

Asynchronous learning: evaluation of virtual classroom metrics according to the perception of university students

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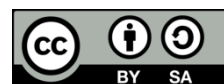
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ABSTRACT

The process and means that the university offers its students must be efficient and of quality, even more so considering the influence of the quality of educational services on student satisfaction. The objective of this article is to analyze the perception of asynchronous learning according to the evaluation of the virtual classroom metrics, carried out by business administration students, the results will allow to continue improving the teaching-learning process in the virtual context of education higher. The methodology of this study is qualitative at the descriptive level, the validation of the data by Cronbach's Alpha, gave a reliability value of 0.985. The results show us that 73.8% of the students perceive that the virtual classroom improved communication and helped the exchange of information between students and 71.4% indicated that the use of the virtual classroom made them more efficient and secure asynchronous learning activities. According to these results, there is a higher percentage of students who consider that the use of the virtual classroom positively influences their asynchronous learning, therefore, it is proposed to continue improving the skills in the use and appropriation of technologies of information and communication technology (ICT) in virtual students.

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1. INTRODUCTION

Society is currently immersed in a spiral of technological transformations that have led to numerous changes, regarding the educational sector, the use of technology more than a complement today is a necessity [1]. Due to the health emergency, worldwide, educational systems have had to respond urgently to a new situation, modifying presentiality to a totally distance education [2]. In this way, students and teachers have been impacted by the temporary cessation of face-to-face activities, thus readapting their educational activities to a virtual model with new forms of teaching-evaluation [3], [4]. Given this, teachers have assumed an indispensable role for the continuity of teaching, applying strategies, assuming the challenge that non-face-to-face education implies, which are classified into synchronous and asynchronous learning [5]-[7]. In the present context of virtual education, the evolution of technology generates new learning models, which require the presence of new and renewed methodological visions, now more focused on curricular design,

administrative management and the rational and appropriate use of the available means, especially information and communication technologies (ICT) [8], [9]. ICT can be used to motivate and improve student learning, the use of technological resources, computer applications, to carry out interactive classes in collaborative environments, seeking to generate a benefit in teaching, because it allows interaction through the use of technology in a virtual environment [10]. One technology option is virtual classrooms, which allow the creation of asynchronous learning spaces in which collaborative, reflective and critical activities can be carried out, in order to promote relevant learning experiences [11]. Within the educational environment, the services that are provided, such as virtual classrooms, are an essential means in the context of distance education, and their performance metrics are relevant in terms of their availability assessment [12], [13].

Such a situation arouses the interest of the scientific community, as it deserves to carry out studies to submit them to an analysis and to be able to develop more effective teaching models [14], [15]. Within these studies, academic satisfaction is evaluated through surveys, student satisfaction is seen as a dynamic process related to the level of education of the institution, the perception and understanding of students regarding their learning and environment where this is developed [16]-[18]. The process and the means that the university offers to its students must be efficient and of quality, even more so taking into account the influence of the quality of educational services on student satisfaction [19]-[21]. Therefore, if a high degree of satisfaction is obtained, the quality of the service provided by the virtual classroom is made known, in terms of the development of the subject through asynchronous learning [22], [23]. However, what is offered by the virtual classroom would be inefficient, if a high percentage of student satisfaction is not obtained [24], [25]. Since students must be the main beneficiaries of the service provided by the university, since, from their perspective, they can assess the level of education, this being an indicator to improve the quality and progress of the academic activities of the institutions [26]-[28].

In this sense, the present study constitutes a valuable tool for the institution of higher education and for students, by establishing a frame of reference regarding the level of education through the virtual classroom and the factors that intervene in the learning process. Therefore, the objective of this study is to analyze the perception of asynchronous learning according to the evaluation of the metrics of the virtual classroom, carried out by business administration students. The results will allow to continue improving the teaching-learning process in the virtual context of higher education.

2. LITERARY REVIEW

The competency-based training model is one of the issues that has challenged higher education in recent years, and where the identification of the competencies that determine good teaching becomes essential for the world of higher education [1]. Going from content-focused teaching to another in which general competencies and general skills are strengthened, not only of the student but also of the teacher, must be assumed as a commitment to change by both. This transformation of teaching must be accompanied by a participatory attitude of educators and students, where a collaborative culture of change is promoted and educational programs are created that allow student mobility [3]. Regarding the research that supports this study, in [7] presents us with a study whose purpose was to identify the ICT competences of the students from the perspective of the teachers, said 5 research was carried out in a virtual postgraduate group, among the conclusions it is found that some of the works elaborated by the students show few deepening skills, continuous learning, as well as a lack of ethical skills in the use of information. They also evidenced a performance gap between what is considered by the students to be competent in the use of ICT and the way in which this competence is evident in the work done, as well as in the assessment that teachers make of their abilities. Raising the need to formulate training strategies for students prior to admission to virtual modality programs in a way that ensures the conditions so that they can assimilate and deepen ICT skills.

It is possible to carry out the analysis of the acquisition of ICT skills, this through the application of an assessment instrument that intervenes in the population under study before and after taking a course, which must be structured based on pedagogical guidelines designed for environments of virtual learning [29]. Among the different results, it is found that it was possible to identify that ICT competence can be worked on transversally during the training of students, so it is necessary for teachers to rigorously analyze the technological tools to be used, so that their selection is adequate and it is achieved, as well as promoting an adequate use that generates in students the skills of debugging, analysis and delimitation of the data found on the web as well as in any other information system [18]. A fundamental element to improve ICT skills in students are the teachers, from whom a transformation of their actions is demanded, since the learning achieved by the students is directly related to the quality of the practices in the classroom, that is, it must be taken into account that the teacher is the central agent on which ICTs are used in a significant way and that despite the fact that many of them have a regular use of technology, they require the development of these skills [4]. In an investigation focused on identifying the evaluations of the participants in relation to their experiences and learning developed from the use of an educational innovation, in a population of 151

students, it has been determined that 48% of students did not know the Google Drive tool and its functionalities prior to their participation in the research, as for the students who did know the tool, only 7 of them, that is, 5%, had had experience of collaborative work online [30].

3. METHOD

The methodology of this study is qualitative at a descriptive level, because the results of the perception of asynchronous learning will be analyzed according to the evaluation of the virtual classroom metrics, carried out by the 756 students from the first to tenth cycle of the professional career of business administration in the academic semester 2021-A, from a public university in Peru. After that, the relationship between the asynchronous learning perception indicators and the virtual classroom metrics will be analyzed by means of Chi-squared and crossed tables. In addition, it is intended to determine the level of relationship between the indicators under analysis by means of the Spearman statistic, used for qualitative approaches. The instrument used is a survey, which is made up of the indicators shown in Tables 1 and 2. The indicators in Table 1 refer to how the perception of asynchronous learning will be determined, which in order to facilitate the processing From the data collected, a coding was established through the acronym ALi (asynchronous learning), in which the subscript "i" represents each indicator, in this case "i" goes from 1 to 7. Likewise, the indicators of Table 2 refer to how the perception of the virtual classroom metrics will be determined, for which the acronym Mj (Metric) was used as the coding of the indicators, in which the subscript "j" represents each indicator of this variable, in this case "j" goes from 1 to 7. The validation of the instrument was carried out through the research published in [6]. It should be noted that the Likert scale of 5 levels of perception was used for processing the collected data. The validation of the data by Cronbach's Alpha, yielded a reliability value of 0.985. It should be noted that the results were processed with SPSS and Microsoft Excel software.

Table 1. Asynchronous learning perception indicators

Asynchronous learning indicators	
AL1	The virtual classroom allowed increasing asynchronous learning
AL2	Faced with any difficulty, the virtual classroom helped him to seek support from teachers or his classmates
AL3	After class time, the virtual classroom facilitated communication between teachers and students
AL4	The virtual classroom helped group learning by allowing communication through digital platforms
AL5	The virtual classroom improved communication by exchanging information between students and teachers
AL6	The virtual classroom favored social relationships promoting team learning
AL7	The virtual classroom made learning activities more efficient and safe

Table 2. Virtual classroom metrics

Virtual classroom metrics	
M1	You have access at any time to the information uploaded in the virtual classroom
M2	The material and resources available in the virtual classroom enhance meaningful learning in students
M3	The virtual classroom offers a personalized learning space for students
M4	The virtual classroom offers multiple advantages that meet the expectations of the asynchronous learning process
M5	The virtual classroom offers educational resources that complement asynchronous learning
M6	The evaluation strategies used by the teachers in the virtual classroom allowed them to achieve the competencies established in the course
M7	I have the necessary knowledge to manage the virtual classroom

4. RESULTS AND DISCUSSION

Initially in Figure 1, the results are shown regarding the perception of business administration students in the asynchronous learning process. The study carried out in [27] indicates that only 3.44% of surveyed students affirm that the tools of the virtual classroom did not allow them the necessary communication between their classmates and teachers. Which is why they point out it as inappropriate for virtual learning, while the 47% of them agree in total with the use of the virtual classroom for these purposes.

Figure 2 shows the results regarding the evaluation of the virtual classroom metrics. The results indicate that 73.9% of the students indicated they fully agree that they have access at any time to the information uploaded in the virtual classroom (M1). Likewise, 73.8% of the students indicated they fully agree, that they had the necessary knowledge to manage the virtual classroom (M7). While 26.2% of the students indicated they neither agree nor disagree that the virtual classroom offers a personalized learning space to students (M3) in the same way, 21.4% neither agree nor disagree that the Virtual classroom offers multiple advantages that meet the expectations of the asynchronous learning process (M4). On the other

hand, 16.7% indicated that they totally disagreed that the material and resources available in the virtual classroom enhance meaningful learning in students (M2) and that the virtual classroom offers educational resources that complement asynchronous learning (M5). As indicated in [28], 72.5% of users give a low rating to the use of the virtual classroom, when they consider that this tool does not meet the expectations of asynchronous learning.

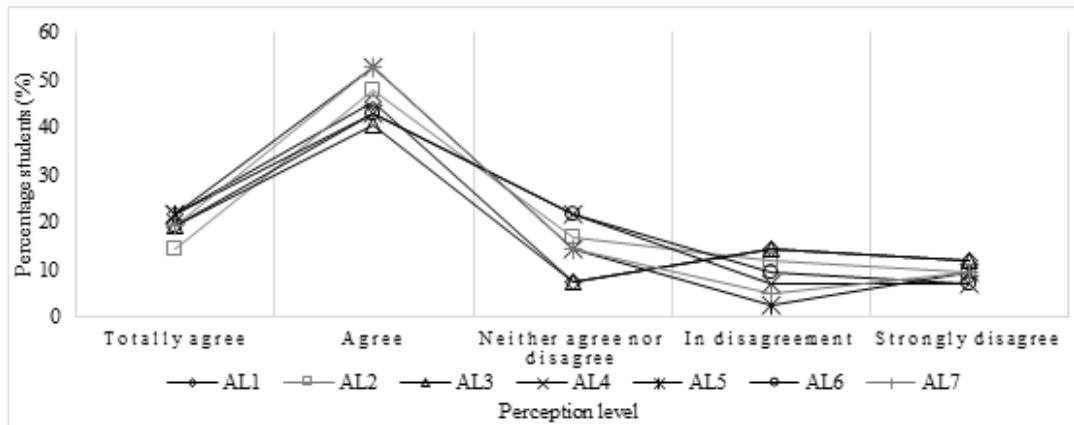


Figure 1. Perception of business administration students in the asynchronous learning process

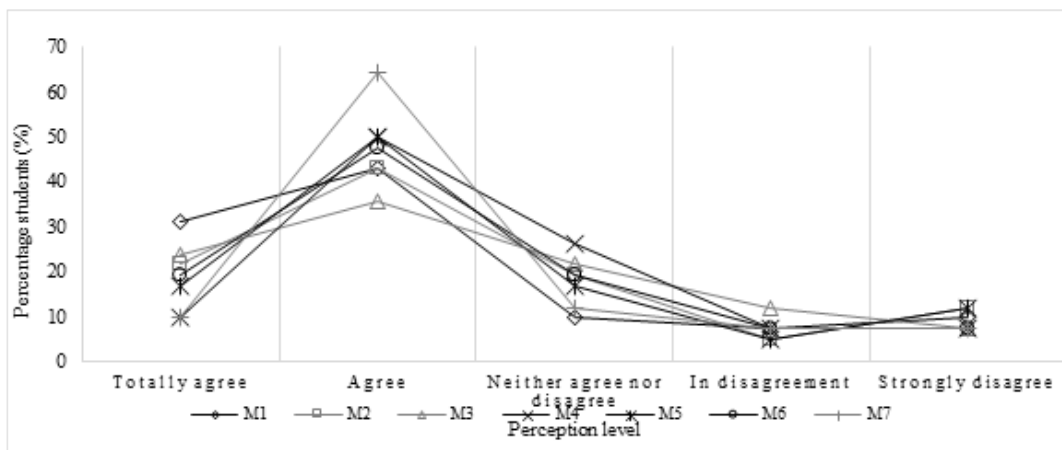


Figure 2. Evaluation of the virtual classroom metrics

López *et al.* [31] the students surveyed have responded that it is of vital importance that digital educational resources work quickly and effectively, in view of this, 60% consider that the use of the virtual classroom makes the activities carried out in the classroom more efficient and safe the subjects of their specialty. From these results, we can point out in a general way that 65.98% of students are very satisfied with the use of the virtual classroom and consider that it positively influences their learning, due to the service it provides. However, 16.6% of students are dissatisfied with the service offered by the virtual classroom, perceiving that this did not allow them to increase asynchronous learning and I facilitated communication between teachers and students, either due to the material and resources that it is available in the virtual classroom that does not enhance meaningful learning or because of educational resources that complement asynchronous learning.

Regarding the results in [32] it is indicated that 62% of the students considered that they prefer their teaching using information and communication technology (ICT) tools. Since this enhances and reinforces their learning, 62.5% stated that the ICTs used were beneficial for classes and professional skills acquired and 59% agreed with the fact that ICT was more effective than traditional classes. Next, the relationship between the asynchronous learning perception indicators and the virtual classroom metrics is determined by means of the chi-square test.

As can be seen in Table 3, for all cases the asymptotic (bilateral) significance is equal to 0.000, which confirms the existence of a relationship. By means of Spearman's correlation coefficient, the degree or level of relationship is determined. Table 3 shows the high and very high degree of relationship existing between the indicators under analysis. In Tabassum [33] it is pointed out that there is a moderate and significant relationship between the indicators of the technological tools and the collaborative learning of the student's university demonstrated by Rho Spearman by 0.722 and a significance of $p < 0.01$. Using the cross-table relationship technique, we will describe the results in terms of student perception. For this analysis, we will choose the indicators that have a higher level of relationship Table 3. In Table 4 we will analyze the relationship of the students' perception according to indicators AL4 and M4.

Table 3. Correlational analysis

Spearman	Chi-square			0.000			
	M1	M2	M3	M4	M5	M6	M7
AL1	0.839	0.693	0.755	0.723	0.752	0.696	0.635
AL2	0.763	0.755	0.836	0.733	0.789	0.763	0.670
AL3	0.807	0.803	0.859	0.704	0.734	0.754	0.665
AL4	0.731	0.715	0.715	0.864	0.832	0.760	0.796
AL5	0.798	0.861	0.794	0.663	0.742	0.698	0.710
AL6	0.815	0.797	0.816	0.810	0.781	0.834	0.738
AL7	0.681	0.707	0.685	0.687	0.788	0.813	0.849

Table 4. Cross tables AL4 and M4

	M4					Total
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	
Strongly disagree	100%	0.0%	0.0%	0.0%	0.0%	100%
Disagree	0.0%	100%	0.0%	0.0%	0.0%	100%
AL4 Neither agree nor disagree	0.0%	0.0%	88.9%	11.1%	0.0%	100%
Agree	0.0%	0.0%	16.7%	83.3%	0.0%	100%
Strongly agree	0.0%	0.0%	0.0%	55.6%	44.4%	100%
Total	7.1%	7.1%	26.2%	50.0%	9.5%	100%

From Table 4, it can be indicated that 7.1% of the total of 756 students indicated that they totally disagreed with indicators AL4 and M4, 16.7% who agreed that the virtual classroom helped group learning by allowing communication through digital platforms (AL4) indicated that they neither agree nor disagree that the virtual classroom offers multiple advantages that it meets the expectations of the asynchronous learning process (M4). Ouchaouka *et al.* [34] it is pointed out that the indicators of communication modalities and digital learning environments reflect an excellent internal consistency with relational values of 0.88 and 0.84 regarding the reversed pedagogy approach of the biology course. Likewise, in Table 5 we will analyze the relationship of the students' perception according to the AL5 and M2 indicators. The results show that 75% of the student students indicated that they totally disagreed with the AL5 and M2 indicators, 18.2% agreed that, during asynchronous learning, the virtual classroom improved communication through the exchange of information between students and teachers (AL5) indicated that they did not agree or disagree that the material and resources available in the virtual classroom enhance meaningful learning in students (M2).

Table 5. Cross tables AL5 and M2

	M2					Total
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	
Strongly Disagree	75.0%	25.0%	0.0%	0.0%	0.0%	100%
Disagree	0.0%	100.0%	0.0%	0.0%	0.0%	100%
AL5 Neither agree nor disagree	33.3%	0.0%	66.7%	0.0%	0.0%	100%
Agree	0.0%	0.0%	18.2%	72.7%	9.1%	100%
Strongly agree	0.0%	0.0%	0.0%	22.2%	77.8%	100%
Total	11.9%	4.8%	19.0%	42.9%	21.4%	100%

Next, in Table 6 we will analyze the relationship of the perception of the students according to the indicators AL3 and M3. From Table 6, it can be indicated that 7.1% of the total of 756 students indicated that they totally disagreed with indicators U3 and D3, 11.8% who agreed that after class time, the use of the virtual classroom facilitated the communication between teachers and students (AL3) indicated that they do not agree or disagree that the virtual classroom offers a personalized learning space to students (M3). Given the results obtained in Figure 3, the factors that have been best evaluated in relation to asynchronous learning and the metrics of the virtual classroom are shown, such as the factors that students have indicated not to be completely satisfied, for which strategies should be applied of improvement that influence the degree of academic progress of the subjects and the performance of business administration students.

Table 6. Cross tables AL3 and M3

		M3					Total
		Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	
AL3	Strongly Disagree	100%	0.0%	0.0%	0.0%	0.0%	100%
	Disagree	0.0%	100%	0.0%	0.0%	0.0%	100%
	Neither agree nor disagree	0.0%	10%	70%	20%	0.0%	100%
	Agree	0.0%	0.0%	11.8%	64.7%	23.5%	100%
	Strongly agree	0.0%	0.0%	0.0%	25.0%	75%	100%
	Total	7.1%	11.9%	21.4%	35.7%	23.8%	100%

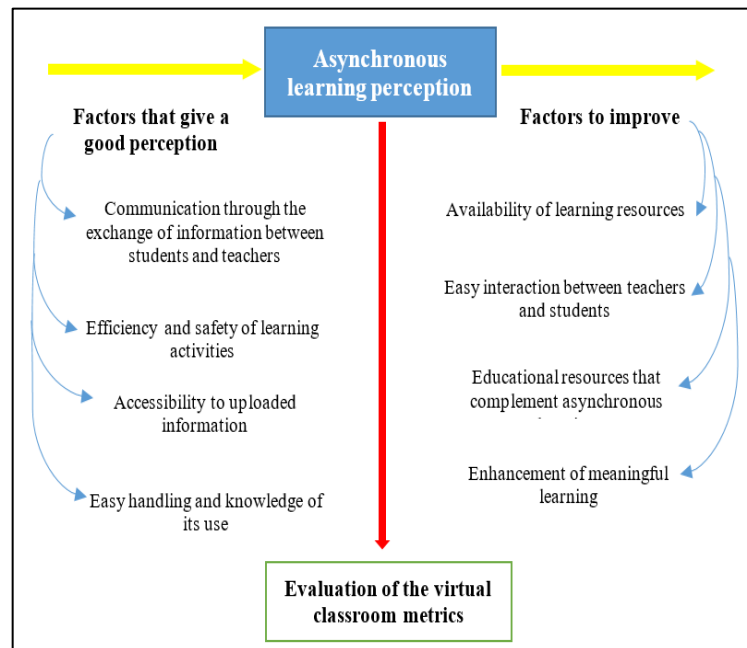


Figure 3. Evaluation of the virtual classroom metrics

5. CONCLUSION

In these times, students easily use technology, which facilitates the insertion of new digital strategies to impart the teaching-learning process, virtual classrooms, should help students to feed back their knowledge, share information regarding the topics taught in class and interact with teachers or other students. For this reason, accessibility, functionality and reliability become essential elements to take into account when conducting a service quality measurement review in educational environments, as they are common metrics among information technology systems.

Part of the success of virtual programs is based on student satisfaction and the quantitative and qualitative assessment that they perceive in this virtualization context. This research shows that 65.98% of students are very satisfied with the use of the virtual classroom and consider that this positively influences their learning, because they perceive an improvement in communication through the exchange of information between students and teachers. They also agree that the virtual classroom made learning activities more

efficient and safe since they have access to the loaded information at any time and they have the necessary knowledge to handle it. However, 16.6% of students are dissatisfied with the service offered by the virtual classroom, perceiving that this did not allow them to increase asynchronous learning or facilitated communication between teachers and students, either due to the material and resources that It is available in the virtual classroom that does not enhance meaningful learning or because of educational resources that complement asynchronous learning.




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