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Virtual tools in distance education: university satisfaction regarding its application as part of teaching strategies

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ABSTRACT

When virtual education was implemented in Peru, the limitations of teachers in technological management were evident. For this reason, the research seeks to analyze the perception of university satisfaction regarding the use of virtual teacher tools as part of teaching strategies, in order to improve virtual teaching-learning, achieving student motivation and facilitating this meaningful learning through the use of virtual tools. The method used according to the investigative approach is qualitative, according to its scope it is descriptive and correlational. During the development of the research, it was identified that the satisfaction regarding the use of virtual tools by the teacher is focused on the critical, constructive and positive attitude towards virtual tools and in the acquittal of students' questions regarding the use of virtual tools. On the other hand, the indicator that is related to low student satisfaction focuses on the low diversity of methodological strategies used for the development of virtual learning sessions. Likewise, the Chi-square test shows the significant relationship between the perception of the teacher's competences regarding the use of virtual tools and the perception of the quality of the teaching offered to students during distance education.

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1. INTRODUCTION

Worldwide, higher education has undergone changes and transformations, due to the virtualization of teaching-learning, thus generating that universities face new challenges, which go hand in hand with the advancement of technology [1]-[3]. All this, with a single objective, to train students in the necessary skills that allow them to perform efficiently in the various labor fields [4]. The concept of competence refers to a set of knowledge, skills and attitudes that the human being applies to learn, adapt and perform in the world [5]. Thus, the competencies that are formed in students are made up of cognitive resources, knowledge, skills and values to face different situations of work in the professional field [6]. Given this, a vital factor, within the training of the university student, is the teacher, who is responsible for stimulating in students the knowledge of the discipline they teach and the skills that are necessary for adaptation in the world of work

[7]. Traditionally, the university teacher has been required to be a container and transmitter of knowledge, a conception that is currently obsolete, under this new virtual educational context, it is demanded that the university teacher not only provide the student with scientific skills, but also methodological, technical, social, participatory, digital and personal [8], [9]. Digital skills can be understood as the ability to use different digital resources and virtual tools appropriately. For this, a complex and gradual learning process is passed, from the search for information to its transformation in a critical way [10], [11]. This implies being able to use digital technology consciously; the development of this capacity must be part of the daily learning process, given the inherent progress of the digital society, which in many aspects is decisive for the success of each individual [12]. As far as the teacher is concerned, this digital competence is conceived as a relationship of attitudes, knowledge and skills necessary for the empowerment of virtual tools for their daily pedagogical practice [13], [14]. This implies a change in the role of the teacher, given the abundant information on the network, where he must systematize knowledge: accessing, selecting, evaluating to finally transmit knowledge in his pedagogical activity, complementing the orientation and guidance of the student [15]. Teachers, therefore, on a day-to-day basis, must strive to adhere to the principles of effective practice so that the best learning experience is properly provided. The teaching-learning process is basically an interaction between different individuals that takes place within a social context where the roles of teacher and student are generally clearly defined [16], [17]. Teachers expect students to actively participate in their class and students, conversely, expect the teacher to influence their learning. Teachers are role models for their respective students and, therefore, their job performance is crucial for the success of students [18].

In this sense, it has been possible to verify in various investigations, the importance of the evaluation of the university teaching performance regarding the use of virtual tools as part of the teaching strategies, for the improvement of the quality of the distance education process [19]. Therefore, the evaluation of teaching performance in this new virtualization environment is considered as a strategy aimed at improving distance education [20]. 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 [21]. It can be said that the evaluation of the performance of the university teacher under the perception of the students, is one of the most important, due to the changes and transformations that higher education is currently undergoing and the quality of teaching-learning is a continuous effort of each of the higher education institutions [22], [23]. In addition, these competencies influence the effectiveness and satisfaction of students in the teaching-learning process, taking as relevance this new scenario of virtualization [24]. Because, student satisfaction can be conceptualized as the well-being that students experience because they feel their academic expectations are covered as a result of the activities carried out by the institution to meet their educational needs [25]. In relation to relevant studies on this topic, we have in [26], an investigation on the performance of the university teacher in the use of virtual tools in front of an e-learning teaching program, corresponding to an educational institution in Colombia, where it is concluded that the most developed capacity on the part of teachers is computerization and digital literacy, while the creation of digital content is one of their weakest skills. Recommending the implementation of a program to strengthen competencies in all its dimensions as strategies to achieve quality teaching within the health context resulting from COVID-19.

On the other hand, the study carried out in Mohamed and Nafie [27] on the documentary review about the latest conceptualizations of the competences of the university teacher in the use of technological tools in the context of the pandemic, concludes that one of the strategies for the development of the virtual teaching is the flipped classroom model, based on information from the studies reviewed. It should also be added that one of the principles of the national strategy for digital technologies in basic education 2016-2021 is the role of the teacher as an agent of change. This is conceived because, with the empowerment of digital technologies, teachers will be able to fulfill their role as generators of change; promoting information and communication technologies (ICT) from the physical or virtual classroom, preparing for the changes and challenges of learning and collaborative work with the student; despite being, the latter, more familiar with digital. Likewise, Benavente-Vera *et al*. [28] they carried out a study on teacher competencies in the use of virtual tools in managers and teachers in a context of remote learning, as a result of the health emergency in Peru; where it was concluded that the teachers of the educational institutions selected for the sample have a higher level of digital skills with respect to the managers; highlighting the domain for communication, collaboration and creation of digital resources of the former.

Competencies in the use of virtual teaching tools are of great importance given the pandemic context, in the participation of people from different sectors of society; economic, social, educational, among others [29]. In this last sector, ICT appear as a form of development, with a great possibility of success in achieving greater interactivity with the student; thus it also appears as a mechanism of generation, transmission and evaluation in the educational activity and the construction of meaningful learning [30]. An important factor that justifies the development of the research is indicated in [28] where it is pointed out that,

in Peru, after confinement, remote education (virtual teaching-learning) was implemented throughout the country, evidencing the limitations of the teachers of technological management and the lack of resources of educational institutions. For this reason, it is important to analyze the perception of university satisfaction regarding the use of virtual teacher tools as part of teaching strategies, in order to improve virtual teaching-learning, achieving student motivation and thus facilitating meaningful learning through the use of virtual tools. In that sense, this research is divided into five sections, including this introduction. In the second section, the literary review is theoretically detailed, in the third section the research methodology is described. The fourth section shows the results and discusses them against other similar studies; finally, in the fifth section, the most relevant conclusions are presented.

2. LITERARY REVIEW

Almusharraf and Khahro [31] explained point out that there are two major "paradigms" or approaches to virtual learning: one of them focuses on technology, emphasizing the available tools, and tends to see learning as the result of the use of such technologies; while the other focuses on the pedagogical, on the dialogical experience between the actors in the learning process. This distinction is evident in the way different terms are used to refer to teaching and learning through new information and communication technologies. Likewise, the relevance of investigating satisfaction in virtual education lies in the favorable impact on student training on personal development and learning for life, and on staying in education online. It is revealed that to achieve high levels of satisfaction there are factors that condition them such as the role of the learner, the role of the teacher, the design of the virtual course, connectivity and technology, and institutional management [32]. The participation of the students, the performance, the perceived quality of the course, the effective contact between teacher-student generates satisfaction on the part of university students in virtual teaching. Describing satisfaction is related to measuring the quality that is provided by offering a service, therefore, to speak of student satisfaction is to speak of their appreciation of the service provided by the university [33]. On the other hand, the results of online learning through virtual tools are closely linked to satisfaction based on interaction, course structure, motivation, quality of online tutorials, technological quality and facilitation of knowledge of the course teacher. The factors that condition student satisfaction are linked to the proper development of the teacher's role in virtual education, in which the influence of technology and connectivity are part of correct institutional management [34].

3. METHOD

The method used according to the investigative approach is qualitative; according to its scope, it is descriptive and correlational. In this research, the perception of university satisfaction regarding the use of virtual tools of the teacher as part of the teaching strategies will be analyzed, likewise, the cause-effect relationship between the indicators that make up the variable teaching performance regarding the use of virtual tools is determined (ID1-ID9) with the variable quality of teaching offered to students during distance education (OD1), this analysis is carried out through Chi square and cross tables, through the SPSS statistical software. Figure 1 shows the indicators that are part of the perception of teaching performance regarding the use of virtual tools (ID1-ID9).

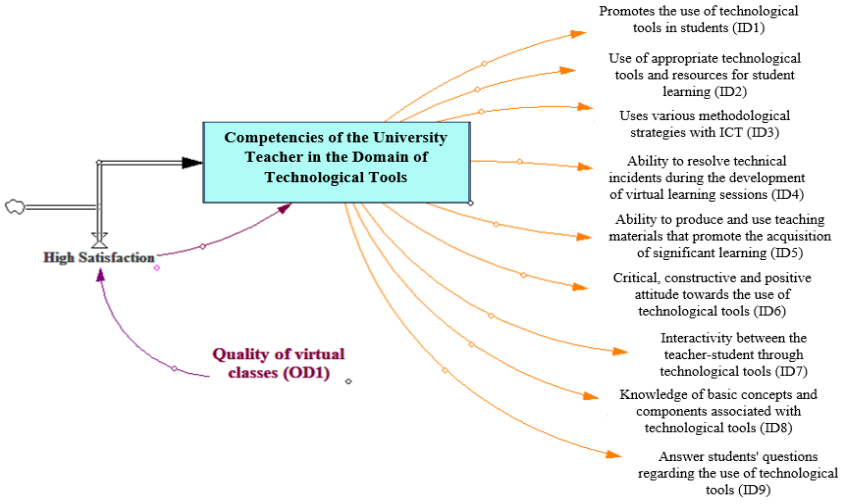

Figure 1. Perception of teaching performance regarding the use of virtual tools

The technique is the survey, in which, through a virtual questionnaire of 10 questions, the perception of 715 students from four professional engineering careers, enrolled in the academic semester 2020-II, was obtained. It should be noted that the survey was applied to all students, in a general and compulsory manner. Due to this, it was possible to obtain the perception of the entire population under study, for this reason, the sample is equal to the population. For data processing, the likert scale of 4 satisfaction levels was used (1: dissatisfied, 2: little satisfied, 3: satisfied and 4: very satisfied). Likewise, the reliability of the collected data was validated through Cronbach's alpha coefficient, using the SPSS statistical software, whose reliability result is 0.958.

4. RESULTS AND DISCUSSION

Figure 2 shows the results of the perception of engineering students of teaching performance regarding the use of virtual tools as part of teaching strategies during distance education. Thus, it is also observed that students perceive greater satisfaction with the ID9 indicator, with this it can be said that 80.3% of students state that they are highly satisfied (very satisfied and satisfied) because the teacher answers their questions regarding the use of virtual tools. It is followed by the ID7 indicator, with 79.7% of students who are highly satisfied (very satisfied and satisfied) due to the interactivity that is generated between the teacher-student through virtual tools. On the other hand, 27% of the students who say they are not very satisfied, refer to the low use of various methodological strategies with ICT.

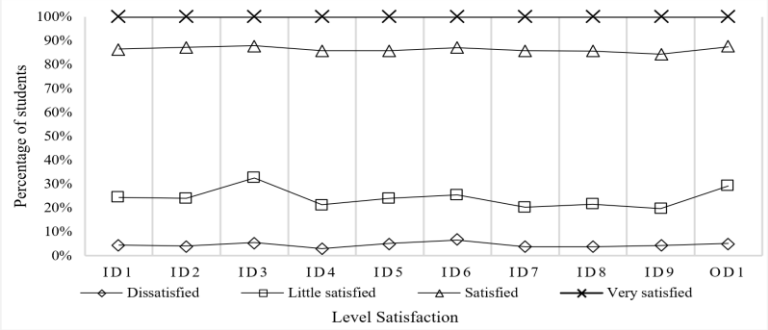

Figure 2. Results of the perception of teaching performance regarding the use of virtual tools

These results obtained, in terms of the perception of teaching performance regarding the use of virtual tools, are reflected in the general satisfaction of 70.9%, in the little satisfaction of 24.1% and in the dissatisfaction of 5% with the quality of virtual teaching. This is similar to what was obtained in [13], where it is pointed out that regarding the performance of the teacher in the use of virtual tools, 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 various didactic tools within their teaching, which makes students perceive that their experience in the acquisition of knowledge is not being fed correctly. Regarding the interactivity of the teacher and student in [35], it is pointed out that technological skills favor the development of educational processes that seek to be innovative, which, in turn, allow the student body a more direct interaction with the teaching staff. In other words, technological skills are directly related to people's skills, knowledge and attitudes regarding the use of ICTs in different areas of application. Likewise, as indicated in [36], interaction mechanisms through virtual environments have led to learning spaces being able to diversify. Currently there are not only formal spaces for learning, but also those considered non-formal and informal learning spaces, which, supported by digital environments, can be highly constructive spaces, where learning and collaborative work serve as new proposals to generate knowledge.

Regarding the application of virtual tools as part of the teaching strategies in engineering students [11], it is pointed out that although technology is experiencing great innovation due to the virtualization of teaching, to be successful, it is vital in the community of engineers that optimal teaching management is provided, prior to planning, in order to correctly integrate virtual tools into the curricular plan. The results in terms of student dissatisfaction can be answered in [37] where it is noted that in Peru almost 98% of teachers are located only at a first level of mastery of digital skills, making use only at the elementary level ICT; For this reason, there is a need to update the first phase of the national technology strategy, gradually and in levels: explorer, expert, and leader. Likewise, as indicated in [26] in Peru, the training and development of

digital skills in teachers were accelerated due to the pandemic and virtual teaching, reflecting that 83.0% of teachers in Peru participated in virtual courses and 67.0% were trained in the use of ICT. This scenario led to the majority of teachers having an approach to digital tools; however, if compared to some standards in the region, it would be missing to raise the degree and level of teacher mastery to a degree of expert and leader with the possibility of guaranteeing the success of virtual teaching in this pandemic context. Next, by means of the Chi-Square test and the Spearman correlation coefficient, we will statistically determine which indicator has a greater relationship between the indicators that make up the teaching performance variable regarding the use of virtual tools (ID1-ID9) with the variable quality of teaching offered to students during distance education (OD1). The results are shown in Table 1.

Table 1. Chi-Square Test

	OD1	
	Chi-square	Spearman correlation
ID1	0.000	0.727
ID2	0.000	0.867
ID3	0.000	0.819
ID4	0.000	0.740
ID5	0.000	0.818
ID6	0.000	0.750
ID7	0.000	0.862
ID8	0.000	0.723
ID9	0.000	0.849

As can be seen in Table 1, all the indicators of the teaching performance variable regarding the use of virtual tools (ID1-ID9) have an asymptotic significance (bilateral) equal to 0.000, which initially validates the relationship between the variables. In analysis; Likewise, by means of the Spearman correlation coefficient, it can be indicated in a general way that there is a high level of relationship between the variables. Being the indicators, (ID2), (ID7) and (ID9), the ones that present a greater relationship with the assessment of the quality of the teaching that is offered to the students during distance education. That is, students perceive a better quality of teaching when they feel satisfied with the use of adequate technological tools and resources in their learning (ID2), when there is good interactivity between the teacher-student through technological tools (ID7) and when their doubts and questions regarding the use of technological tools are cleared up (ID9).

These results can be sustained, because ICT are means that support teaching and learning strategies, altering the way in which students and teachers interact and communicate, which affects the new ways of evaluating learning. Likewise, satisfaction in university education is based on positions that are aligned with the generation of new knowledge. Regarding the relationship between the indicators that make up the variable university teaching performance with the use of virtual tools (ID1-ID9) with the variable quality of teaching offered to students during distance education (OD1), Alejo and Aparicio [7] showed pointed out that the optimal assessment of the factors of teaching performance is due to the fact that there is a high degree of correlation between their development and student learning, with which it is inferred that teaching performance positively influences learning. In the same way in Eddington *et al*. [5], it was determined that the student's perception regarding the quality of the educational service is highly related to the technology that is used, with the modernization of equipment, and with the skill that the teacher shows regarding his use.

Likewise, these results are similar to those obtained in Silván *et al*. [16], where it is determined that 54.4% of the students perceive the competences above the good level, and 45.6% of the students perceive the competences with a bad level and regular, the latter percentage quite high. Which is related because the technological tools used do not allow a good interaction between the students and the teacher, which is why many times certain questions that arise during the development of class sessions remain unanswered. Having determined the indicators that are most closely related to the assessment of the quality of teaching offered to students during distance education, in the following analysis we will describe the existing relationship in percentage terms according to each level of satisfaction (1: dissatisfied, 2: little satisfied, 3: satisfied and 4: very satisfied).

Table 2 shows the analysis between the ID2 indicator and the OD1 variable. From Table 2, it can be indicated that there is a 61.5% relationship between students who are dissatisfied with the use of appropriate technological tools and resources in their learning (ID2), with which they state they are dissatisfied with the quality of teaching during distance education (OD1). On the other hand, there is a relationship of 73.6% in those who agree to be very satisfied with both indicators (ID2 and OD1), 86.1% in those who agree to be satisfied and 67.4% agree to be little satisfied with indicators ID2 and OD1. Table 3 shows the analysis between the ID7 indicator and the OD1 variable.

Table 2. Cross table of ID2 and OD1

		OD1				Total
		Dissatisfied	Little satisfied	Satisfied	Very satisfied	
ID2	Dissatisfied	61.5%	25.6%	10.3%	2.6%	100.0%
	Little satisfied	3.6%	67.4%	27.5%	1.6%	100.0%
	Satisfied	1.0%	7.3%	86.1%	5.6%	100.0%
	Very satisfied	1.1%	3.4%	21.8%	73.6%	100.0%
	Total	7.1%	5.0%	24.1%	58.3%	12.6%

Table 3. Cross table of ID7 and OD1

		OD1				Total
		Dissatisfied	Little satisfied	Satisfied	Very satisfied	
ID7	Dissatisfied	69.4%	19.4%	5.6%	5.6%	100.0%
	Little satisfied	6.6%	71.3%	21.3%	0.7%	100.0%
	Satisfied	0.5%	15.2%	80.7%	3.6%	100.0%
	Very satisfied	0.0%	1.0%	29.4%	69.6%	100.0%
	Total	5.0%	24.1%	58.3%	12.6%	100.0%

From Table 3, it can be indicated that there is a relationship of 69.4% between the students who are dissatisfied with the interactivity between the teacher-student through technological tools (ID7), with those who state they are dissatisfied with the quality of teaching during distance education (OD1). On the other hand, there is a relationship of 69.6% in those who coincide in being very satisfied with both indicators (ID7 and OD1), 80.7% among those who coincide in being satisfied and 71.3% among those who coincide in being little satisfied with the indicators ID7 and OD1 indicators. Finally, in Table 4, the analysis is carried out between the ID9 indicator and the OD1 variable. In which it can be indicated that there is a relationship of 76.7% between the students who are dissatisfied with the fact that the teacher answers their doubts and questions regarding the use of technological tools (ID9), and those who state they are dissatisfied with the quality of teaching during distance education (OD1). On the other hand, there is a relationship of 63.4% between the students who state that they are very satisfied with both indicators (ID7 and OD1), while 78.8% coincide in being satisfied and 76.6% agree in being little satisfied with the indicators ID7 and OD1.

Table 4. Cross table of ID9 and OD1

		OD1				Total
		Dissatisfied	Little satisfied	Satisfied	Very satisfied	
ID9	Dissatisfied	76.7%	10.0%	13.3%	0.0%	100.0%
	Little satisfied	6.3%	76.6%	14.4%	2.7%	100.0%
	Satisfied	1.1%	16.7%	78.8%	3.5%	100.0%
	Very satisfied	0.9%	6.3%	29.5%	63.4%	100.0%
	Total	5.0%	24.1%	58.3%	12.6%	100.0%

5. CONCLUSION

Technological skills favor the development of educational processes that seek to be innovative, which, in turn, allow the student a more direct interaction with the teacher. That is, the skills of the University Teacher with the use of virtual tools are directly related to the skills, knowledge and attitudes of people regarding the use of ICT in different areas of application. For this reason, it is important to train or prepare teaching staff in technological skills, which should be included in the teacher's teaching strategies. The teacher must be trained to provide the student with learning experiences that are mediated by ICT, according to the current context in which they operate. Therefore, technological skills should be part of the basic and professional training of teachers. During the development of the research, it was identified that the satisfaction regardxing the teaching performance with the use of virtual tools focuses on the critical, constructive and positive attitude towards the technological tools and in the acquittal of the students' questions regarding the use of virtual tools. On the other hand, the indicator that is related to low student satisfaction focuses on the low diversity of methodological strategies used for the development of virtual learning sessions. Likewise, the Chi-square test shows the significant relationship between the perception of the performance of the university teacher with the use of virtual tools and the perception of the quality of teaching offered to engineering students during the development of education from distance.

Given what was obtained, it is suggested to deepen strategies for the definition of dimensions and indicators of each engineering career of the higher institution, in such a way that a profile of technological

competences can be elaborated to define a concrete plan of action that enhances the continuous and/or permanent training of the teacher in the acquisition of the skills and abilities necessary to make a correct use and integration of digital technologies in the training processes, according to the curricular plan of each professional career. Likewise, this allows the teacher to manage their pedagogical practice with tools, resources and digital environments during virtuality with projection to a post-pandemic context.

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