

Teaching through virtual tools and its effect on the perception of student satisfaction

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ABSTRACT

In this context of virtualization, the educational sector has seen the need to make use of technological advances, for this reason it is important to know the perception of students, after having fully adapted distance learning through tools virtual, which have allowed teachers and students to maintain the pedagogical link at a distance, either through the virtual classroom or through the use of simulation software. In this sense, the objective of this article is to identify the perception of teaching through virtual tools in university students and determine its level of effect or relationship in student satisfaction. This research is approached from a qualitative approach using the Likert measurement method and a content analysis methodology using virtual instruments. The results of the study indicate that 92.9% and 89.3% of the students are satisfied, these results focus on the indicators “absolves the questions asked regarding the use of virtual tools” and “knowledge shown by the teacher in the development of the sessions through virtual tools”. Likewise, the correlational analysis, through Spearman's Chi square test, establishes that there is a high relationship or significant effect of 0.850 between the perception of teaching through virtual tools with student satisfaction.

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1. INTRODUCTION

In recent years, many institutions responsible for guaranteeing university educational quality have placed special emphasis on defining indicators that establish how to quantify the degree of satisfaction of the service offered to the student [1], [2]. In this regard, the researchers [3], [4] pointed out that every academic organization should focus on the quality of service, which should be focused on aspects such as teaching, research and social projection. Likewise, Ouahabi *et al.* [5] concludes that, in the search for universities to achieve accreditation, they are obliged to define an evaluative follow-up and monitoring for the professional development of their teachers, which is reversed in the increase of the quality of university processes.

Student satisfaction in relation to the service offered by the university is a permanent reference of quality [6]. Atalaya *et al.* [7] pointed out that since quality is a dynamic element, it is necessary to measure it permanently through indicators such as student satisfaction, since it largely reflects the strengths and weaknesses inherent to the teacher, this is based on [8] where it is pointed out that the student feels satisfied

when he is aware that his expectations regarding his competence were met or exceeded. Bautista *et al.* [9] pointed out that student satisfaction can be conceptualized as the well-being that students experience because they feel their academic expectations are met as a result of the activities carried out by the institution to meet their educational needs.

As indicated in [10], [11] professional skills influence the effectiveness and satisfaction of students in the teaching-learning process, taking as relevance this new scenario of virtualization, technology becomes an indispensable factor in the education sector. Hieder *et al.* [12] indicated that technology has had a significant advance in all its areas, whose purpose of improvement is to be more efficient, and education is part of this evolution. The researchers [13]–[15] stated that the use of virtual tools are becoming important actors for the teaching-learning process; and it is that this factor represents a competitive advantage for the university institution that differentiates it from others in relation to educational quality.

The concern to ensure quality in the mediation of virtual environments has led to the existence of two major approaches, the first focused on the mastery of virtual tools and the second on the planning of the content to be developed [16]. Maldonado *et al.* [17] pointed out that distance education implies the planning and design of experiences based on synchronous and asynchronous virtual environments, and is characterized by its complex nature and scope, involving a wide range of non-traditional forms of teaching and learning. For this reason, the researchers [18], [19] pointed out that it is important to analyze the evaluation of the performance of the university teacher in the domain of virtual tools for the development of learning sessions.

The evaluation of university teaching performance represents the obtaining of a relevant instrument, since, with it, the teacher will respond immediately to a better performance [20]. This evaluation should be characterized by assessing performance as part of the teaching-learning process (methods, techniques, and strategies) aimed at student satisfaction [21], [22]. In this regard, Mukhtar *et al.* [23] pointed out that it is essential to have an evaluation system that fosters a culture of continuous improvement. And it is that evaluating performance implies measuring the degree of compliance with the established requirements, based on the achievement of standards or objectives of any organization [24], [25].

It has been possible to verify in various investigations, the importance of the evaluation of the performance of the university teacher, for the improvement of the quality of the teaching-learning process [26]. Therefore, its evaluation regarding the use of virtual tools in this new online education environment is considered as a strategy aimed at improving distance education [27]. The evaluation of teaching performance in higher education has been carried out by various procedures and methods, such as: teacher self-assessment, assessment by peers and academic managers, and assessment by students [28], [29]. It can be said that knowing the perception of students in relation to teaching through virtual tools allows measuring the degree of satisfaction with the quality of distance teaching-learning, which today represents a continuous effort of each one of higher education institutions [30], [31].

Taking the aforementioned as a reference, the main objective covered in this article is to identify the perception of teaching through virtual tools in university students and determine its level of effect or relationship in student satisfaction in the environment of the education service remote top. For which, initially, the results of satisfaction with teaching through virtual tools and student satisfaction in the distance education environment will be identified, according to the perception of mechanical engineering students; to then determine the level of relationship or effect through Spearman's Chi square test. The justification of the research focuses on knowing the perception of mechanical engineering students, as a basis in the essential contribution to the improvement of the quality of teaching performance, which will be reflected in the improvement of the quality of the service of distance higher education, whose corrective actions can be complemented from other perspectives of the educational process.

In general, this research is divided into four sections, including this introduction. In the second section, the research methodology is detailed, in the third section the results are described and discussed against other similar studies. Finally, in the fourth section, the most relevant conclusions are presented.

2. RESEARCH METHOD

2.1. Research level and desing

The research design is non-experimental of the transectional type, because it does not alter or exert action on the population, which leads to the alteration of the perception of teaching through virtual tools in students of mechanical engineering and student satisfaction in the environment of the distance higher education service. It is of the transactional type because the data was collected in a single instant of time. Thus, the level is also correlational, because it seeks to establish the level of relationship between the variable “teaching through virtual tolos” (TT) with the variable “student satisfaction in the environment of the higher education service at a distance” (S); this analysis will be carried out through Spearman's Chi square test.

2.2. Collection and validation of data and instrument

For data collection, the perception of 56 students belonging to the ninth cycle of the professional school of mechanical engineering of a public higher institution in Peru was obtained. Due to the context of the distance higher education service, the data collection technique used was the survey, applied virtually; and the instrument is the questionnaire that was generated through Google Forms, whose link was sent to the learning platform of each student. The model used for the design of the instrument responds to the “distance higher education quality service” (DIHEQS) model, in which the “educational-teaching” dimension was used, this dimension was aligned to the current context of teaching through virtual tools. It should be noted that the perceptions of teaching through virtual tools are addressed from a qualitative approach using the Likert scale measurement method (1: strongly disagree, 2: disagree, 3: neither agree nor disagree, 4: agree, and 5: strongly agree).

Likewise, the reliability of the data collected was validated through Cronbach's alpha, whose general result of the variables under study was 0.859. It should be noted that the validation of the instrument of the model used is carried out in [2], in addition this research is related to the study carried out in [32]. Figure 1 shows the indicators and their respective coding of the variables “teaching through virtual tools” and “student satisfaction in the environment of the distance higher education service”.

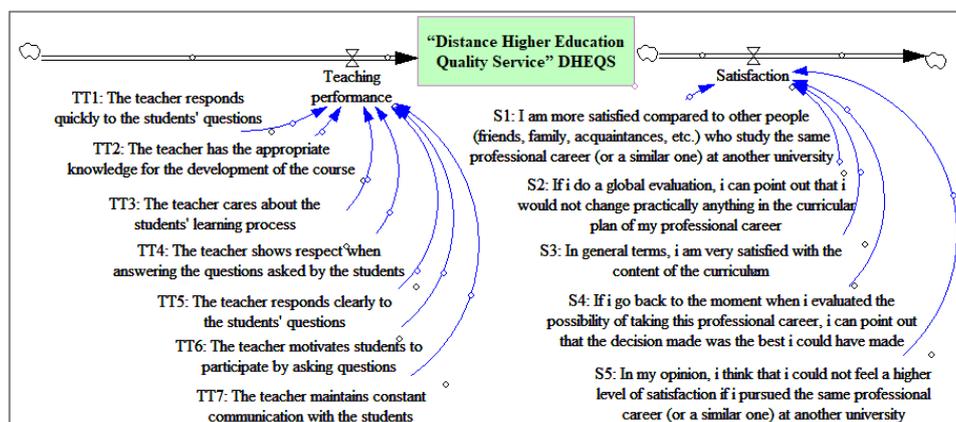


Figure 1. Indicators of the variable teaching through virtual tools and student satisfaction

3. RESULTS AND DISCUSSION

Initially, the results of the perception of teaching through virtual tools (TT) are shown, according to the perception of mechanical engineering students. From Figure 2, it can be noted that 92.9% of the students are satisfied (strongly agree and agree) with the clarity with which the teacher answers the questions asked regarding the use of virtual tools (indicator TT5) and with the respect shown by the teacher when answering the questions regarding the use of virtual tools (indicator TT4). Likewise, 89.3% of the students are satisfied (strongly agree and agree) with the knowledge that the teacher shows in the development of the sessions through virtual tools (indicator TT2) and with the quick way that the teacher responds to the questions asked regarding the use of virtual tools (indicator TT1). Given these favorable results, it should be taken into account that 14.2% of the students are dissatisfied (strongly disagree and disagree) with the motivation that the teacher transmits to them to participate by asking questions regarding the use of virtual tools (indicator TT6).

These results agree with what was obtained in [20] where it is pointed out that students satisfactorily evaluate the virtual teaching process when the teacher gives them a clear explanation of their concerns during the development of the course content, making them feel that their abilities are being strengthened. Likewise, as pointed out in [16], soft skills are responsible for at least 70% of job success and high teacher qualifications, which is why it is essential to reformulate the teacher selection process, as well as induction programs-training with a view to including soft skills as a weight indicator in a teaching contract, which guarantees an improvement in performance.

Bejarano *et al.* [27] pointed out that the perception of students regarding teaching in the virtual environment is mainly based on the relationship between the commitment and the perceived confidence of the teacher, and communication is also a determining factor to avoid the isolation effect that it usually occurs in distance learning models; in fact, the authors have evidenced the preference of students for mixed learning models that combine synchronous and asynchronous. Next, it is shown in Figure 3, the results of student satisfaction in the service environment of distance higher education (S).

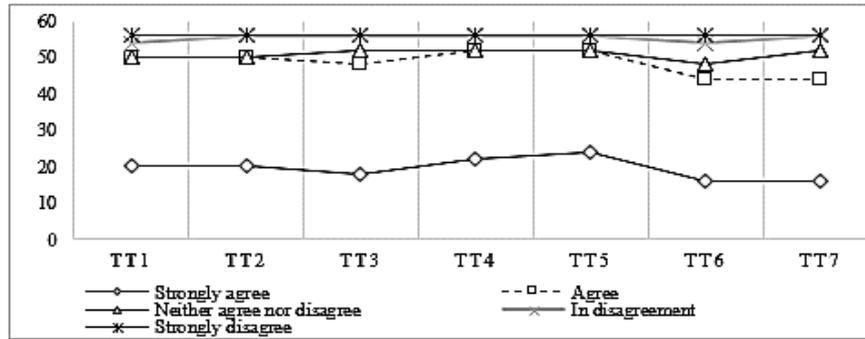


Figure 2. Results of the perception of teaching through virtual tools

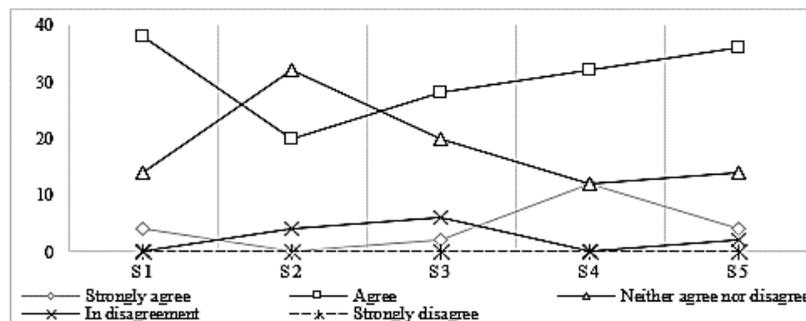


Figure 3. Results student satisfaction

From Figure 3, it can be noted that 78.5% of the students are satisfied (strongly agree and agree) with the decision to have chosen to study a professional career in mechanical engineering (indicator S4). Next, 75% of the students feel satisfied (strongly agree and agree) as well as other people who study the same professional career (or a similar one) in another university (indicator S1). Likewise, 71.4% of the students are satisfied (strongly agree and agree) for pursuing this professional career at their higher institution (indicator S5). On the other hand, 10.7% of the students are dissatisfied (strongly disagree and disagree) with the content of the curricular plan and the integration of the use of virtual tools (indicator S3).

Alejo and Aparicio [26] pointed out that regarding student satisfaction, 52.59% of the students are satisfied and 38.22% are not when in the online teaching methodology, teachers are not familiar with virtualization, therefore they do not apply within its teaching various didactic tools, which makes students perceive that their experience in the acquisition of knowledge is not being fed correctly. Regarding this, Almenara and Gimeno [30] pointed out that almost 98% of teachers are located only at a first level of mastery of virtual tools, making use only at an elementary level of information and communication technologies (ICT). On the other hand, Bernaola *et al.* [31] it is indicated that the training and development of digital skills in teachers were accelerated due to the pandemic and virtual teaching, reflecting that 83.0% of teachers participated in virtual courses and 67.0 % were trained in the use of virtual tools.

Finally, with the objective of establishing the level of relationship between the variable “teaching through virtual tools” with the variable “student satisfaction in the environment of the service of higher education at a distance”; Spearman's Chi square test will be used through the SPSS statistical software. It should be noted that, to carry out this analysis, the data for each indicator was transformed into a single variable; thus, as part of the analysis, the null hypothesis (H0) and the alternative hypothesis (H1) are established. Table 1 shows the results of Spearman's Chi square test. H0: Student satisfaction in the distance higher education service environment is independent of the perception of teaching through virtual tools. H1: Student satisfaction in the distance higher education service environment is dependent on the perception of teaching through virtual tools.

Table 1. Spearman's Chi square test

Teaching through virtual tools	Student satisfaction	
	R de Spearman	0.738
	Significance	0.000

From Table 1, initially it can be pointed out that there is a cause-effect relationship between the variable “teaching through virtual tools” with the variable “student satisfaction in the environment of the distance higher education service”, because the significance is equal to 0.000, which is less than the significance level (alpha) of 0.05, for this reason the null hypothesis (H₀) is rejected, thus establishing the dependence between the variables. Likewise, Spearman's R coefficient indicates that the cause-effect relationship is 0.738, this means that the perception of mechanical engineering students with teaching through virtual tools has a significant and strong effect on student satisfaction in the service environment of distance higher education.

Similarly, Atalaya *et al.* [4] pointed out that the Chi-square test validates the significant relationship between student satisfaction with the perception of the quality of university services, finding the indicators of student capabilities and teaching methods, such as those presented by a higher level of relationship within each variable. Likewise, Aziz *et al.* [13] it is indicated that the results show that all the factors are positively and significantly related, being among the most important factors of student satisfaction the quality of teaching and the technological infrastructure of the higher institution. The results obtained in [17] show that there is a positive and significant relationship between the security that the teacher develops when generating new and strengthened knowledge in the students and the academic satisfaction towards the higher institution.

Determined the relationship between the variable “teaching through virtual tools” (TT) with the variable “student satisfaction in the service environment of distance higher education” (S), in the following analysis we will describe the existing relationship in percentage terms according to each level of satisfaction (1: strongly disagree, 2: disagree, 3: neither agree nor disagree, 4: agree, and 5: strongly agree). Table 2 shows the results of this analysis by means of cross tables.

Table 2. Cross tables between the variables TT and S

		Student satisfaction (S)					Total
		Strongly disagree	In disagreement	Neither agree nor disagree	Agree	Strongly agree	
TT	Strongly disagree	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
	In disagreement	0.0%	33.3%	0.0%	66.7%	0.0%	100.0%
	Neither agree nor disagree	0.0%	50.0%	0.0%	50.0%	0.0%	100.0%
	Agree	0.0%	7.1%	28.6%	64.3%	0.0%	100.0%
	Strongly agree	0.0%	0.0%	62.5%	25.0%	12.5%	100.0%
	Total	0.0%	10.7%	35.7%	50.0%	3.6%	100.0%

From Table 2, it can be indicated that there is a 10.7% relationship between student satisfaction in the environment of the distance higher education service of mechanical engineering students who express disagreement with teaching through virtual tools. On the other hand, there is a 35.7% relationship between the student satisfaction of mechanical engineering students who state that they neither agree nor disagree with teaching through virtual tools. Likewise, there is a 50.0% relationship between the student satisfaction of mechanical engineering students who state that they agree with teaching through virtual tools. Finally, it can be pointed out that there is a 3.6% relationship between the student satisfaction of mechanical engineering students who state that they strongly agree with teaching through virtual tools.

4. CONCLUSION

The emergence of new technologies in this context of virtualization, have influenced higher education institutions to promote strategies of massification, flexibility and modernization of a training process, which goes hand in hand with the use of virtual teaching-learning tools, which not only have an effect on the skills that university students possess, but it is also important to consider their effect on the perception of their usefulness as a pedagogical mediation tool. The perception of the university students constitutes an essential contribution, in terms of the quality of teaching. In addition, the evaluation of student satisfaction provides the opportunity to open new horizons, a new style of reflection on educational practice and the necessary continuous change for the improvement of the educational service in the virtual environment. In the present investigation, it was possible to effectively integrate the DIHEQS model for the evaluation of teaching through virtual tools and student satisfaction in the environment of the distance higher education service. The satisfaction of the students surveyed in relation to teaching through virtual tools focuses on the indicators “absolves the questions asked regarding the use of virtual tools” and “knowledge that the teacher shows in the development of the sessions through virtual tools”. The study demonstrated by means of Spearman's Chi square test, it demonstrated the relationship-cause or significant effect between the variables, this is visualized in the student satisfaction in the environment of the distance higher education service, in which the satisfaction with the decision to have chosen to study a professional career in mechanical engineering and satisfaction with pursuing this professional career at their higher institution.

Although good results were observed, challenges appear to strengthen the usefulness of e-learning compared to traditional tools, allowing them to more directly identify the advantages of using virtual learning platforms to improve teaching and learning processes, even more so when has determined the existence of a relationship between teaching through virtual tools and student satisfaction in the service environment of distance higher education.

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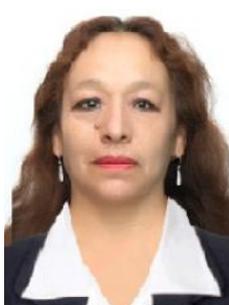
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