Student Perceptions of Emerging Virtual Teaching in Business Management Fields

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Abstract

In recent years, virtualization has been present in educational institutions, both in teaching-learning processes and in management and research, using the Internet to facilitate communication, document consultation and the virtual modality of courses, among others. This is why today the use of information technologies (ICT) is essential to facilitate the teaching process for teachers and the learning process for students. The objective of this study is to know about the perception of the students and the strategies implemented in the University Center of Economic-Administrative Sciences of the University of Guadalajara, to adapt the teaching and learning due to the contingency of COVID-19. The methodology is empirical and the data were obtained through interviews and the application of a questionnaire whose results were analyzed with statistical tools. The results show that students improved their autonomous learning, that the use of digital tools allows teachers to better explain the concepts, and that it is difficult to do teamwork and personal interaction but it is necessary.

Keywords: Covid-19, online education, higher education, education management

1. Introduction

In recent years, virtualization has been present in educational institutions, both in teaching and learning processes, in management and research by using the Internet to facilitate communication, document consultation and the virtual modality of courses, among others. This is why today the use of information technologies (ICT) is essential to facilitate the teaching process for teachers and the learning process for students. On 11 March 2020, the World Health Organization (WHO) declares a
pandemic state for COVID-19. To prevent the spread of the coronavirus, activities in almost all sectors were halted, and the Ministry of Public Education (SEP) decreed the suspension of classes in all schools for an initial period from 23 March to 17 April 2020 (DOF, 2020); likewise, the University of Guadalajara suspended on-site classes in high schools, undergraduate and postgraduate programs, stating that in order not to affect the training of students, the programs and activities would be carried out virtually. This situation led to the implementation of new strategies for carrying out teaching tasks.

In this context, face-to-face teaching had to be replaced by online teaching using technological means, noting, at this point, that there are substantial differences between the virtual educational modality itself and the model resulting from the application of emerging strategies to face-to-face courses, which were adapted by making use of the technological resources available; in other words, the virtualization of face-to-face education.

It is therefore a mistake to consider that the emergent virtualization of face-to-face courses means the transition to the virtual educational modality, since this modality requires not only the use of platforms, tools and technological resources used in an emergent manner to continue the educational process, but also requires instructional design based on educational methods and models that were born for virtuality. Decision-makers, staff and technical support teams at universities have done a lot of work to develop the necessary infrastructure and support for online teaching, as well as training courses for both teachers and students in the use of the technologies needed to enable online classes, while students have been confronted with a modality that demands greater discipline and commitment to learning.

The context for this study was the University Centre for Economic and Administrative Sciences of the University of Guadalajara (CUCEA-UdeG). This center is one of the six centers that make up the university network in the metropolitan area of Guadalajara. The university also has nine interdisciplinary regional centers and 165 higher secondary education centers distributed in the different municipalities of the state of Jalisco, and also, in order to provide university services, it has the Virtual University System (SUV), which is responsible for university activities in virtual environments. The CUCEA is made up of three divisions: Accounting, Economics and Society, and Business Management; it offers 14 bachelor's degrees, 19 master's degrees and six doctorates. The university center also offers training and computer culture development programs through the Coordination of Learning Technologies (CTA), which also supports academic programs that require ICT. In addition, there is the B-learning program, an enriched face-to-face program, which offers 134 courses for the different degree programs.

According to several authors, one of the characteristics that identifies distance education is the spatial or temporal separation, which promotes independent and flexible learning for students, supported by technological resources (Dolz, 2015); which also implies innovation to maintain the quality of education and in turn reduces costs (Chiecher, Donolo and Rinaudo, 2005; García, 2006). However, distance education is an educational modality that can have a percentage of face-to-face and another virtual, which will depend on the institution that provides it; sometimes, distance education does not require internet connection or technological resources, even the resources can be physical (such as correspondence education); but, for the purposes of this study we can speak of distance education in virtual environments as an educational modality, when we refer to that modality developed in virtual educational environments, with internet connection and with the use of technological resources.

Therefore, distance education in virtual environments requires quality as an educational action that distinguishes it as a modality, among them, an electronic platform, a curriculum designed for the modality, accessible and affordable sources of information; personnel, equipment and processes for the design, production and distribution of courses and educational materials, among others (Moreno, 2007). On the other hand, virtual education and online education can be considered as part of distance education in virtual environments. Virtual education necessarily requires an internet connection and communication between teachers and students usually takes place asynchronously.
In the case of online education, it has all the characteristics of the virtual modality, but it adds the fact that students can have synchronous communication with their classmates and teachers by coinciding in schedules, this modality usually uses video calls or live classes, in addition to other learning strategies in various virtual spaces. When face-to-face methods are mixed with the use of ICT, as necessary tools for the virtualization of the teaching-learning process, Blended Learning or better known as B-Learning (Silvio, 2006) emerges (Silvio, 2006). Having said this, it is worth mentioning that the use of ICT by itself does not automatically convert teaching-learning processes into virtual or online education, much less when it is carried out in emergencies. The teaching-learning processes that were developed in the COVID-19 contingency did not initially have an institutional design and planning or systematic models for their implementation and development.

Effective online education, as Hodges, Moore, Lockee, Trust and Bond (2020) point out, requires investment in an ecosystem of learner supports, which takes time to identify and build, with the development of a fully online university course requiring six to nine months of preparation before it is fit for delivery, and is consolidated by the third iteration of the course. Therefore, courses adapted for online delivery during the health emergency should not be considered online courses, but rather emergent remote courses, or as the authors call it, emergency remote modality. According to Sotelo (2017), the use of ICTs in education has shown to have an important role in enriching the teaching-learning process, with a positive impact by breaking down time-space barriers, they have contributed to the construction of communication and interaction channels between teachers and students, not only intra-institutionally, but also inter-institutionally, which strengthens not only learning but also collective/joint research. With regard to students, it is a useful alternative for those who cannot stick to school-based teaching (Almazán and Cárdenas, 2012).

However, it is also necessary to point out that, during the pandemic, students faced difficulties for the development of learning processes in remote modality, in this sense, Díaz, Ruiz and Egüez (2021), identified some of them, which are described below:

- Unreliable information: It is known that information on the Internet can vary in quality and accuracy. Not all online information is reliable, and during the pandemic students narrowed their choices of information sources to those found on the Internet. However, not all the internet users could have the skills to discriminate reliable and unreliable information.

- Internet distractions: The Internet offers a wealth of useful information and resources, but it can also be a major source of distractions. Some of the most common distractions students faced were social networking, constant news, online advertising, viral content, and multitasking online.

- Visual fatigue and other physical problems: The excessive screen time is a cause for visual fatigue.

- Incomplete learning: Across the board, students perceived (especially at the beginning of the pandemic) that their learning was incomplete due to lack of direct interaction, connection problems, lack of resources needed for learning, distractions from home environment, lack of motivation, and limited feedback from teachers.

- Waste of time: education in virtual modalities requires constancy, discipline and, above all, investment of time and effort due to the fact that many of the tasks are performed autonomously, in this sense, students perceived that they waste more time than in face-to-face modalities.

- Technical difficulties: poor quality connection negatively affected the learning experience in remote modality. Technical problems can interrupt classes, causing students to miss some of the content and having difficulties in active participation.

- Lack of technological resources: Some students did not have access to necessary resources, such as educational materials and specialized software. This may have limited their ability to delve deeper into topics and complete assignments effectively.
Although it is not a new issue, the current situation has forced the adoption of a distance modality, but, as Almazán and Cárdenas (2012) pointed out, it is important to analyze the possibility of replicating it and directing it to school students, and thereby define whether the strategies and actions carried out in the face of the contingency are adequate, but above all to identify whether the conditions of the students allow them to take advantage of this emerging window and how they perceive it.

The lack of established protocols for online learning in this context has generated a great deal of confusion throughout history, and uncertainty remains. Despite this, the global reaction in the education field was to give continuity to the training processes and the need for the research community to delve deeper into the effects that this has generated (Bazán, Quispe, Huauya and Ango, 2020). This revealed weaknesses related to the lack of infrastructure and technological resources, resistance on the part of academics to adapt, as well as a lack of training for teachers and students in their use, so that the migration to virtual classes was marked by improvisation, which also allowed for the reconfiguration of processes (De la Riva and Álvarez, 2020; De Vincenzi, 2020; Fundación Universitaria Católica del Norte, 2005).

All of this opens up an opportunity for students to access knowledge in a new modality, taking advantage of technology. However, Chiecher et al. (2005) highlight the existing educational gap given the unequal and inequitable availability of resources among students, which allow them to integrate and give continuity to the virtual teaching-learning process in the face of this emergency (Altuzarra, Gálvez and González, 2018; Armitage and Nellums, 2020; Cáceres, Jiménez and Martín, 2020; Orgaz, Moral and Domínguez, 2018; Sánchez, et al., 2020). In line with the latter, the study by Bazán et al. (2020) shows that online courses are highly valued by students with advantages of accessibility and connectivity, as they perceive less difficulty in the management of resources by teachers. Chiecher et al. (2005) carried out a comparative study between a face-to-face and a mixed group, in the results of which positive perceptions were obtained in the group that included the virtual modality.

In this sense, the study by Zoller (1992) is useful, as it seeks to deepen and understand students’ perceptions of teaching performance, including aspects such as course planning and organization; the technique and style of instruction; the use of didactic material and evaluation; as well as the results in student learning. Regarding the impact assessment, Sotelo (2017) points out that it is possible to base it on aspects such as the pedagogical approach in terms of participation and satisfaction with the elements of the course from the student’s perspective and academic performance, also taking into account the technological approach referring to accessibility to technological tools; the results show a positive impact of the virtual modality. However, it is premature to state that the results of such research are conclusive, which requires further study of distance education and the strategies that higher education institutions have followed to deal with the contingencies derived from the pandemic, as well as the perception that students have of it.

The aim of this study is to find out how CUCEA students perceive the distance-learning model and what strategies were used to continue with their education in the emergency situation. The starting point of this research is located one month after the start of online classes, at that time we applied an online survey through a questionnaire designed to know the opinion of students about the effectiveness of teaching skills and school performance resulting from the change from face-to-face teaching to the emerging virtual one; the survey was applied to a sample of 437 students who were studying in the CUCEA careers.

The analysis of the results showed that, from the perspective of some students, the alternative of distance-learning is not effective because, in their opinion, it means an excessive workload with few classes; they pointed out that in some subjects they were only assigned work and homework; on the contrary, for some others the continuity was normal both in terms of class time and activity load. Regarding the perception of the teachers’ ability to use digital tools and platforms, most of them assessed it as fair, and with regard to school performance, most of the students considered the impact to be high and very high. Secondly, after knowing the students’ opinion about the emerging change, the research continued to find out, on the one hand, how the CUCEA students perceive, one year
after the pandemic began, the online teaching model that had to be adapted, and on the other hand, what were the strategies, actions and resources implemented by the corresponding bodies to continue with the teaching-learning process and its adaptation to virtual education.

2. Materials and Method

The study is of an empirical nature, with a mixed methodology, the qualitative method consisted of structured interviews with the coordinator of Learning Technologies and the head of the Educational Design Unit, who were responsible for implementing the distance education model, and therefore the strategies followed to adapt the emerging remote education. As far as the quantitative method is concerned, first the information necessary to test the hypotheses of the study was defined, for which a questionnaire was designed, based on the proposal of Pérez, Vázquez and Cambero (2021), whose purpose is to ensure that the data obtained complies with all aspects of the objective of the study, which is to know the perception of CUCEA students about the distance learning model that due to the contingency was imperative to apply.

The health contingency led to the suspension of face-to-face classes and their substitution, in an emergent manner, by the remote modality at all levels of education, which implied the use of computer technologies, both learning platforms and virtual tools. It was also necessary to carry out refresher courses on virtual environments and online classes to mitigate the possible limitations that both teachers and students could present. The effort to preserve educational continuity by resorting to virtualization has brought to light various aspects, notably the socio-economic gap between students, in this sense, UNESCO (2020) points out that for students in vulnerable situations, the crisis can turn into a dropout, deepening the already existing inequality that is evident in the possibilities of access to higher education. In another study, Cabrera, Pérez and Santana (2020) confirm that online courses mostly affect students with lower cultural and socio-economic capital. From these perspectives it is established that:

H1: The availability of technological resources and access, as well as the individual characteristics of the students influence in the possibility of giving continuity to their studies in the emerging situation.

In order to deal with the contingency, it is essential that teachers have the knowledge, skills and abilities to create and modify teaching-learning processes that are available to students, so it is considered necessary to rely on ICT to strengthen this process.

H2: In face-to-face courses following the pandemic, the use of technological resources and tools has been integrated.

H3: The teachers’ knowledge and skills in handling digital tools are adequate to meet current needs.

H4: Connectivity in my locality is adequate to take my courses virtually.

In relation to communicative synchrony in online education, Hodges et al. (2020) note that it will depend on the characteristics of the learners and what best suits their needs, suggesting that synchronous sessions are more appropriate for young learners, while adult learners require more flexibility, so asynchronous is often better, perhaps with optional synchronous sessions. Based on these insights and because face-to-face courses were migrated to remote modality, it is expected that CUCEA students will respond to synchronous teaching, so the following hypothesis is established:

H5: The distance education model used by teachers, focuses on synchronous teaching.

It is clear that everyone’s daily life has had to be reorganized to adjust to confinement, and with it the loss of social contact. The break into everyday life in the university environment, therefore, involves new activities that must be evaluated, such as the decisions taken by the institutions, how the students perceive them and how they value the rupture of social interactions.
Educational institutions, faced with the pandemic, defined from the beginning, the continuation of training through online education, through the use of virtual platforms (UNESCO, 2020), but not all universities have technological and didactic resources. The UdeG is one of the higher education institutions in Mexico that has a history of virtual education through SUV, and various b-learning courses that are taught in the CUCEA, but not all teachers are familiar with this modality, so, given the contingency, they received courses of technological updating and acquisition of competences in digital teaching. Given this scenario, it is necessary to evaluate the impact of the emerging migration to online courses; therefore, the following hypothesis is put forward:

H6: Students value favorably the dynamics established for emerging remote courses.

To validate the hypotheses, a questionnaire was designed consisting of four sections. The first, aimed at collecting the socio-demographic characteristics of the student, includes information about age, sex, marital status, semester studied, degree, father’s and mother’s studies, work, and address before and during the contingency. The second section is aimed at obtaining information about the resources and the way in which students have dealt with the situation, about their resources and technological access, such as equipment available and internet connectivity, the response scales ranged from 1 “totally disagree” to 5 “totally agree”.

The third section refers to the use of learning platforms, technological and digital tools used during confinement, the questions were presented with 5 response options on a Likert scale, ranging from “never” to “always”. The fourth section, with the same response options as the previous section, aims to obtain information about the type of distance education model received. Finally, the fifth section aims to detect how students perceive virtual teaching from various perspectives: learning performance, decisions taken institutionally and the disadvantages and difficulties for virtual teaching and learning.

After designing the questionnaire, we proceeded to validate it, first, with Cronbach’s alpha to identify questions that do not provide value, in this case with the aspects related to the students' perception of the emerging remote modality; and second, with the Kaiser Meyer Olking statistic to corroborate that the factor analysis (FA) is adequate, verifying that the questions in the questionnaire are related. The results in table 1 show that the questionnaire is good (Cronbach’s alpha; 0.805> 0.8) and that the factor analysis is relevant because of the correlation between the questions and the theoretical factors (KMO; 0.755 > 0.5).

Table 1. Reliability of the questionnaire

<table>
<thead>
<tr>
<th>Cronbach’s alpha</th>
<th>N of items</th>
</tr>
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<tbody>
<tr>
<td>0.805</td>
<td>39</td>
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</table>

Kaiser-Meyer-Olkin measure of sampling adequacy...

Bartlett’s test of sphericity Approximate

<table>
<thead>
<tr>
<th>Chi-square</th>
<th>Degrees of freedom</th>
</tr>
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<tbody>
<tr>
<td>351.271</td>
<td>105</td>
</tr>
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</table>

| Sig. | 0.000 |

Source: Own elaboration.

The data were obtained from a sample of 413 enrolled students, assigned to all semesters and the 14 degrees of the CUCEA-UdeG, the students voluntarily answered the questionnaire provided in Google Forms, whose characteristics are: average age 20 years, 62. Of the students who lived away from their parents' home, 3.3% returned home. Regarding the parents' education, it is worth noting that the father has a higher level of education, 31.5% have higher education, while the mothers have 25.2%.
3. Results and Discussion

From the analysis of the responses of the interviews with the coordinator of Learning Technologies (CTA-CUCEA) and the head of the Educational Design Unit, responsible for the adaptation of distance education at the University Center of Administrative Economic Sciences (CUCEA), in order to know the strategies designed for the adaptation to the emerging remote modality, we found the following:

One aspect that favored the operationalization of strategies to cope with the pandemic, is that the CUCEA has a technological infrastructure of four servers, in addition to the fact that the teachers' accounts are on Google and Google for education, a situation that facilitated access to all Google tools and CTA services.

In order to continue with education, emergent remote courses were designed for the subjects of the common core during the second semester of 2020. The design involved staff from the Academic Secretary's Office, heads of departments, full-time professors, as disciplinary experts, and a team of professionals in instructional design that was contracted for this purpose.

The emergent remote courses were designed with the aim of providing teachers with an online tool for the development of their subjects, covering both aspects of instructional design and the disciplinary area, so that students can have access to educational content with the support of their teachers.

Parallel to this, a two-week intensive training plan was established for teachers through Webinars, where topics related to online counselling and platform management were addressed.

Finally, interviewees pointed out that student learning in the emerging remote modality depends on multifactorial aspects. In relation to course design, quality in the teaching-learning process is sought, but also the self-management skills of the students and the close guidance of the teacher are required. The design of the courses is aimed at meeting the training needs of the students; in this case, learning does not depend exclusively on the modality, but on related factors.

Once the qualitative part of this study was completed, we proceeded to the analysis of the data, which will be described on the basis of frequencies, which are suitable for analyzing questions with Likert scales.

From the questionnaires, we also analyzed the questions reflecting the students' opinion as to whether they perceive the possibility of carrying out normal academic activities, both those students who work and those who do not.

In this sense, we can point out that when faced with the implementation of emerging remote modality and with regard to the possibilities of carrying out academic activities in a normal way, two aspects were observed: the students who were able to carry them out and those who were not able to do so. In the first case, most students say that they have been able to carry them out because they have enough time to fulfill the academic responsibilities that their studies demand of them; in this respect, students who do not work devote all their time to their studies and students who do work have made agreements with their superiors, who give them time off from their paid work to devote to their studies; they also said that their work situation has changed and they are teleworking, so the need for self-management and organization of their time has increased.

With regard to equipment and tools, most of the students indicate that they have what they need to carry out their studies remotely; most of them have a personal computer and in other cases a shared computer, a mobile phone, Internet service and electronic access to sources of information. With regard to the change of modality and adaptation to new ways of learning, most of the students indicate that they have not had any problems with adaptation and even refer to their personal liking for the modality due to its practicality and flexibility; however, one student sector refers that the amount of homework has increased with respect to the face-to-face modality and this results in a greater investment of time, but they do not consider this to be an impediment to continuing with their studies in the virtual mode. A noteworthy fact is the mention made by some students, who indicate that their educational programs do not require a large amount of practical work, but rather,
they must take theoretical classes and this situation is a support for them to be able to carry out their studies remotely without major difficulties.

Finally, students say that, although they do not have substantial difficulties, they miss the personal interaction and face-to-face attendance. As pointed out by Díaz, Ruiz and Egüez (2021), who mention that students perceive their learning as incomplete, mainly due to the lack of direct interaction. In the second case, with regard to the implementation of emerging remote modality and the possibilities of carrying out academic activities in a normal way, most of the students who did not manage to do so reported having serious difficulties in their studies, mainly due to the distractions and lack of privacy that studying from home represents for them, some mentioned having domestic responsibilities because they are taking care of their children or supporting their parents in these tasks.

In terms of equipment and tools, most of the students reported that they do not have personal or shared computer equipment and do not have the financial means to buy one, pay for Internet service or go to a cybercafé. Those who do have computer equipment and Internet connection indicate that they have had difficulties in maintaining a stable connection. In relation to the change of modality and the adaptation to new ways of learning, most of the students indicate that they have had difficulties in learning, even worrying about the fact that they have not learned anything, despite the fact that they do many more tasks than in the face-to-face modality. In addition, they indicate that the lack of face-to-face interaction with their teachers and classmates has been a problem for them because it has not allowed them to learn properly. Regarding the resources and the way in which students have dealt with the emerging remote modality, in addition to the availability of computer equipment and Internet connectivity (see graph 1), 71.2% of the students interviewed indicated that they can carry out their academic activities online.

Graph 1: Availability of computer equipment and internet connectivity
Source: Own elaboration

From figure 1 we can point out that 58.9% have either a PC or a personal laptop; 92.7% have access to the internet; 45.7 and 46% consider that the connectivity at home is sufficient, both for them and for the teachers, to take or teach online classes, respectively.
The virtual environments and tools used in the confinement are summarized in graph 2; the graphs were constructed from the averages obtained from the scale opinions, with 5 being the highest score, therefore, it is highlighted that the Classroom platform has been the most used, with an average of 4.56. With respect to the technological tools, Meet is the most used (average 4.54), and of the digital tools, homework, videoconferencing, assessment and reading materials, with averages of 4.74, 4.23, 4.19 and 4.07, respectively.

Graph 2: Technological resources  
Source: Own elaboration.

Graph 3 shows the type of distance education model received; we can highlight that, on average (3.79), the presentation of the courses is synchronous.

Graph 3: Distance Education Model  
Source: Own elaboration.
Finally, figure 4 shows the graphs related to the way in which students perceive emergent virtual teaching, they point out that they have improved their capacity for autonomous learning, they consider that the use of digital tools in classes allows teachers to explain concepts better; as disadvantages, they think that it requires greater dedication in learning the subjects and that it is complicated to do team work.

![Student's perception graph](image)

**Graph 4:** Students’ perceptions of emerging remote modality  
**Source:** Own elaboration.

![Institutional decisions graph](image)

**Graph 5:**  
**Source:** Own elaboration.

According to the qualitative analysis of the strategies for adapting to emerging remote education carried out by the CUCEA, it is possible to highlight the design of emergent remote courses for the subjects of the common core, with the intention of maintaining quality in the teaching-learning process and covering training needs, as well as offering training to teachers on the use of platforms and online consultancy. In addition, a project was presented for the conversion of face-to-face
courses to a digital model with the support of instructional design.

In relation to the students' perception of the distance learning model, we point out the most relevant findings that allow us to validate the first hypothesis, given that 71.2% of the students have the resources to continue their academic activities, so that individual conditions have generated a different experience. On the one hand, it is generally noted that the conditions of those who consider that they have had no complications coincide with what Cabrera et al. (2020), Chiecher et al. (2005) and Bazán et al. (2020) point out about the use of ICT, but above all that the perception of this is positive given that the students point out that they have the equipment, tools and connectivity to carry out their activities, so they have been able to adapt; However, for those who work, it has meant more organization and time management. One aspect that is worth highlighting is the fact that, in general, the courses taught at the center do not contain a heavy load of subjects and practical activities, with all that this can mean for distance learning.

On the other hand, those who report difficulties in continuing their education highlight the lack of access to equipment and tools, as well as the lack of or poor connectivity, together with the lack of economic solvency to look for alternatives, which confirms UNESCO's (2020) statement on the impact that this situation has on students in vulnerable situations, showing the widening of the digital and educational gaps. Among other aspects that generate distractions by having to attend to other responsibilities while staying at home. In general, it is perceived that, unfortunately, interaction with peers and teachers has been weakened, which for some has an impact on their level of learning. In consideration of the teaching-learning processes when using technological resources and tools after the start of the contingency, the second hypothesis is validated by identifying that use has been made of platforms, among which Classroom stands out; in terms of technological and digital tools, their use registers high scores derived from the needs that have arisen with the migration to virtuality. The use of ICT contributes to the interaction between students and teachers, and has enriched the process with a positive impact, as Sotelo (2017) points out, given that students perceive that the emerging virtual teaching has favored their capacity for autonomous learning and that the use of digital tools facilitates the explanation of concepts, so hypothesis six is confirmed. The results of this research are consistent with those of Avendaño, Luna and Rueda (2021), who comment that in the faculty of business sciences in the city of Cúcuta (Colombia), the positive impact of virtual education in times of COVID-19 on issues such as learning, autonomy, management of emotions, development of competencies and skills in general is confirmed.

With regard to the third hypothesis, it is perceived that teachers do not have time to give feedback and correct tasks and activities with a regular score, however, this could be the result of the excessive load reported by the students, and not necessarily evidence of the teachers' knowledge and skills in the management of digital tools, so this analysis would need to be further explored. In this sense, the results contrast with those of Velásquez (2020), who states that at the Centro Universitario de Oriente of the University of San Carlos, Guatemala, professors were quick to adapt to the urgency and that, despite the weaknesses and limitations in digital and technological skills, professors made special efforts to respond to students and keep up with the demands of the historical moment. Regarding the degree of connectivity that students have, as well as their perception of the teacher's connectivity, it is not possible to validate hypothesis four, since it was found that less than 50% consider it to be adequate. In relation to the virtual education models, there is not enough evidence to affirm the validity of the fifth hypothesis, given that, although the synchronous presentation of the courses presents the highest score, it is followed by asynchronous presentations and synchronous video tutorials, so it is possible to observe that various models of virtual education are used.

4. Conclusions

With the above it is recognized that the university center has had an adequate reaction to the emergency when defining the strategies to follow, favored by a beneficial technological infrastructure and the agreement with Google for education, which facilitated the teachers' access to the tool, and
therefore a positive perception on the part of the students, in addition to proactively working on preparing the scenario for the immediate future.

In purely pedagogical aspects, some latent difficulties faced by the institution are recognized, such as the adaptation to teaching and learning processes in virtual and/or remote modalities by students and teachers, problems of motivation and participation, difficulties for an effective evaluation of learning, uncertainty towards long-term pedagogical planning, among others. Therefore, it is considered necessary for the institution to face these challenges and take advantage of the positive results of the implementation of the strategies to face the emergency, with an adaptive vision, for which these researchers issue the following recommendations:

- Ensuring continuous technological updating, with quality internet access, devices for students and teachers, and secure and effective online learning platforms.
- Continuous training for teachers in the effective use of technological tools and online teaching strategies.
- Flexible course design that can be adapted to different educational modalities, whether face-to-face, virtual, online, hybrid, remote, etc.
- Development of assessment methods that can evaluate competencies and skills in a meaningful way, in any type of educational environment or modality.

By implementing these recommendations, the educational institution can adapt more effectively to the demands of post-pandemic education and create inclusive and flexible learning environments.

References


