	1	0.9			
Very bad	0	0.0	1	0.9	1	0.9	1	0.9	0	0.0	0	0.0	0	0.0	1	0.9			
No know/No opinion	1	0.9	0	0.0	1	0.9	0	0.0	1	0.9	0	0.0	0	0.0	1	0.9			
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			

Note: The table presents data on participants' perceptions in six categories (Excellent, Good, Fair, Poor, Very Bad, Don't Know/Don't Think).

Table 6 shows the use of other collaborative tools, finding the following distribution by category, where 31.3% of the participants consider WhatsApp to be excellent, 47.3% have a positive perception, rating WhatsApp as good, 18.8% perceive the platform in a neutral or regular way, the Bad and Very bad categories together, represent a very low percentage of 1.8%, indicating that there are negative opinions but they are a minority, the Don't know/Don't Have an opinion category represents 0.9% where they expressed a not very clear opinion, according to their comparative analysis, WhatsApp has an uneven distribution of responses, with the "Good" category as the most predominant, followed by "Excellent", the "Fair" category shows a significantly lower proportion, the trend of the "Good" category is the largest, suggesting that the majority of participants have a positive perception of WhatsApp, the lack of significant negative responses indicates a general acceptance of the application according to Cabero-Almenara, et al. [15] mention that the possession of mobile technologies by teachers and students facilitates the use of ICT in teaching-learning processes, as well as the tendency for students to turn to open websites for access as an initial source of information, according to Flowers [16] in their research they show that the use of ICT within their student life has been marked by the use of traditional applications such as Word, Excel or Power Point, not the same with other types of software, so the new virtual environments cause difficulties at first but with time and practice it becomes easier to use.

4.2. Level of Student Satisfaction with the Virtual Environments used in Their Learning Process

To determine the perception of the students of the Faculty of Social Sciences of the National University of the Altiplano – Puno regarding their satisfaction with the use of the virtual environments utilized in the teaching-learning process, we have grouped these perceptions into satisfaction with the virtual environments used, satisfaction with the online resources, satisfaction with the browsing experience, satisfaction with assessment in virtual environments, and satisfaction with teachers' communication and availability in virtual environments.

Table 7 shows the distribution of responses regarding the satisfaction with the virtual environments used by students of the Faculty of Social Sciences of the National University of the Altiplano Puno in their academic training. The analysis of the extremes "very satisfied" and "satisfied" in the different categories studied shows a fairly acceptable level of satisfaction with the use of virtual environments (57.2%, 59%, 52.7%, and 44.7% respectively), which indicates a positive user experience of more than 50% on average. At the other end of the spectrum, the values for "dissatisfied" and "very dissatisfied" are lower compared to the other categories analyzed (6.3%, 6.3%, 12.5%, and 11.6% respectively), with the UNAP virtual environment being the one with the lowest acceptance among students, representing 12.5% of dissatisfaction compared to the general experience in the use of virtual environments. Another important category is the "neutral" one, which expresses indifference regarding satisfaction with the use of virtual environments (36.6%, 34.8%, 34.8%, and 42.9% respectively). The general satisfaction trend would be moderate with respect to the other categories evaluated; however, the presence of unsatisfactory responses implies a need for improvement in the experience of university virtual environments. Its implication for research is to explain the reasons behind neutrality and dissatisfaction, which can provide valuable information to improve the user experience. Sánchez and Morales [17] consider the importance of virtual tools, highlighting the role of Moodle in visualizing the organization of teaching, as well as for the exchange of information and documents, and to a lesser extent, for generating spaces for collaboration and coordination.

Table 7.
Perception of the level of satisfaction 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**	**%**			
How would you rate your overall level of satisfaction with your experience with virtual university environments so far?																			
Very satisfied	8	7.1	7	6.3	15	13.4	2	1.8	13	11.6	0	0.0	0	0.0	15	13.4			
Satisfied	20	17.9	29	25.9	49	43.8	14	12.5	33	29.5	2	1.8	0	0.0	49	43.8			
Neutral	15	13.4	26	23.2	41	36.6	19	17.0	19	17.0	2	1.8	1	0.9	41	36.6	0.618	0.349	0.303
Unsatisfied	2	1.8	3	2.7	5	4.5	2	1.8	3	2.7	0	0.0	0	0.0	5	4.5			
Very dissatisfied	0	0.0	2	1.8	2	1.8	2	1.8	0	0.0	0	0.0	0	0.0	2	1.8			
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			
Are you satisfied with the virtual environments used in your educational background?																			
Very satisfied	7	6.3	10	8.9	17	15.2	3	2.7	14	12.5	0	0.0	0	0.0	17	15.2			
Satisfied	18	16.1	31	27.7	49	43.8	17	15.2	30	26.8	2	1.8	0	0.0	49	43.8			
Neutral	18	16.1	21	18.8	39	34.8	15	13.4	21	18.8	2	1.8	1	0.9	39	34.8	0.781	0.331	0.811
Unsatisfied	1	0.9	4	3.6	5	4.5	3	2.7	2	1.8	0	0.0	0	0.0	5	4.5			
Very dissatisfied	1	0.9	1	0.9	2	1.8	1	0.9	1	0.9	0	0.0	0	0.0	2	1.8			
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			
Are you satisfied with the virtual environment that UNA Puno is applying?																			
Very satisfied	5	4.5	6	5.4	11	9.8	3	2.7	14	12.5	0	0.0	0	0.0	17	15.2			
Satisfied	22	19.6	26	23.2	48	42.9	17	15.2	30	26.8	2	1.8	0	0.0	49	43.8			
Neutral	13	11.6	26	23.2	39	34.8	15	13.4	21	18.8	2	1.8	1	0.9	39	34.8	0.655	0.244	0.502
Unsatisfied	4	3.6	5	4.5	9	8.0	3	2.7	2	1.8	0	0.0	0	0.0	5	4.5			
Very dissatisfied	1	0.9	4	3.6	5	4.5	1	0.9	1	0.9	0	0.0	0	0.0	2	1.8			
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			
How would you rate your overall level of satisfaction with the virtual environment used in your university courses?																			
Very dissatisfied	2	1.8	3	2.7	5	4.5	4	3.6	1	0.9	0	0.0	0	0.0	5	4.5			
Unsatisfied	2	1.8	6	5.4	8	7.1	6	5.4	2	1.8	0	0.0	0	0.0	8	7.1			
Neutral	21	18.8	27	24.1	48	42.9	17	15.2	29	25.9	2	1.8	0	0.0	48	42.9	0.906	0.878	0.072
Satisfied	13	11.6	19	17.0	32	28.6	9	8.0	20	17.9	2	1.8	1	0.9	32	28.6			
Very satisfied	7	6.3	11	9.8	18	16.1	2	1.8	16	14.3	0	0.0	0	0.0	18	16.1			
Total	45	40.2	66	58.9	111	99.1	38	33.9	68	60.7	4	3.6	1	0.9	111	99.1			

Table 8.
Perception of the level of satisfaction with the quality of the online resources 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**	**%**			
How satisfied are you with the quality of the online resources (study materials, learning platforms, digital libraries, etc.) provided by the university?																			
Very satisfied	5	4.5	12	10.7	17	15.2	3	2.7	14	12.5	0	0.0	0	0.0	17	15.2			
Satisfied	19	17.0	24	21.4	43	38.4	11	9.8	30	26.8	2	1.8	0	0.0	43	38.4			

Neutral	15	13.4	24	21.4	39	34.8	17	15.2	19	17.0	2	1.8	1	0.9	39	34.8	0.847	0.342	0.319
Unsatisfied	4	3.6	5	4.5	9	8.0	5	4.5	4	3.6	0	0.0	0	0.0	9	8.0			
Very dissatisfied	2	1.8	2	1.8	4	3.6	3	2.7	1	0.9	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 9.
Perception of the level of satisfaction with the ease of navigation of 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**	**%**			
How would you rate the usability and ease of navigation of the online learning platform?																			
Very satisfied	7	6.3	5	4.5	12	10.7	3	2.7	9	8.0	0	0.0	0	0.0	12	10.7			
Satisfied	21	18.8	34	30.4	55	49.1	16	14.3	35	31.3	3	2.7	1	0.9	55	49.1			
Neutral	15	13.4	23	20.5	38	33.9	16	14.3	21	18.8	1	0.9	0	0.0	38	33.9	0.543	0.975	0.774
Unsatisfied	2	1.8	3	2.7	5	4.5	2	1.8	3	2.7	0	0.0	0	0.0	5	4.5			
Very dissatisfied	0	0.0	2	1.8	2	1.8	2	1.8	0	0.0	0	0.0	0	0.0	2	1.8			
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			

Table 8 shows the distribution of responses regarding satisfaction with the quality of the online resources provided by the university and used by students in their learning process. Of the respondents, 38.4% are satisfied with the online resources, 34.8% remain neutral, 15.2% are very satisfied, 8.0% feel dissatisfied, and 3.6% are very dissatisfied with the online resources provided by the university. The comparative analysis of this category indicates that the majority of participants (53.6%) demonstrate quite respectable levels of satisfaction, reflecting an overall positive trend (very satisfied and satisfied). A significant percentage (34.8%) remain neutral in terms of their satisfaction, which suggests that participants do not have a clear opinion or are undecided about the quality of online resources. Additionally, a smaller percentage (11.6%) is dissatisfied or very dissatisfied, indicating a need to investigate the reasons for these perceptions in more depth to help improve the resources of the university's learning platforms. According to Maldonado and López [18], it has been detected that academic monitors play a decisive role, as they serve as permanent advisors who promote and stimulate students in the virtual educational process.

Table 9 shows the distribution of responses regarding satisfaction with the ease of navigation on online learning platforms. Of the respondents, 49.1% are satisfied with the usability and ease of navigation of online platforms, 33.9% maintain a neutral opinion, 10.7% are very satisfied, 4.5% feel dissatisfied, and 1.8% are very dissatisfied with the usability and ease of navigation. When performing the comparative analysis, it is shown that the majority of participants (59.8%) exhibit positive levels of satisfaction, while a smaller percentage (6.3%) is dissatisfied or very dissatisfied. A significant percentage (33.9%) remains neutral in terms of usability and ease of navigation, indicating that general satisfaction is relatively high, with a distribution inclined towards the fulfillment of expectations and the presence of neutral responses. This may suggest that some participants do not have a clear opinion or are undecided about the usability of the platform. Similarly, exploring the reasons behind neutrality and dissatisfaction can provide key information to improve the usability and ease of navigation of the platform. Inzunza, et al. [19] conducted a study that allows for the determination of students' perceptions about the virtual environment, indicating that students have a positive acceptance and appreciation of virtual media as an important complement to face-to-face classes, in addition to demonstrating more active participation in the classroom.

Table 10 shows the distribution of responses regarding the degree of satisfaction with the evaluations carried out online. Where 43.8% of students are satisfied with the online assessment process, 31.3% remain neutral, 17.0% are very satisfied with the online assessment process, 6.3% are dissatisfied, and 1.8% are very dissatisfied with this process. The comparative analysis shows that the majority of participants (60.8%) exhibit fairly high levels of satisfaction, a significant percentage (31.3%) remain neutral, and a smaller percentage (8.1%) are dissatisfied or very dissatisfied. Their tendency indicates that overall satisfaction is relatively high compared to levels of dissatisfaction, with a distribution of opinions inclined towards satisfaction and the presence of neutral responses that may suggest that some participants do not have a clear opinion or are undecided about online assessments. This implies that it is necessary to explore the reasons behind neutrality and dissatisfaction to provide key information that helps improve online assessment processes.

Table 11 shows the distribution of responses regarding the perception of teachers' time availability for communication with their students. The table indicates that 41.1% remain neutral regarding the communication and availability of their teachers, 34.8% are satisfied, 9.8% are dissatisfied, 8% feel very satisfied, and 6.3% feel very dissatisfied with the communication and availability of their teachers. The comparative analysis shows that most of the participants (42.8%) exhibit levels of satisfaction or neutrality (41.1%) in the communication and availability of their teachers; however, a significant percentage is dissatisfied or very dissatisfied (16.1%), indicating a negative tendency regarding the communication and availability of teachers in the virtual environment. We must pay attention to these dissatisfied participants to understand the specific areas that need improvement and to collect specific feedback on teacher communication and availability. Fernández-Pascual, et al. [20] highlight the significant level of student satisfaction with the experience and reveal the most important variables when explaining the variance in satisfaction.

Table 10.
Perception of the level of satisfaction of the evaluations 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	%			
How would you rate the assessment process (exams, assignments, projects) online?																			
Very satisfied	10	8.9	9	8.0	19	17.0	4	3.6	15	13.4	0	0.0	0	0.0	19	17.0			
Satisfied	19	17.0	30	26.8	49	43.8	19	17.0	27	24.1	2	1.8	1	0.9	49	43.8			
Neutral	12	10.7	23	20.5	35	31.3	14	12.5	19	17.0	2	1.8	0	0.0	35	31.3	0.759	0.907	0.818
Unsatisfied	3	2.7	4	3.6	7	6.3	1	0.9	6	5.4	0	0.0	0	0.0	7	6.3			
Very dissatisfied	1	0.9	1	0.9	2	1.8	1	0.9	1	0.9	0	0.0	0	0.0	2	1.8			
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			

Table 11.
Perception of the level of satisfaction in communication and availability of teachers 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**	**%**			
How would you rate the communication and availability of your teachers through the virtual environment?																			
Very satisfied	3	2.7	6	5.4	9	8.0	0	0.0	9	8.0	0	0.0	0	0.0	9	8.0			
Satisfied	16	14.3	23	20.5	39	34.8	13	11.6	24	21.4	2	1.8	0	0.0	39	34.8			
Neutral	18	16.1	28	25.0	46	41.1	20	17.9	23	20.5	2	1.8	1	0.9	46	41.1	0.819	0.002	0.560
Unsatisfied	6	5.4	5	4.5	11	9.8	3	2.7	8	7.1	0	0.0	0	0.0	11	9.8			
Very dissatisfied	2	1.8	5	4.5	7	6.3	3	2.7	4	3.6	0	0.0	0	0.0	7	6.3			
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			

Table 12.
Perception of suggestions for the use of virtual environments used by students in their learning process.

SCALE	**Gender**						**Semester**												
	M		**F**		**Total**		**III**		**IV**		**V**		**VIII**		**Total**		**P* Value**		
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**			
Are there any additional comments you would like to add about your experience with virtual environments or your perceptions as a student?																			
Virtuality is not favorable for practical courses	1	0.9	4	3.6	5	4.5	2	1.8	2	1.8	1	0.9	0	0.0	5	4.5			
It is not a good learning method, it is boring, there is little participation, I prefer face-to-face classes	3	2.7	8	7.1	11	9.8	5	4.5	6	5.4	0	0.0	0	0.0	11	9.8			
They are a good option in the event of inconveniences, strikes and work, so that students are not harmed	3	2.7	0	0.0	3	2.7	0	0.0	2	1.8	1	0.9	0	0.0	3	2.7			
It must have a specific purpose for the exchange of information	0	0.0	1	0.9	1	0.9	0	0.0	1	0.9	0	0.0	0	0.0	1	0.9	0.071	0.000	0.086
Greater understanding of the teacher, they do not have a good signal, there are areas without	2	1.8	5	4.5	7	6.3	2	1.8	5	4.5	0	0.0	0	0.0	7	6.3			

internet, exams cannot be loaded																			
Procedures for tasks or projects should be better detailed	0	0.0	1	0.9	1	0.9	0	0.0	1	0.9	0	0.0	0	0.0	1	0.9			
It helps to exploit technology, confidence, be self-taught, seek more information and use virtual tools	2	1.8	7	6.3	9	8.0	0	0.0	8	7.1	1	0.9	0	0.0	9	8.0			
I prefer virtual classes because it can be recorded and it helps with feedback	0	0.0	5	4.5	5	4.5	4	3.6	0	0.0	1	0.9	0	0.0	5	4.5			
None	34	30.4	36	32.1	70	62.5	26	23.2	43	38.4	0	0.0	1	0.9	70	62.5			
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 12 reflects different opinions and perceptions of students about virtuality as a teaching-learning method, which are grouped by similarity according to the answers provided by the participants. The most significant opinions reflect that 9.8% indicate that education through virtual environments "is not a good learning method; it is boring, and there is little participation, making known their preference for face-to-face classes." This shows that there is a significant proportion of students who find disadvantages in virtuality, such as boredom and lack of participation. Additionally, 8% believe that "it helps to exploit technology, gives confidence, promotes self-teaching, seeks more information, and uses virtual tools," highlighting benefits such as the development of technological skills, confidence, and autonomy in learning. Furthermore, 6.3% mention that there should be "greater understanding from teachers due to technical difficulties such as not having a good signal; there are areas without internet, and exams cannot be loaded," indicating that technical and connectivity challenges are of utmost importance to improve the learning experience of students, which are seen as limitations of virtuality. Another 4.5% consider that "virtuality is not favorable for practical courses." These answers show the preference for face-to-face instruction in a group of subjects where there are deficiencies in carrying them out virtually. Another 4.5% express that "they prefer virtual classes because they can be recorded and it helps with feedback," revealing a series of advantages of online learning, such as recording and feedback, which are aspects appreciated by some students who prefer virtual classes. Another group of students, 2.7%, mentions that online learning "is a good option in the face of inconveniences, strikes, and work; in this way, students are not harmed." These opinions state that some students value virtuality as a useful alternative in specific situations, such as strikes or labor problems. Additionally, 0.9% indicate that "it must have a specific purpose for the exchange of information," suggesting that the majority do not seem to have a negative opinion about the need for a clear purpose in the exchange of virtual information. Another 0.9% indicate that "the procedures of tasks or projects should be better detailed," providing evidence that a minority percentage suggests an improvement in the clarity of the procedures for virtual tasks or projects or that teachers do not give precise instructions for their development. Finally, in the "None" category, there is 62.5%, indicating that there is a considerable group of students who do not express specific opinions, suggesting neutrality or a lack of additional comments. Ochoa [21] considers that the students' perception of didactic strategies is mostly moderately favorable; the activation, organization, evaluation, and feedback strategy is part of the virtual modality in education, which generates new techniques, resources, and teaching activities aimed at significant learning achievement in university higher education students.

5. Conclusions

The study has revealed that, although virtual environments offer flexibility and accessibility, students' perceptions are mixed. The results show that many students value the advantages of these environments, especially video conferencing platforms, highlighting the convenience of learning at their own pace. However, there are also areas for improvement, such as the quality of interaction and the resolution of technical problems. In general, students have shown acceptable satisfaction, although it is necessary to continue improving the implementation and use of these technologies to better adapt to academic needs.

The perception of the virtual environments used by students can be grouped into three (3) types of functions that offer interoperability, flexibility, and ease of use. In this way, we find unique integrated systems (Laurassia, Moodle, etc.), interoperability platforms for videoconferencing (Cisco Webex, Zoom, Google Meet, Microsoft Teams, etc.), and instant messaging tools (WhatsApp, Telegram, etc.), among others, tools for educational use included within interoperability platforms (Classroom, JamTable, Google Documents, etc.). The greatest preference of students in terms of advantages for teaching in virtual education are the videoconferencing interoperability platforms Google Meet (74.1%) and Zoom (43.7%), over the rest of the platforms and tools of Classroom platforms (35.7%) and instant messaging tools WhatsApp (47.3%). Through the research, it has been possible to identify a variety of perceptions among the students of the FCS of the UNA Puno regarding the virtual environments used in their learning process. Positive opinions have been detected, such as the recognition of the accessibility and flexibility offered by virtual environments for learning, as well as negative opinions, such as technical difficulties or limitations in interaction. The insights collected provide an initial insight into how students perceive and experience virtual environments, which can serve as a starting point for improvements and adjustments in the implementation of these tools.

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