







ISSN: 2617-6548

URL: www.ijirss.com



Quality and satisfaction of virtual education in students of a public university in Peru

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Abstract

The objective of this research was to evaluate the level of satisfaction and quality of virtual education perceived by students of the Faculty of Education Sciences of the National University of the Altiplano Puno. The study is framed in the positivist paradigm and uses a quantitative methodology with a non-experimental descriptive design and a correlational-comparative level of scope, employing the deductive method. The sample consisted of 620 students from the IV to X semester, and a questionnaire with a Likert scale was utilized as a data collection instrument. The results revealed that 37% of students perceive an average quality in virtual education, while 19% evaluate it as unsatisfactory. Regarding the student satisfaction variable, 41% report being satisfied, although 17% consider themselves dissatisfied. In addition, the correlational analysis showed a direct and significant relationship between the quality of virtual education and student satisfaction, with a Pearson correlation coefficient (Rho) of 0.778, indicating a high positive correlation between both variables. This study provides evidence of the importance of strengthening the quality of virtual education as a key factor to improve student satisfaction at the Professional School of Early Education of the National University of the Altiplano Puno.

Keywords: Educational quality, Satisfaction levels, Teaching virtually, University education.

DOI: 10.53894/ijirss.v8i1.4872

Funding: This study received no specific financial support.

History: Received: 7 January 2025/**Revised:** 10 February 2025/**Accepted:** 14 February 2025/**Published:** 21 February 2025

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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.

Transparency: The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

Publisher: Innovative Research Publishing

1. Introduction

Virtual education has established itself as an educational modality that promotes access to and development of learning in various contexts, especially in the university environment. Fainholc [1] mentions that the quality of virtual education is very important because it focuses on student satisfaction, as there is effectiveness in teaching and learning. Silvio [2] argues that virtual education allows for the strengthening of knowledge, processes, and objects focused on teaching and learning for teacher-student interaction. Martelo, et al. [3] argue that teaching takes place in various teaching and learning spaces and

seeks to contribute to the development of competencies while ensuring the quality of virtual education. [Chávez, et al. \[4\]](#) state that whether virtual teaching and learning is carried out as effectively as in university classrooms is crucial for achieving training goals; however, these concerns persist.

[Ruiz and Dávila \[5\]](#) maintain that the experience of university teachers in both face-to-face and virtual modalities includes an assessment of students in university internships. [Marciniak and Sallán \[6\]](#) affirm that the technological infrastructure must be guaranteed, prioritizing the teacher's didactic strategy and virtual materials. [Flores \[7\]](#) states that the objective of his research is to determine the relationship between virtual education and student satisfaction; therefore, students consider that virtual education and learning resources present a moderate level of effectiveness. [Tasayco \[8\]](#) mentions that UNESCO proposes objectives to guarantee education by increasing the quality of education and strengthening the administrative aspects as well as the management of the entire education system. [Vidal Ledo and Morales Suárez \[9\]](#) maintain that a safe educational system should be considered in terms of educational quality, possessing the following characteristics: change and innovation, participation of the entire educational community, and adaptation to the needs of the students, along with the comfort and motivation of the teacher. The [Ministry of Education of Peru \[10\]](#) mentions that Article 27 prescribes that Distance Education is a modality of the Educational System characterized by simultaneous or deferred interaction between the actors of the educational process, facilitated by technological means that promote autonomous learning.

[Farm \[11\]](#) states that the pedagogical interaction is the task of the teacher and must be affective, regulating, socializing, and interactive in the teaching-learning process. [Pereira \[12\]](#) points out that the quality of virtual education is characterized by the teacher's practice in different teaching-learning spaces, carrying out training activities that are immersed in the changes of our society. [Llerena \[13\]](#) aims to determine the relationship between virtual education and student satisfaction; therefore, virtual education is significantly related to student satisfaction. [García, et al. \[14\]](#) argue that applying videoconferencing platforms in higher education is of great importance, as it opens a scenario for dialogue and interaction in virtual learning and teaching. [Barrera and Mullo \[15\]](#) argue that in today's world, educational platforms occupy a very important space since the vast majority of higher education institutions and universities use this tool for interaction between teachers and students. [Cabero \[16\]](#) states that videoconferences are an educational resource that applies various didactic strategies. [Hernández and Infanta \[17\]](#) point out that in university settings, teaching and learning encompass various actions carried out by teachers and students that lead to achieving learning outcomes in accordance with the institutional mission and vision. [Copari \[18\]](#), in her research, evidences the influence of virtual teaching on student learning; therefore, the study shows the homogeneity of the groups before the intervention of virtual teaching.

[Surdez, et al. \[19\]](#) argue that in the progress of a country, it is very important to have a significant measure of educational quality offered by university institutions in order to achieve student satisfaction. [Burgos \[20\]](#) defines satisfaction as the fulfillment of people's perspectives regarding a product or service, meaning that user acceptance is essential. [Vilcatoma \[21\]](#) states that student satisfaction is achieved when their expectations are significantly met, thus indicating effective performance. [Tacca Huamán, et al. \[22\]](#) maintain that satisfaction occurs when students' expectations for the quality of educational service are fulfilled. [Botello, et al. \[23\]](#) emphasize that studying student satisfaction is of utmost importance, as it helps maintain student retention and enables the achievement of academic success. Likewise, [Maple \[24\]](#) indicates that when analyzing the cognitive stance, the consumer focuses on a post-purchase or post-use perspective; it should be noted that satisfaction is generated in the student, not dissatisfaction. [Tenorio and Valles \[25\]](#) assert that university student satisfaction is paramount, as it focuses on advancing educational quality, thereby leading to the improvement of institutional academic objectives.

[Asalde and Cárdenas \[26\]](#) agree that they designed the University Student Satisfaction (SEU) questionnaire, which focuses on attention in various contexts, considering students' interests and needs, as well as their perspectives. According to [Hernández and Infanta \[17\]](#), important aspects of teaching and learning are raised: the organizational aspect, the pedagogical aspect, and the technological aspect. [Guevara \[27\]](#) argues that one way of learning for university students is by considering the flipped classroom strategy, where the teacher acts as a mediator of knowledge and learning through interaction and dynamism. [Quesada \[28\]](#) states that in this modality, the evaluation of learning and teaching in students leads to the achievement of various competencies. [Pino \[29\]](#), in his research, aims to determine the relationship between the level of satisfaction and the learning of mathematical competencies in students, asserting that this relationship is highly significant, positive, and moderate ($\rho = 0.516$). Additionally, [Vergara-Morales, et al. \[30\]](#) state that in higher institutions in our neighboring country, Chile, student satisfaction is more focused on teaching and learning. Therefore, in this research, the hypothesis of quality in virtual education and satisfaction in virtual education among students is significant, and the objective is to determine the level of satisfaction and quality in the virtual education of the students of the Professional School of Early Education at the National University of the Altiplano Puno.

2. Theoretical Review

2.1. Quality of Virtual Education

Quality in virtual education has emerged as a central issue in the academic field due to the increasing implementation of this modality, especially during the COVID-19 pandemic. According to [Fainholc \[1\]](#), the quality of virtual education focuses on the effectiveness of teaching and learning processes, considering student satisfaction as a key indicator. This modality allows for the strengthening of knowledge and interactive processes between teachers and students, consolidating specific competencies [\[2\]](#).

To achieve quality virtual education, it is essential to ensure adequate technological infrastructure, relevant teaching resources, and effective pedagogical strategies [6]. In addition, educational platforms and digital tools play a fundamental role in facilitating learning, especially in contexts of synchronous and asynchronous interaction [16]. According to Pereira [12], teaching practice in virtual environments must be aligned with the demands of today's society, promoting training activities and competencies that respond to a constantly changing environment.

In this context, quality also implies overcoming barriers such as limited connectivity in rural areas, which significantly affects student access and participation [19]. UNESCO has highlighted the importance of increasing the quality of education through the integration of technological resources and the efficient management of education systems [8].

2.2. Student Satisfaction in Virtual Education

Student satisfaction is defined as the degree to which students' expectations regarding the educational services received are met (Burgos [20]). In the field of virtual education, satisfaction is closely linked to factors such as the perception of quality, technological accessibility, and teacher-student interaction [26].

According to Llerena [13], virtual education is significantly related to student satisfaction, highlighting the importance of designing educational experiences that promote active participation and engagement. Guevara [27] points out that innovative strategies, such as the flipped classroom, can contribute to improving satisfaction by encouraging greater interaction and dynamism in learning processes.

On the other hand, the lack of familiarity with technological tools and the limited interaction between teachers and students can generate dissatisfaction, especially in contexts of technological inequality (Vilcatoma [21]). Botello, et al. [23] highlight that student satisfaction not only influences academic permanence but also the achievement of educational goals and institutional success.

2.3. Virtual Education in the Context of the Peruvian Altiplano

The rural context of the Puno highlands presents specific challenges for the implementation of virtual education. Limited connectivity, especially in rural areas, has made it difficult for students to access digital platforms and educational resources during the pandemic [4]. According to the Ministry of Education of Peru [10], the distance education modality should aim to promote autonomous learning through the use of technological means that facilitate simultaneous or deferred interaction among the actors in the educational process.

The satisfaction and quality of virtual education in these areas require special attention to the needs and expectations of students. Studies such as those by Tenorio and Valles [25] and Pino [29] highlight the importance of designing strategies that integrate accessible technologies and innovative pedagogical approaches to improve the educational experience and achieve greater satisfaction.

3. Method

3.1. Setting or Place of Study

The research work was carried out at the National University of the Altiplano Puno in the Faculty of Education Sciences, located on the shores of Lake Titicaca, the highest navigable freshwater lake in the world, situated in the central Andes, within the Collao plateau, at an average altitude of 3,812 m a.s.l. With an area of 3,300 km² between the territories of Bolivia and Peru, it has been inhabited by humans for 10,000 years and simultaneously represents a cultural space where traditions, ways of life, customs, and ancestral values of its current inhabitants coexist.

3.2. Description of Methods

In the present research, the positivist paradigm is assumed, according to Hernández and Infanta [17], within a quantitative approach of non-experimental descriptive design, at a comparative correlational level of scope, using a deductive method.

3.2.1. Sampling Period or Sample Rate

The population is considered to be students who attend from the fifth to the tenth cycle of initial, primary, and secondary schools. In the research, non-probabilistic sampling will be carried out.

Sample size: Our sample consists of 520 students from the V to X cycle, of which 50% are from the Faculty of Education of the National University of the Altiplano Puno. We have considered that these students have achieved their training and contribute to the development of educational quality.

Table 1.

Table of students enrolled semester 2022 – II

Academic program	Cycle	Number of enrollees
Early Education	V to X	130
Secondary education	V to X	336
Primary education	V to X	154

3.2.2. Detailed Description of the Materials, Inputs and Instruments Used in the Execution of the Research

Human materials were used, such as the author of the research, administrative staff, teachers from the Faculty of Education Sciences, young women, and students from the V to X cycle during the period 2022-II. We also utilized various supplies, including an HP Core i3 laptop, Movistar fixed internet, an L4160 printer, 80-gram ultra-copy boom sheets, 7 manila

folders, 8 manila envelopes, and 5 pens. For the execution of the research, instruments such as surveys, survey forms, and questionnaires were used.

3.2.3. Variables Analyzed in the Specific Objective

First, a survey sheet was applied according to the sample, in a questionnaire of questions to the students of the Faculty of Education, whose objective of the research is: "To identify the level of quality in virtual education among the students of the Faculty of Education Sciences of the National University of the Altiplano Puno 2022."

Next, the survey sheet was also applied to the students of the Faculty of Education, with the objective of the research being: "To identify the level of satisfaction in virtual education of the Faculty of Education of the National University of the Altiplano Puno 2022."

3.2.4. Applied Statistical Test

To establish the relationship between the quality of virtual education and student satisfaction, Pearson's statistical correlation test "r" was used, with a significance level of 5%, which is equal to $\alpha = 0.05$, and a confidence level of 95%.

Using the Pearson Correlation formula:

Where:

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}} =$$

r = Correlation

n = Sample

x = Quality Level of virtual education

and = Level of student satisfaction

4. Results and Discussion

According to the objectives set, the results obtained from the applied surveys were analyzed. Statistical figures were prepared in which the data are reflected in percentage terms for better interpretation of the results obtained. For the general results, the average was used, for which descriptive statistics were employed to determine the normality of the investigation. Based on the results of the test, the application of Pearson's correlational test was determined, with the purpose of establishing the relationship between virtual education and student satisfaction among students of the Faculty of Education of the UNA - Puno.

Table 2.
Pearson scale.

Value	Meaning
-1	Large and perfect negative correlation
-0.90 to -0.99	Very high negative correlation
-0.70 to -0.89	High negative correlation
-0.40 to -0.69	Moderate negative correlation
-0.20 to -0.39	Low negative correlation
-0.10 to -0.19	Very low negative correlation
0	Null correlation
0.01 to 0.19	Very low positive correlation
0.20 to 0.39	Low positive correlation
0.40 to 0.69	Moderate positive correlation
0.70 to 0.89	High positive correlation
0.90 to 0.99	Very high positive correlation
1	Large and perfect positive correlation

4.1. Descriptive Analysis of The Quality Result of Virtual Education

This table shows the results of the first objective, where the students of the Faculty of Education Sciences consider that 37% believe there is good quality and 4% indicate excellent quality of virtual education. This is reaffirmed by studies carried out according to [Pereira \[12\]](#), which point out that the quality of virtual education is characterized by the didactics of the teacher in different teaching-learning spaces. [Surdez, et al. \[19\]](#) maintain that in the progress of a country, it is very important to have a significant measure of educational quality offered by university institutions. This is corroborated by the studies of [Martelo, et al. \[3\]](#), which maintain that the realization of teaching seeks to contribute to the development of competencies and ensure the quality of virtual education. They also state, according to [Fainholc \[1\]](#), that the quality of virtual education is very important because it focuses on student satisfaction, as there is effectiveness in teaching and learning.

Table 3.
Quality of virtual education.

Rating scale		Quality of virtual education	
Literal	Range of scores	fi	%
Excellent quality	[28 - 32]	8	4%
Good quality	[23 - 27]	315	37%
Regular quality	[18 - 22]	132	33%
Poor quality	[13 - 17]	60	18%
Terrible quality	[16 - 1]	5	1%
Total		520	100%

For this reason, it is reaffirmed with the studies carried out according to [Llerena \[13\]](#), where the relationship between virtual education and student satisfaction in the areas of history, geography, and economics of students in the second year of the secondary level of the I.E.P. Juan Pablo Magno in the district of Tiabaya, 2021, concludes that of the 108 students, virtual education is significantly related to student satisfaction, with its correlation coefficient being 0.827. The table indicates that there is a high correlation, while the following (bilateral) = 0.000, which is less than 0.05, leading to the acceptance of the alternative hypothesis. In the same way, the conclusions align with those obtained by [Vilcatoma \[21\]](#), where the relationship between the quality of service and the satisfaction of the students of the Graduate Unit of the Faculty of Mechanical Engineering – UNCP concludes that the satisfaction of the respondents shows that 54.9% of the total respondents rate their satisfaction as medium, while 45.1% qualify it as high satisfaction. On the other hand, it should be noted that no respondent showed low satisfaction. However, [Martelo, et al. \[3\]](#) in his research concludes that a list of factors was obtained that were subjected to an exhaustive evaluation by experts, who analyzed the relationships between them to classify them. The indirect classification showed that eight of the ten factors turned out to be key, and one was determinant, indicating that in the CEV (Quality in Virtual Education), all the variables and factors are important and must be taken into account when formulating strategies to implement improvements in this study modality. It should be noted that the results of applying the MICMAC technique are a guide that shows an approach to the reality of the situation studied, but it does not mean that it is an absolute reality because the technique is subject to qualitative bases such as the choice of factors and the assessment of the relationships between them.

4.2. Descriptive Analysis of the Student Satisfaction Result

In this table, the results of the second objective can be seen, where the young women students of the Faculty of Education Sciences consider 41% to be satisfied with virtual education, while 5% believe they are totally satisfied with virtual education during COVID-19. According to studies carried out by [Asalde and Cárdenas \[26\]](#), student satisfaction must be achieved because it is considered a primary axis. Therefore, the needs and expectations of students for academic development must be known. Additionally, [Burgos \[20\]](#) indicates that satisfaction is the fulfillment of people's perspectives regarding a product or service, which means that there is user acceptance. Likewise, [Botello, et al. \[23\]](#) agree that satisfaction is about meeting the student's expectations, and maintaining the student body is essential for achieving the success of the students. Furthermore, the study conducted by [Tenorio and Valles \[25\]](#) states that university student satisfaction is paramount since it focuses on the advancement of educational quality, thus leading to the improvement of institutional academic objectives.

Table 4.
Student satisfaction.

Rating scale		Student satisfaction	
Descriptive	Range of scores	fi	%
Totally satisfied	[28 - 32]	30	5%
Satisfied	[23 - 27]	305	41%
Somewhat satisfied	[18 - 22]	115	30%
Unsatisfied	[13 - 17]	52	17%
Totally dissatisfied	[8 - 12]	18	7%
Total		520	100%

The results obtained are similar to those of [Anton \[31\]](#), who found that virtual teaching is at a medium level with 73%, and academic satisfaction is also at a medium level with 76%. Therefore, it is concluded that there is a direct and significant relationship between virtual education and academic satisfaction among students of the Faculty of Systems Engineering of the National University of Callao, 2020 ($r=0.719$ and $\text{Sig.}=0.000$). Similarly, the conclusions align with those obtained by [Soto \[32\]](#), who concluded that virtual education is strongly related to the satisfaction of 5th-year students of the Santa Rosa de Trujillo National Educational Institution, with $\text{Sig.} = 0.000 < 0.05$ and a Pearson's Rho correlation coefficient equal to 0.994. A satisfactory level was determined regarding the virtual education received, as the students possess basic aspects that enable them to receive their virtual education effectively, such as access to a virtual classroom, access to technological tools, mastery of the subject by the teacher, and management of the new teaching methodology. Likewise, the conclusions are consistent with those obtained by [Valdez \[33\]](#), where the relationship between virtual education and student satisfaction at the National Maternal Perinatal Institute in 2017 was determined, with a correlation coefficient of 0.827 indicating high correlation. Additionally, the relationship between virtual learning resources and student satisfaction was identified, with a

correlation coefficient of 0.757, indicating moderate correlation, and the relationship between virtual accompaniment and student satisfaction was determined, with a correlation coefficient of 0.861, indicating high correlation. Therefore, it is also important to highlight specific studies on the platform used by students in the indicated population.

It can be observed that the highest percentages are found in the satisfied level for the variable Quality of Virtual Education (37%), while 19% fall into the unsatisfied level. For the variable Student Satisfaction, the satisfied level has a higher percentage (41%), with 17% categorized as dissatisfied. This reflects the percentages of Quality Levels of Virtual Education and Student Satisfaction at the Faculty of Education Sciences of the National University of the Altiplano of Puno – 2022.

The level of educational quality and student satisfaction at the Faculty of Education Sciences of the National University of the Altiplano in Puno regarding the service of the teachers yielded a satisfactory result. The teaching methodologies used for the students are highly valued and contribute effectively to their university education. According to Surdez, et al. [19], it is crucial for a country's progress to have a significant measure of educational quality offered by university institutions; similarly, student satisfaction is also considered essential for analysis. Likewise, Tasayco [8] mentions that UNESCO proposes objectives to guarantee education by increasing the quality of education and strengthening the administrative aspects as well as the management of the entire education system. On the other hand, [9] maintains that a safe educational system should be evaluated in terms of educational quality, possessing the following characteristics: change and innovation, participation of the entire educational community, adaptation to the needs of the students, and the comfort and motivation of the teacher.

Table 5.

Comparative results of the quality of virtual education and student satisfaction.

Rating scale		Quality of virtual education		Student satisfaction	
Literal	Score	fi	%	fi	%
Very satisfied	[5]	8	4%	30	5%
Satisfied	[4]	315	37%	305	41%
Normal	[3]	132	33%	115	30%
Unsatisfied	[2]	60	19%	52	17%
totally dissatisfied	[1]	5	6%	18	7%
Total		520	100%	520	100%

The results do not agree with those indicated by Anton [31], who showed that 84.0% believe that the Moodle platform is not adequate for ensuring good quality for users of virtual environments. In contrast, the vast majority of the population in this study qualifies the quality of virtual education as regular. These results differ from those reported by Durán [34] in his descriptive research with students at the Polytechnic Institute of Panama, where he observed a high degree of satisfaction (44%) regarding the expectations for the discussion list presented on the virtual platform. Additionally, 77.8% met their expectations with the virtual platform, and 100% were satisfied with the lectures given. However, Valenzuela [35] indicates that quality in virtual education represents the standards of a "straitjacket" for educational institutions. Therefore, some lessons learned from the work of developing quality standards reflect on how the use of these standards can become a straitjacket, potentially hindering innovation within an educational modality that claims to be highly innovative.

However, the situation varies in an international context. The student assumes a greater commitment in social interaction with the staff of the educational institution and students and seeks to establish a work network to achieve educational quality and student satisfaction.

The hypothesis is contrasted with the results where H0: Virtual education is not related to student satisfaction at the Faculty of Education Sciences of the UNA Puno. H1: Virtual education is related to the satisfaction of students at the Faculty of Education Sciences of the UNA Puno. The significance level is 0.05, and the decision rule is: If the p-value < 0.05, reject H0; if the p-value > 0.05, accept H1.

Table 6.

Correlation results of the study.

		The quality of virtual education	Student satisfaction
The quality of virtual education	Pearson correlation	1	0.7784
	Sig. (bilateral)		0.000
	N	190	190
Student satisfaction	Pearson correlation	0.7784	1
	Sig. (bilateral)	0.000	
	N	190	190

From the results of Table 6, it can be seen that there is a relationship between the quality of virtual education and student satisfaction, as indicated by a significance value of less than 0.05 ($p=0.00 < 0.05$). With respect to the degree of correlation between variables, Pearson's Rho correlation coefficient registers a value of 0.778, which demonstrates a high positive correlation between the variables.

5. Conclusions

According to the results of the research, the level of satisfaction and quality in the virtual education of the students of the Faculty of Education Sciences of the National University of the Altiplano Puno is significant, such that the hypothesis raised in the research work is accepted.

Regarding the objective of the quality of virtual education, it is concluded that it is significant, with 37% of students considering themselves satisfied with the quality of virtual education at the Faculty of Education Sciences. On the other hand, 19% are at an unsatisfied level, as they faced difficulties with connectivity and access to digital platforms, mainly in rural areas where there was no internet during the pandemic. This aligns with the studies conducted by Surdez, et al. [19], which argue that a significant measure of educational quality offered by university institutions is crucial for a country's progress. Similarly, student satisfaction is also considered important for analysis. Pereira [12] points out that the quality of virtual education is characterized by the teacher's practice in different teaching-learning spaces, carrying out training activities that are immersed in the changes in our society.

Regarding the objective of satisfaction in virtual education, it is concluded that it is significant, with students indicating that 41% are satisfied with virtual classes. On the other hand, 17% express dissatisfaction, which is attributed to limited knowledge in the use of communication and information technologies, as well as minimal interaction and participation from the students. However, studies conducted by Asalde and Cárdenas [26] corroborate that student satisfaction must be achieved, as it is considered a primary axis. Therefore, the needs and expectations of students for academic development must be understood by utilizing both asynchronous and synchronous work. Additionally, Burgos [20] defines satisfaction as the fulfillment of the expectations that individuals have of a product or service, indicating that there is acceptance from the user regarding what they expect from an institution.

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