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Telecommunications and virtualization in times of pandemic: Impact on the Electrical Engineering career

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Abstract

With the surprise arrival of Covid-19 at the end of 2019, the course of the world has undergone a 360° change, directly hitting the commercial, business, tourism, and especially the sector educational. This "pandemic" has forced the transfer of classrooms to the homes of students and teachers, bringing with it problems and at the same time solutions to the different aspects and points of their lives outside the student and work environment. Some of these problems lie in personal and family relationships. During all the chaos of the pandemic, Higher Education Institutions have had to adapt to what is known as "virtualization", leaving aside tasks and face-to-face tasks completely. Thus, a mapping of the strengths and weaknesses of the University sector has been achieved, allowing these strengths to be enhanced to reduce weaknesses and be prepared for the next health emergency. This article tries to highlight the different difficulties that have appeared throughout the migration process from face-to-face to virtual. For this, it has been chosen to carry out surveys to certain students of the electrical engineering career, taking into account their point of view to establish a precedent within the investigation.

Contents

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1 Introduction

COVID-19 located for the first time in Wuhan, Hubei province, China (Quiroz et al., 2020), has broken the established schemes and protocols, within a society that was not prepared to face a "pandemic" of such magnitude. This refers to the fact that the main danger within this state of emergency has been misinformation and fear caused in the minds of many, which caused an abysmal decline in the economy, spirituality, and social welfare of millions around the world. The following article aims to address these issues focused on the university reality and to be more specific to the reality presented in the homes of parents, teachers, and students, who have had to move the classrooms to their family environment.

According to Aparicio (2009), the technologies that have been appearing have facilitated different tools to enhance education and extension of services in the face of the pandemic, without taking into account time and space, attenuating the areas of education, computing, and collaboration (Bravo et al., 2020; Zhang et al., 2020). Above all, this is necessary for the government to provide, in a timely and accurate manner, rapid, open, and reliable information, from a scientific point of view.

According to Cabero (2000), the application of ICT is the response that has been developed to face a time in which it is necessary to keep distance, but at the same time be closer (Dominikus, 2020; Khan & Smith, 2020; Rayuwati, 2020). This through the creation of virtual learning environments based on synchronous and asynchronous communication systems. It is about building hypertextual information environments that allow interaction between the users of the system, with updated feedback through the connection to the network and being of a collaborative nature, thus breaking the space-time barriers that are presented in face-to-face communication (Navarrete et al., 2020). Other techniques can be applied in times of isolation, such as marker spaces (Pérezet al., 2020).

These virtual environments through ICT provide synchronous communication, which is the transmission of information in real-time, for example, videoconference platforms and others such as Facebook (Zambrano et al., 2020). On the other hand, asynchronous communication is more accessible in terms of time. It facilitates the environment for University students, since the classes are in delayed times, using emails, audiovisual material, messaging, in addition to the use of technologies such as computers, telephones, tabes among others (Mendoza et al., 2020). It can be said that the synchronous medium is the one that enhances the collaborative environment, while the asynchronous one enhances self-learning.

According to Wahl (2020), the health crisis has forced us to veer rapidly towards virtuality, which implies joining forces and reviewing the work that each of our institutions has done in open educational resources, and then making them available to the public. different Ministries of Education and support the teaching community in the immense task of providing distance training to their students. At the Technical University of Manabí, which consists of approximately 35,000 students, distributed between undergraduate and graduate courses, it has had a great challenge when implementing virtual classes in its entirety, not only for its students but also for its body of teachers whom they had to train hard. It should be noted that the extensive list of Universities that address the face-to-face modality, consists of protocols to follow according to the provisions of the Ecuadorian State, but many of these have disadvantages due to the lack of experience in the virtual field.

Among the different tools and technologies used for virtuality are: email, blogs, Google suite, files in the cloud such as Drive and Dropbox. Educational platforms such as Google Classroom, Moodle, and the use of office automation tools. But, what happens with the reality that is presented in the homes of each student? Is it possible to establish a uniform education within the virtual environment? The problems presented range from lack of equipment to connect to class, internet connection problems, lack of discipline on the part of teachers and students, and intra-family problems.

It has been proposed to carry out a virtual survey within a group of students in the 5th semester of the Electrical Engineering career, where they are asked questions related to their experience in the Virtual classroom called EVA and their willingness to continue in this medium (Keizer et al., 2002; Khater et al., 2020). Said survey is respectively filtered through Excel and proposed statistically to obtain an easier reading. Using the virtual medium for this purpose, a survey link is obtained by Google, where questions are established based, as previously said, on the experience of the students before virtuality and its different problems.

2 Materials and Methods

The survey technique is one of the most widely used research methodologies in the empirical field because it allows obtaining and preparing data and tables in an orderly manner to present them in the form of graphs. For this research, the creation of a Google form is chosen, which is applied to a sample of 50 students from the Electrical Engineering career. In this form, questions with multiple options and others with free responses are asked where the individual problems of the students are detailed. This questionnaire was shared in WhatsApp groups of students with the permission of the teachers and tutors in charge. Some varied and significant responses were obtained. Hoping that this applied study goes from a local level to an international level.

3 Results and Discussions

As it can be seen that, by associating the results obtained with the purpose of the proposed investigation, it is noted the importance that virtuality has had in this time of the pandemic, and especially the communication networks that allow through educational and videoconferencing platforms, optimal teaching through the virtual environment. Within the survey, a series of questions related to the use of the Virtual Learning Environment (VLE) is presented, in which it was determined that all students have access; but they have not had an induction on the management of the VAS, and the results can be seen in figure 1.

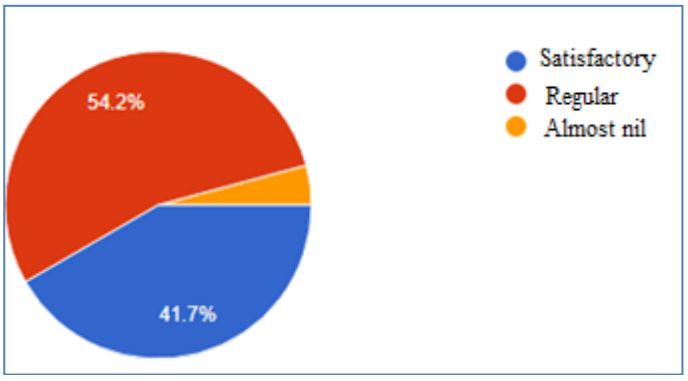

Figure 1. Induction received on the management of the VAS

There are 54.2% of the students have had a regular induction and 41.7% satisfactory. to which the question arises, should it be done to achieve that uniformity in training on the virtual medium? In figure 2, it is shown how the students consider the delivery time of the tasks, it is noted that the largest number of students consider that the task time is satisfactory.

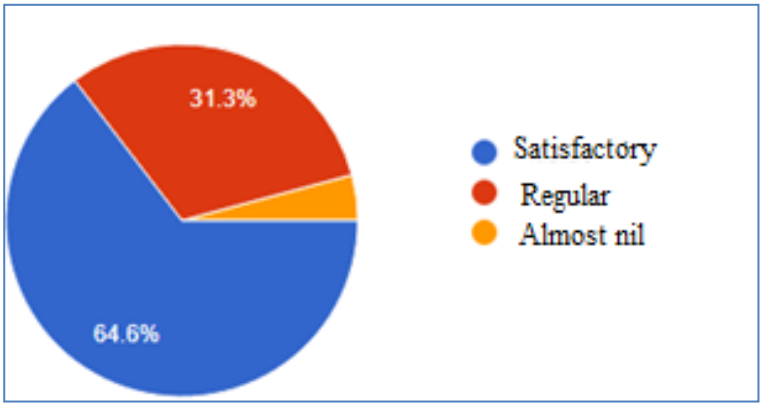

Figure 2. Task delivery time

Despite this, the rest of the students do not consider the assigned time adequate. In figure 3, the appraisals and experiences that students have had are shown of the Virtual modality.

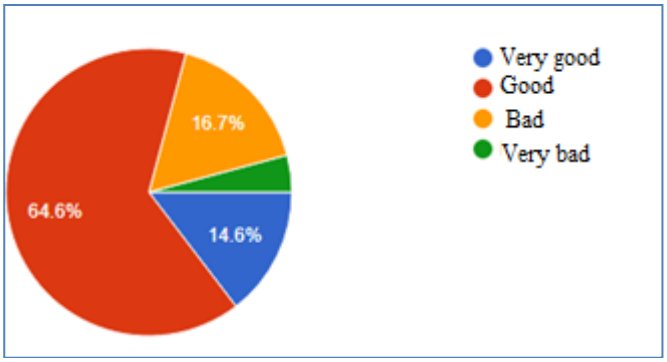

Figure 3. Experience within the Virtual modality

As you can see, the responses show that not everything has been satisfactory because they have faced difficulties that in many cases have conspired with obtaining good results, such as poor internet connection, lack of equipment to connect, overwork, carelessness of students in their deliveries. It should be noted that many of them are working today due to the precarious economic situation that the family has presented. Despite the difficulties, students have found favorable factors in this period of the pandemic, reduced expenses generated by traveling to the university, and safeguarding health and life.

It should be noted that despite the problems raised by the circumstances of the social environment in which the research is presented, students manage to access the Virtual Classroom through different devices and means of connection, either lacking a good internet service or from a team fast enough to do it quickly. Despite the data collected and the number of favorable responses obtained, it is noted that students prefer the face-to-face environment. This could be due to different reasons already exposed before, but it is interesting to see that many of those reasons exposed such as task overload, poor connection, little time, are reasons that exist even in the face-to-face environment, present, but not perceived because of the closest social interaction before virtuality. It was taken into account in the investigation is the fact that in Ecuador not all homes have a fixed internet connection, many still resort to "Cybers" to access to perform tasks and upload them later, generating additional expense and insecurity of the use of the virtual medium.

According to the INEC (2019), based on censuses carried out in 2019 on the use of ICTs, there are 54.5% of households without an internet connection, this being a significant number for the implementation of virtual tools. 40.8% of people do not have an internet connection, in the same way only 40.1% of people have an active cell phone. It also shows 11.4% digital illiteracy. Virtualization has been the means of facing these hard times, not only in the educational and commercial sphere but above all in the personal and social sphere, ensuring that families are united in these difficult moments, causing many students to share more in families and manage to face this stage of study while keeping your family safe (Rodríguez-Haro et al., 2012; García-Valls et al., 2014).

This sudden change in the higher education system from the virtual medium to the ICT medium has caused a need for self-education in technological media and the new technologies of education and communication. However, the virtual environment for the Electrical Engineering career, which requires practices, empirical methods, explanations in numbers, and experimentation in laboratories, has generated a gap that students have had to fill with different tools such as simulators, video calling platforms like Zoom, Jitsi meets, Google meets, etc. This is how teachers and the university have had to implement mechanisms to facilitate the development of topics with these characteristics.

Although the attention has focused on the technological means, the connections and the networks to be used. The conditions of the environment where each student and teacher live cannot be set aside, which continues to be of vital importance for the fulfillment of tasks in the virtual environment. It remains one of the most complex aspects, which the institution cannot easily change. According to an investigation made by the

Department of Industrial Engineering of Valle del Cuca y Cuaca (2020). A large number of teachers in their area assured that the migration to the virtual environment was easy, through ICT. And that, although the pandemic continues and face-to-face classes are not normalized, teachers continue to implement new technologies and increasingly modern tools that adapt to their subjects.

4 Conclusion

The pandemic made the world feel fear and uncertainty; but it was possible to get innovations that previously would have taken years to achieve, that is, the implementation of ICT for Universities efficiently. Real difficulties are shown, such as the lack of technology for students to receive their virtual classes, such as the internet connection, and the lack of technological equipment associated with the economic problems that the country is going through.

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