

<https://doi.org/10.23913/ride.v12i24.1141>

Artículos científicos

El impacto de la pandemia por covid-19 en estudiantes mexicanos de educación media superior

The COVID-19 Pandemic Impact on Mexican Middle Higher Education Students

O impacto da pandemia de covid-19 em estudantes mexicanos do ensino médio

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Resumen

El objetivo de este trabajo fue describir el impacto de la enfermedad por coronavirus de 2019 (covid-19) en estudiantes mexicanos de educación media superior. Para ello, la metodología empleada consistió en una investigación exploratoria con un enfoque cuantitativo de diseño no experimental, de corte transversal y con un alcance descriptivo. Para la recolección de datos, se aplicó un cuestionario a modo de encuesta que permitió caracterizar el comportamiento del fenómeno a partir de cuatro dimensiones: infraestructura tecnológica, capacitación, ámbito social-económico y de salud y competencias digitales. La confiabilidad del instrumento se determinó mediante el coeficiente alfa de Cronbach, el cual proporcionó resultados satisfactorios. Entre los resultados, destaca que, en la mayoría de los casos, los estudiantes cuentan con la infraestructura tecnológica adecuada para continuar con los procesos de aprendizaje de manera virtual, así como con las competencias digitales para el

uso de aplicaciones que promuevan la comunicación. Y respecto a los efectos ocasionados a la salud provocados por las medidas sanitarias, se detectó que mayoritariamente los estudiantes presentaron algún tipo de afectación, principalmente de índole emocional. En conclusión, la pandemia ha generado un impacto negativo en la salud de los estudiantes; sin embargo, se han promovido y ejercitado competencias relacionadas con las tecnologías de la información y comunicaciones (TIC) que han permitido dar continuidad al desarrollo de las actividades escolares desde casa.

Palabras clave: educación a distancia, nivel de enseñanza, sistema educativo.

Abstract

The objective of this work was to describe the impact of the coronavirus disease 2019 (covid-19) on Mexican high school students. For this, the methodology used consisted of an exploratory research with a quantitative approach of non-experimental design, cross-sectional and with a descriptive scope. For data collection, a questionnaire was applied as a survey that allowed characterizing the behavior of the phenomenon based on four dimensions: technological infrastructure, training, social-economic and health field, and digital skills. The reliability of the instrument was determined by Cronbach's alpha coefficient, which provided satisfactory results. Among the results, it stands out that, in most cases, students have the appropriate technological infrastructure to continue with the learning processes in a virtual way, as well as the digital skills for the use of applications that promote communication. And regarding the effects caused to health caused by sanitary measures, it was detected that most of the students presented some type of affectation, mainly of an emotional nature. In conclusion, the pandemic has generated a negative impact on the health of students; however, skills related to information and communication technologies (ICTs) have been promoted and exercised, which have made it possible to continue the development of school activities from home.

Keywords: long distance learning, teaching level, education system.

Resumo

O objetivo deste trabalho foi descrever o impacto da doença de coronavírus de 2019 (covid-19) em estudantes mexicanos do ensino médio. Para isso, a metodologia utilizada consistiu em uma pesquisa exploratória com abordagem quantitativa de desenho não experimental, transversal e com escopo descritivo. Para a coleta de dados, foi aplicado um questionário como levantamento que permitiu caracterizar o comportamento do fenômeno a partir de quatro dimensões: infraestrutura tecnológica, formação, campo socioeconômico e da saúde e competências digitais. A confiabilidade do instrumento foi determinada pelo coeficiente alfa de Cronbach, que proporcionou resultados satisfatórios. Dentre os resultados, destaca-se que, na maioria dos casos, os alunos possuem a infraestrutura tecnológica adequada para dar continuidade aos processos de aprendizagem de forma virtual, bem como as habilidades digitais para o uso de aplicativos que promovam a comunicação. E quanto aos efeitos causados à saúde por medidas sanitárias, detectou-se que a maioria dos alunos apresentou algum tipo de afetação, principalmente de natureza emocional. Em conclusão, a pandemia gerou um impacto negativo na saúde dos alunos; no entanto, têm sido promovidas e exercitadas competências relacionadas com as tecnologias de informação e comunicação (TIC), o que tem permitido continuar o desenvolvimento das atividades escolares a partir de casa.

Palavras-chave: educação a distância, nível de ensino, sistema educacional.

Fecha Recepción: Agosto 2021

Fecha Aceptación: Febrero 2022

Introduction

The present work addresses the impact that the pandemic caused by the 2019 coronavirus disease (covid-19) has caused in upper secondary education (EMS). To enter into context, according to data from the National Institute of Statistics and Geography [Inegi] (March 23, 2021), it is estimated that in Mexico of 54.3 million people between the ages of 3 and 29 during 2020, 62.0% were registered in the 2019-2020 school year, of which 740,000, which represented 2.2%, could not finish; Of the 62.0% mentioned, 37.8% were enrolled in EMS and 3.6% did not complete the indicated school year (Inegi, March 23, 2021), in most cases due to some reason associated with covid-19.

During the month of March 2020, in Mexico most activities were suspended as part of the sanitary measures. An indefinite confinement was called. This provoked the reaction of educational authorities, both institutional and State, who defined the guidelines and tools

for communication between teachers and students that would allow monitoring of school and academic activities, which had been interrupted.

Taking into account the above, derived from the measures of social distancing and confinement proposed by the health authorities, the educational institutions had to adapt the teaching methods, which beyond generating a solution, caused the emergence of some setbacks related to the use of information and communication technologies (ICT), such as the adaptation of face-to-face courses to the virtual modality, training for teachers and students for the management of applications and systems for the management of education, as well as the transition of the processes, both teaching-learning and administrative, that were carried out physically to adapt to the so-called "new normality".

According to the Inegi (March 23, 2021), 65.7% of students used the smartphone as the digital tool that allowed them to continue their activities; followed by 18.2% who used the laptop; while 7.2% used the desktop computer; 5.3% used digital television, and, finally, 3.6% used the tablet. In the specific case of EMS, the use of laptops and desktops increased, and the use of smartphones decreased. (Inegi, 23 de marzo de 2021).

Under this order of ideas, the objective of the present study is to describe the impact of covid-19 on Mexican EMS students. This seeks to generate a diagnosis that allows identifying relevant factors and characteristics related to the behavior of the pandemic and the effect caused in the development of learning processes.

Background

Educational systems around the world have suffered from the pandemic both at the school and academic levels and, something that is not unimportant, the educational and technological responses they have given have revealed a marked disparity. The closures of educational institutions as a measure to contain the covid-19 pandemic have led to an accelerated deployment of distance education solutions to ensure pedagogical continuity at all levels.

In Mexico, the declaration of a health emergency due to the covid-19 pandemic issued in March 2020 led to the suspension of school activities due to the closure of schools at all levels. Unfortunately, the health contingency has not given the Mexican education sector a break since then and it still faces problems beyond public health (Portillo, Castellanos, Reynoso and Gavotto, 2020).

The decision made by the Mexican educational authorities has involved educational, social and economic costs (Fernández, Hernández and Herrera, 2020). At the educational level, the interruption of the face-to-face teaching-learning process has forced the national education system to face unprecedented challenges to ensure the permanence of 36.6 million students of all levels in their homes.

Although the immediate response to face the problem of continuity in education has been deposited in ICTs, in Mexico this alternative has also posed other challenges: the lack of access to the Internet by students and the little training of teachers. teachers to teach classes remotely, which combines problems of infrastructure, training and lack of materials specifically designed for virtual teaching (Ruiz, 30 de marzo de 2020).

Consequently, this response has resulted in greater inequality for young people who come from households with lower incomes, in which there are greater deficiencies in terms of Internet access and availability of equipment, and sometimes of space in the home. Mexico has registered an increase in Internet use of 17.2% in the last five years, according to the National Survey on Availability and Use of Information Technologies in Households 2019 (Endutih), and although 76.6% of the urban population is an Internet user, it is still far from the entire population being interconnected by this means, since the percentage in rural areas is reduced to 47.7% and only 44.3% of households have a computer (Inegi, 2020).

Therefore, the obstacles that the national educational system has faced are multiple, from low connectivity and the lack of content on the Internet aligned with the national study plans to teachers not prepared for this "new normality". Regardless of educational level, the overriding danger is that inequalities in learning will widen, marginalization will increase and the most disadvantaged students will be unable to continue their studies.

Additionally, the deployment of remote education efforts has been uneven. Of course, the implementation of this modality is strongly determined by the socioeconomic conditions of the students' homes that are associated with access to computers, mobile devices and Internet access. In short, the pandemic has affected all students, but more so those who already faced conditions of vulnerability before the crisis.

Given the above, it is evident that the use of ICT is part of the agenda of students, teaching and non-teaching workers in EMS institutions; However, migrating from face-to-face to non-face-to-face education is not a minor goal, even in the midst of the emergencies imposed by a pandemic such as that caused by covid-19.

As pointed out by Fernández et al. (2020), the already fragile national educational system has suffered effects that denote a crisis, especially at the upper secondary level, which even before faced lag, desertion, equity problems in admission and permanence, drop in enrollment and budget deficiency; consequently, covid-19 has exposed the educational inequality that already existed in the EMS in Mexico (Fernández et al., 2020). On the other hand, it must be mentioned that, previously, only 72% of the students who completed the previous level entered the EMS in the immediately subsequent cycle. An example of the above is the dropout and desertion rate of 15.2% during the 2016-2017 school year. (Robles y Pérez, 2018).

The impacts of the covid-19 pandemic on education are uncertain, since, as mentioned by the United Nations Educational, Scientific and Cultural Organization [Unesco] and the International Institute for Higher Education in Latin America and the Caribe [Iesalc] (2020), the "lack of references to similar crises in the past makes it difficult to predict what may happen in the immediate future" (p. 9). While Miguel (2020) points out that these impacts have still been little studied from the perspective of their actors, and much less, from the feelings of the students.

Although there are studies that have analyzed the impact of covid-19 on university students, they have been interested in its psychological effects and stressors (Ozamiz, Dosil, Picaza and Idoiaga, 2020; Sánchez et al. 2021); In all of them, it is concluded that the students, regardless of the degree, have suffered stress levels, which has generated a negative impact on their health and academic performance. Additionally, some other investigations have addressed the issue from its economic, school and health effects (Espinosa, Mesa, Díaz, Caraballo and Mesa, 2020; Osorio and Prado, 2021), whose results have been similar in terms of the psychological effects generated for the confinement.

On the other hand, there are authors who have approached the subject from academic and technological aspects in higher education (Gazca, 2020; Lloyd, 2020; Malo, Maldonado, Gacel and Marmolejo, 2020; Miguel, 2020; Ramírez, 2020). The authors of these coincide in highlighting the role that ICTs have played in education, although its scope has depended on the infrastructure that each institution has and the skills of teachers and students.

Despite the above, there are few studies addressed in the EMS (Bolaños, 2020; Navarrete and Flores, 2021; Portillo et al., 2020; Torres, Acal, El Homrani and Custodio, 2021) that analyze the impact of the pandemic by covid-19 and the implications in its various dimensions.

Upper secondary education in Mexico

According to the International Standard Classification of Education (ISCED), the EMS seeks to consolidate secondary education as preparation for tertiary education, or to provide the skills and abilities to enter the world of work (Flores, Aguayo and Flores, 2020). In other words, although it is the propaedeutic stage for professional education, it is also a final stage of learning and training for the graduate before possible insertion into the labor market (Robles and Pérez, 2019).

For its part, the Organization for Economic Cooperation and Development (OECD) emphasizes that the upper secondary level is increasingly relevant in an environment of changing social and economic conditions, particularly because it is the last level of formal education in an important number of countries (Ministry of Public Education [SEP], September 26, 2008). Thus, the EMS helps students actively and responsibly exercise their citizenship, and at the same time, access minimum levels of well-being (Robles and Pérez, 2019).

In Mexico, the EMS intertwines basic education with higher education and its purpose is based, like the rest of the levels, on article 3 of the Political Constitution of the United Mexican States; its training objectives are to strengthen the students' ability to learn and enrich their scientific, humanistic and technological knowledge (Flores et al., 2020). Since 2012, EMS has been integrated into the national agenda as it is considered part of compulsory education and a fundamental element in the development and welfare strategy (Secretaría de Gobernación [Segob], February 9, 2012).

As Flores et al. (2020), the EMS is characterized by a duration of three years, although there are two-year baccalaureates in some autonomous universities and there are also four-year ones such as art baccalaureates; their study plans are organized around subjects or subjects that are administered every semester, four months, or annually. The typical age of students at this level is between 15 and 19 years old.

Within the modalities that are recognized at this educational level, there is face-to-face education and virtual education. It should be noted that, although they have the same purpose, the latter involves specific educational and technological strategies (ICT) that allow educational communication and the acquisition of knowledge (SEP, September 26, 2008).

In the 2017-2018 school year, the EMS concentrated 5.2 million students, that is, 14.4% of the entire national education system, who were attended by 423,754 teachers in 20,852 schools (General Directorate of Educational Planning, Programming and Statistics,

2018). Although there are considerable advances in this level of education, the one hundred percent coverage projected for the year 2025 by the Mexican Government is still a long way off, since, according to the General Directorate of Educational Planning, Programming and Statistics (2020), in the 2018-2019 cycle, the number of students who attended and finished their EMS studies but did not go to university was 42%.

As for the state of Campeche, for the 2018-2019 cycle, the student population in EMS through the school modality was 37,740 and 3,823 in the non-school modality, who were attended by a total of 2,921 teachers in 148 schools. The dropout rate for the same cycle was 13.9%, with a terminal efficiency of 57.7% (General Directorate of Educational Planning, Programming and Statistics, 2020).

Ciudad del Carmen, Campeche, located on the island of Carmen and belonging to the homonymous municipality, has a total population of 270,642 inhabitants. In this city there are 16 public and private EMS institutions that serve students at this level. At the beginning of the 2019-2020 school year at the municipal level, EMS coverage was 67.9%. In the immediately previous cycle, 2018-2019, the dropout rate had been 11.5% with a terminal efficiency of 50.3%.

In Mexico, inequalities in terms of access and availability of digital technologies between its regions further widen the existing gap in the EMS. According to Endutih (Inegi, 2020), in Campeche only 51.3% of the population has an internet connection, while 44.2% of households have technological equipment. Therefore, the digital divide in the region is alarming, especially if one takes into account that the EMS bets heavily on the ICT skills of both teachers and students.

In this context, and based on the objectives and purposes of the EMS that seek to promote equal opportunities through quality education that ensures the academic skills of students to enter higher education and at the same time the training of professional skills necessary to enter the workplace (Robles and Pérez, 2019), the inevitable question is: how has the covid-19 pandemic impacted EMS students in Ciudad del Carmen, Campeche? To answer this question, based on the effects on its social, economic and health dimensions, as well as on infrastructure, digital skills and training, Gazca's proposal (2020) has been adapted, who designed an instrument to measure in university professors the impact of covid-19.

Method

Given the above, it was proposed to describe the impact of the covid-19 pandemic perceived by EMS students from Ciudad del Carmen, Campeche. As a result of the little existing information on the problem that is addressed, from the methodological point of view, it is an exploratory research with a quantitative approach of non-experimental and cross-sectional design. Regarding its scope, it is initially descriptive, since it only seeks to specify some properties, characteristics, important features about the impact that the pandemic has caused in the lives of students based on their opinion.

The sample was not random for convenience, since for this investigation the EMS students from various institutions that participated in the advisory program for the preparation of the 2021 new entry exam for the Accounting degree of the Autonomous University of Carmen (Unacar).). In total, there were 119 participants who got involved during the month of May of the same year.

The instrument used was a diagnostic-type questionnaire, expressly designed to meet the stated objective. After adapting some items from the Gazca (2020) instrument, it was integrated into two parts: the first contained 14 questions that requested sociodemographic information, which made it possible to characterize the student population surveyed; the second part integrated the four dimensions of the impact of covid-19 on the EMS already indicated above. The questionnaire was self-administered by the students themselves: it was answered completely online. The descriptive analysis of the data, as well as the tests to determine normality, were carried out with the IBM SPSS Statistics 24 program.

Instrument reliability

To determine the reliability of the instrument, the internal consistency method was used, using Cronbach's alpha coefficient. The purpose of this method is to determine that the scale items measure a single theoretical dimension of a latent construct. In that sense, the value of alpha must oscillate between zero and one. The closer the alpha value is to one, the greater the internal consistency of the items analyzed (Frías, 2021).

Taking into account the above, table 1 shows the results corresponding to the evaluation of reliability. In general, it can be shown that the instrument is reliable, given that Cronbach's alpha coefficient was 0.925. Likewise, particularly, each dimension obtained an acceptable score, since the coefficient values ranged between 0.793 and 0.848, respectively.

Tabla 1. Alfa de Cronbach para la confiabilidad del instrumento

Dimensión	Alfa de Cronbach	Núm. de elementos
Infraestructura tecnológica	0.793	5
Capacitación	0.793	5
Ámbito social-económico y de salud	0.848	16
Competencias digitales	0.808	10
Total	0.925	36

Fuente: Elaboración propia

Results

The results obtained from the application of 119 questionnaires as a survey during the month of May 2021 are presented below. The dimensions of the impact of covid-19 on EMS were assessed using a Likert-type scale where: 0 = Not applicable, 1 = Strongly disagree, 2 = Disagree, 3 = Agree, and 4 = Strongly agree. Initially, a description of the sociodemographic characteristics of the students is presented and, subsequently, the analysis of the dimensions, which will allow describing the behavior of the phenomenon in question from the perspective of the participants, taking into account an average of the scores with respect to the scale, considering values between zero and two as a negative result and values between three and four as a positive result.

Sociodemographic characteristics

Of a total of 119 participants, 52.10% were women and 47.90% were men. Likewise, they conformed an average age of 16.76 years, a standard deviation of 1.17 years and a range of 15 to 21 years. The total of the participants were high school students, high school students or equivalent to upper secondary level studies. Finally, 96.60% were students from public institutions and, in most cases, stated that they lived in the municipality of Carmen, Campeche at the time of answering the survey.

On the other hand, regarding the employment situation, 84.90% of the students indicated that they did not work, 10.10% had a part-time job and only 5.00% mentioned that they had a full-time job. In addition to the above, for 33.60% of the cases the father was the

main family support, while for 25.20% it was the mother; 21.00% mentioned that they were both parents and 2.50% of the participants covered their own expenses.

On average, the number of members who said they were part of their family was 4.92 people, within a range of 2 to 11 members. Likewise, to contextualize the situation derived from the covid-19 pandemic in the sample, it was obtained that, according to the data mentioned by the students, on average in their nuclear family there were 0.84 members infected with that disease; while in his extended family, there were 1.91 infected on average; in the close circle of friends of the students, 1.76 infected were estimated; Finally, among his acquaintances, an average of 3.48 infected people were registered.

Dimensions of the impact of covid-19 on the EMS

The results regarding the impact of covid-19 on the EMS are shown in table 2, whose highest average score corresponded to the dimension "Technological infrastructure" and "Digital skills", followed by "Training", and "Social-economic environment and health" to a lesser extent. Taking into account the Likert scale established in the instrument, it can be said that, in general, the students have the hardware and software equipment, as well as the appropriate skills to carry out the study. virtual learning process and avoid the interruption of their academic courses.

Tabla 2. Resultados sobre las dimensiones del impacto del covid-19 en la EMS

Dimensiones	Media	Desv. Estándar
Infraestructura tecnológica	2.75	0.83
Capacitación	2.74	0.75
Ámbito social-económico y de salud	2.65	0.63
Competencias digitales	2.75	0.70

Fuente: Elaboración propia

Technological infrastructure

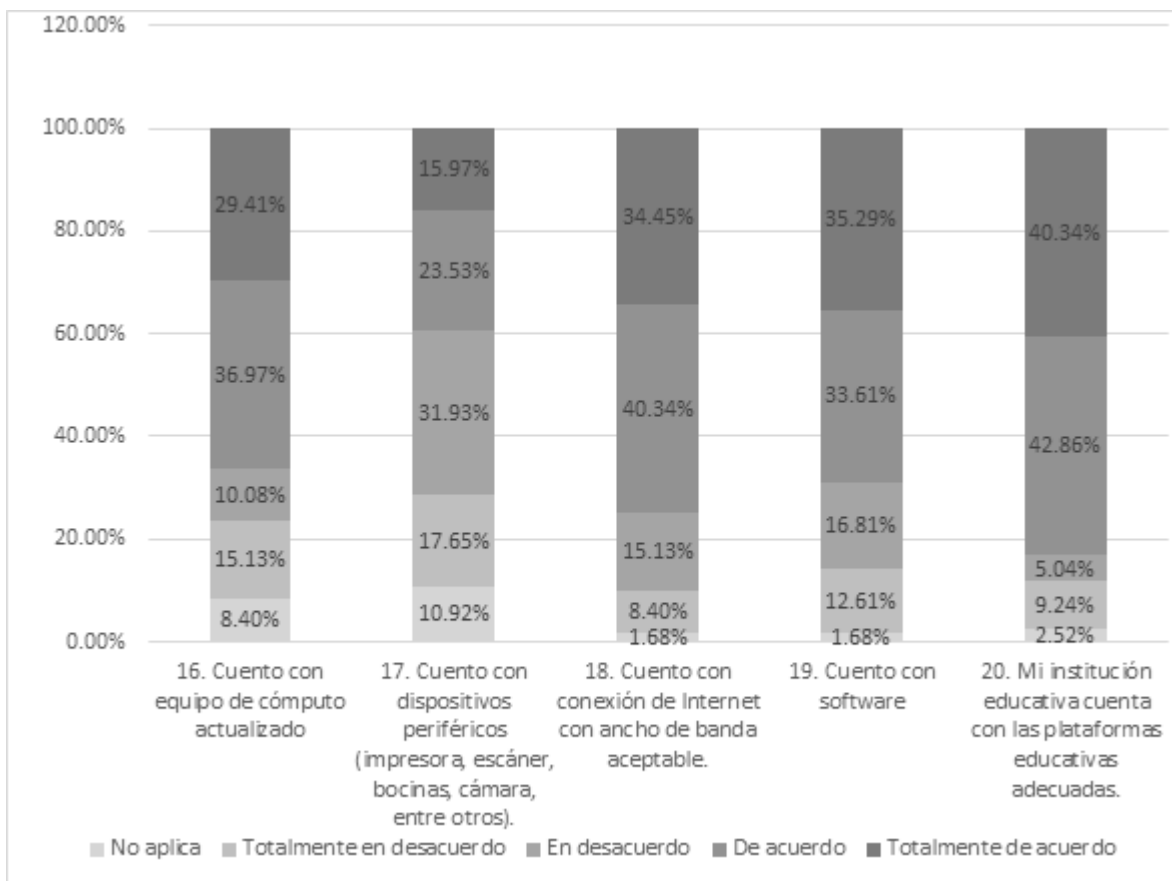
This dimension refers to the technological capabilities of hardware, software and connectivity that high school students have that allow students to continue with the teaching-learning processes under a virtual modality (Gazca, 2020). In this sense, aspects related to physical technological resources and Internet connection were evaluated, as well as mobile

applications or computer programs implemented by educational institutions, or those of the students that in one way or another could promote the development of academic activities in a non-face-to-face way.

In this sense, it can be highlighted that, from a sample of 119 students, 83.19% mentioned that their educational institution has the appropriate educational platforms to favor the teaching-learning processes. In addition to this, it was determined that 74.79% of the students surveyed have access to an internet connection with acceptable bandwidth. Likewise, of the total sample, 68.91% mentioned that they have the appropriate software to carry out the virtual learning process and 66.39% have updated computer equipment. Finally, 48.58% of the students surveyed mentioned that they do not have additional peripheral devices such as a printer, scanner, speakers, camera, among others, to carry out academic activities during the virtual modality (see figure 1).

Taking these results into account, it can be considered that not all students are in the same conditions in terms of technological infrastructure that allows them to adequately and equitably develop academic activities and provide continuity to courses. This can be considered as a determining factor that could reduce learning and, ultimately, lead to new problems in vocational training.

Figura 1. Infraestructura tecnológica



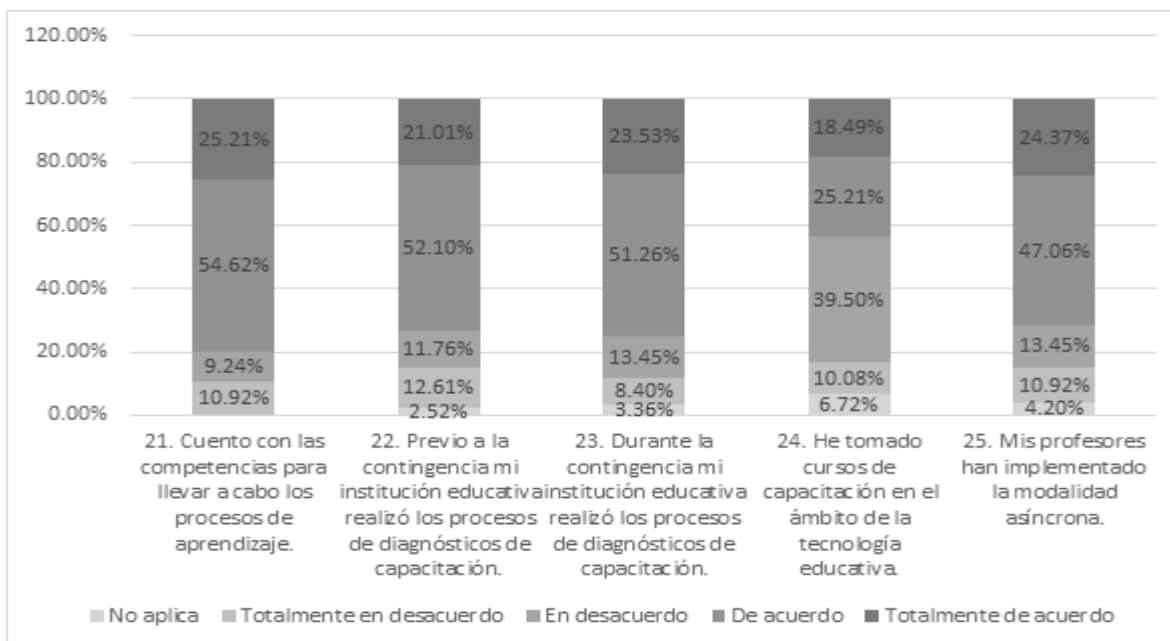
Fuente: Elaboración propia

Training

Regarding the "Training" dimension, this is intended to identify if the students are prepared or trained, either on their own or through the actions that the educational institution has implemented in the different scenarios of the contingency generated by the covid-19, to attend the courses in a digital environment (Gazca, 2020).

In this case, it can be seen in figure 2 that, from a sample of 119 students, 79.83% mentioned that they have the necessary skills to carry out the learning processes under the virtual modality. Likewise, 74.79% responded that during the contingency their educational institution carried out diagnostic processes for training. While 73.11% mentioned that their institution made these diagnoses before the contingency. On the other hand, 71.43% of the students surveyed responded that their teachers have implemented the asynchronous mode to carry out the teaching-learning processes in virtual mode. Finally, 49.58% of the students confessed that they have not taken training courses in the field of educational technology to carry out the learning processes under the virtual modality.

Figura 2. Capacitación



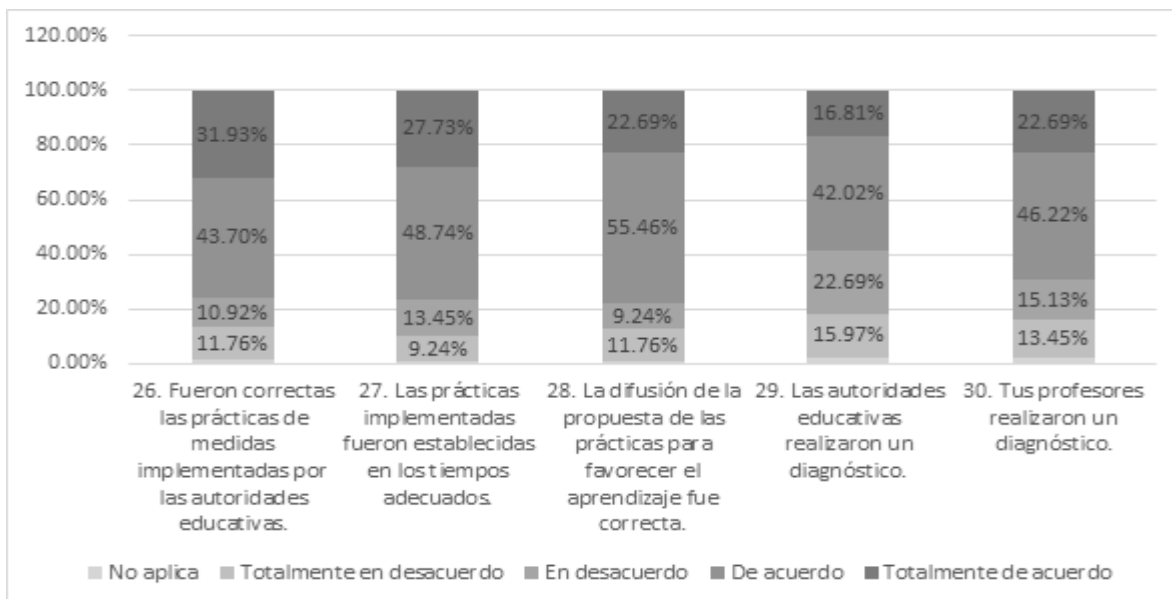
Fuente: Elaboración propia

Social-economic and health field

In this case, the actions and measures implemented by the institutions to facilitate the teaching process under the virtual modality during the contingency caused by covid-19 were evaluated. Likewise, if these actions represented extra expenses for the students and to inquire if they have the medical and security services to be treated publicly or privately, if they have taken the pertinent measures established by the health authorities and if they have experienced any type of damage to their health caused by confinement (Gazca, 2020).

As can be seen in figure 3, the results show that of 119 students, 78.15% considered that the dissemination of practices to promote student learning under the virtual modality was correct. Likewise, 76.47% mentioned that the implemented practices were established at the appropriate times. Also 75.63% responded that the practices of measures implemented during the covid-19 contingency to promote student learning in the virtual modality were correct. On the other hand, it stands out that 68.91% considered that their teachers made a diagnosis to identify if the students have the possibility of learning under the virtual modality; this could be a relevant factor for the proper development of academic activities since, as mentioned above, not all students are in the same conditions in terms of technological infrastructure.

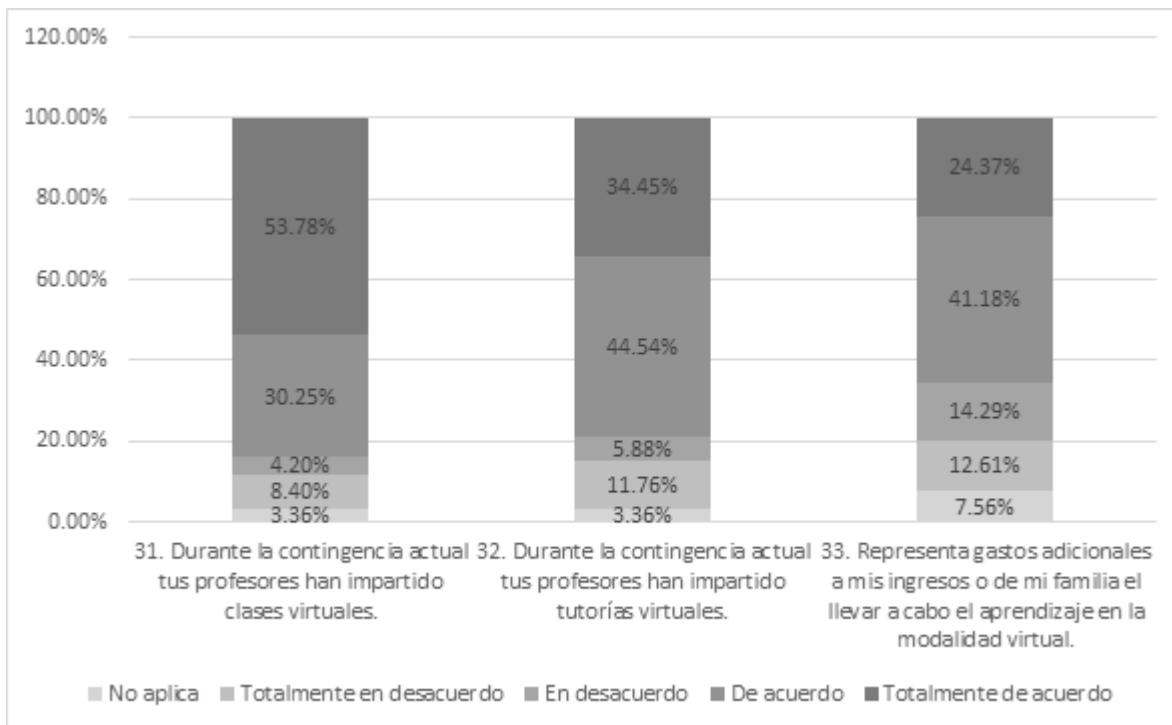
Figura 3. Ámbito social-económico y de salud: medidas implementadas para el aprendizaje en línea



Fuente: Elaboración propia

Regarding the monitoring of teachers' activities and financial resources, respondents were asked if during the contingency caused by covid-19 their teachers have taught classes virtually. As shown in Figure 4, from a sample of 119 students, 84.03% responded positively. On the other hand, as to whether teachers have given virtual tutorials, 78.99% responded positively; and, finally, 65.55% mentioned that carrying out learning virtually has represented additional expenses to their own or family income.

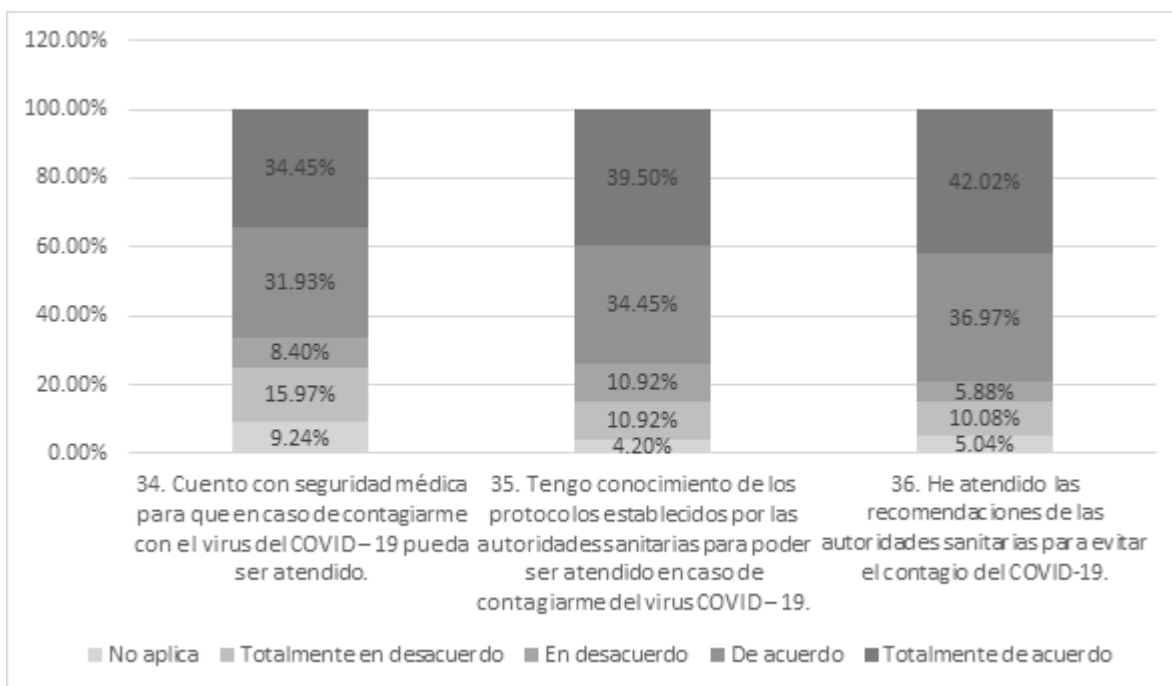
Figura 4. Ámbito social-económico y de salud: actividades y recursos



Fuente: Elaboración propia

In relation to the medical services and the safety protocols issued by the health authorities, it stands out that 78.99% of the students surveyed responded that they have followed the recommendations to avoid the spread of covid-19. However, 15.99% responded negatively. Regarding whether they are aware of the security protocols in case of contagion by covid-19, 73.95% responded positively. Likewise, 66.39% of the students responded that they have medical security services to be treated in case of contagion. However, 24.37% responded that they do not have this type of service. All these results can be seen graphically in Figure 5.

Figura 5. Ámbito social-económico y de salud: servicios médicos y protocolos de seguridad



Fuente: Elaboración propia

Finally, in relation to the health of the students during the confinement established by the health authorities, from the results presented in Figure 6, it stands out that 59.66% of the respondents responded that they had presented some affectation in emotional terms derived from confinement due to quarantine, while 32.77% mentioned not having experienced this situation. On the other hand, 52.94% of the students responded that they had carried out physical activities to improve health.

An important aspect of the gender perspective was to ask if the female gender represented a greater burden of domestic, professional and childcare activities compared to the male gender during confinement. Given this, 52.10% of the students surveyed responded positively, while 47.90% answered the opposite. This could mean that the load of activities, both for the female and male gender, was perceived equally.

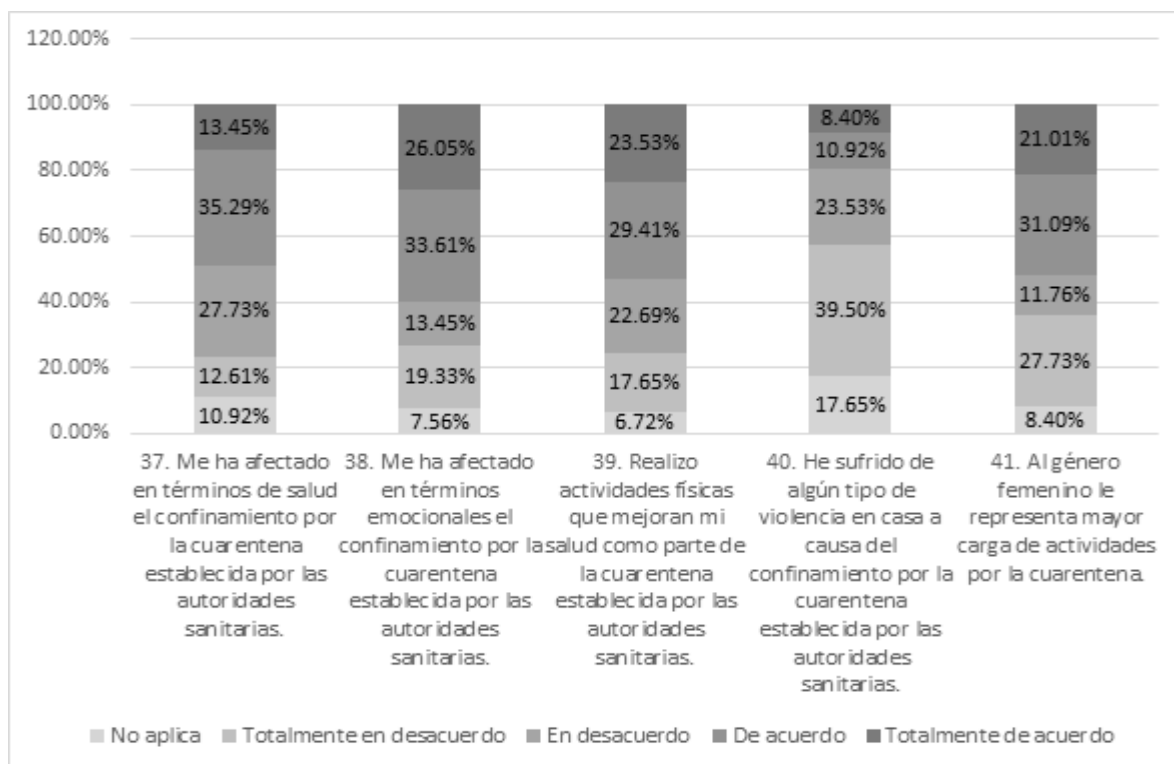
On the other hand, considering social distancing and isolation as one of the important measures implemented by health authorities to avoid contagion by covid-19, this could generate negative impacts of a psychological or mental health nature, such as anxiety and depression, among others. others, associated with the uncertainty of the disease itself, its rapid spread and high risk of infection (Hernández, 2020). Given this, 51.26% of the students

surveyed mentioned that they have not presented health effects caused by confinement; however, 48.74% responded that they had presented some affectation.

Regarding the presence of some type of violence at home due to confinement due to quarantine, it was another important aspect for this study. According to the Inegi (November 23, 2020), the confinement caused by covid-19 has been considered a trigger for various situations such as economic stress and family tension, the effects of which are particularly adverse for women, girls, boys and adolescents who they can confront the emergence or aggravation of situations of violence.

In this sense, figures corresponding to the National Urban Public Security Survey (ENSU) showed that during January and August 2020, 9% of Mexican households experienced some situation of family violence (Inegi, November 23, 2020). In this case, 80.67% of the students surveyed responded that they had not suffered any type of violence at home; however, 19.33% mentioned having experienced some situation of this type.

Figura 6. Ámbito social-económico y de salud: afectaciones a la salud durante el confinamiento



Fuente: Elaboración propia

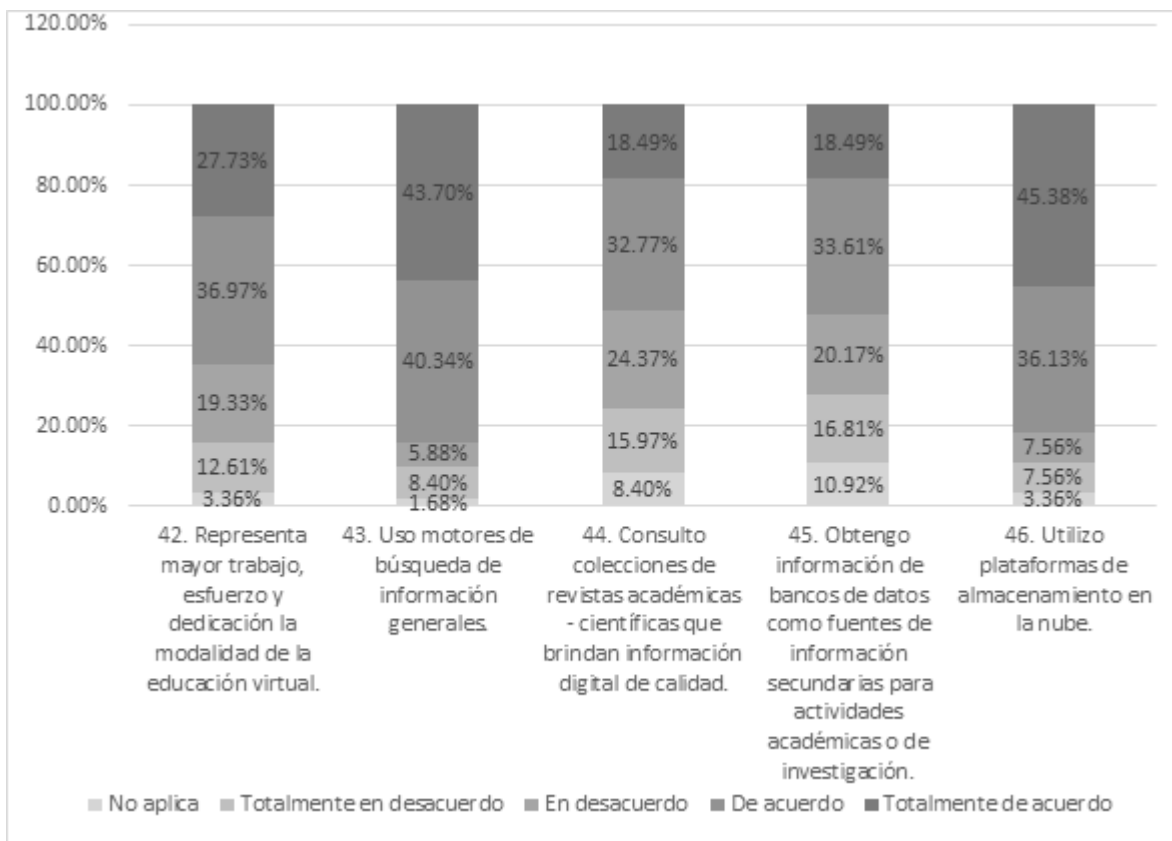
Digital skills

In addition to the evaluation of the technological infrastructure available to students, it is also essential to measure digital skills; that is, the capacity for the proper use of digital communication channels, search for information and content creation in virtual academic environments, as well as the use and implementation of digital tools to share and collaborate on files and the use of specialized software depending of the needs presented by the activities of the teaching-learning process (Gazca, 2020).

Taking into account the above, based on the results presented in figure 7, it can be mentioned that 84.03% of the students have used information search engines, such as Google, Yahoo, Bing, Ask, among others, as support in the virtual learning process. Likewise, 81.51% have used cloud storage platforms. On the other hand, 64.71% responded that education in virtual mode represents more work, effort and dedication.

In the same way, it turned out that 52.10% of the students have consulted data banks of Inegi, Banco de México (Banxico) and Banco Nacional de Comercio Exterior (Bancomext), among others, as sources of information to carry out academic activities. Finally, 51.26% of the students responded that they have consulted collections of academic-scientific journals from repositories such as Scopus, Scielo and Redalyc, among others, as support in the learning process under the virtual modality.

Figura 7. Competencias digitales: información y comunicación

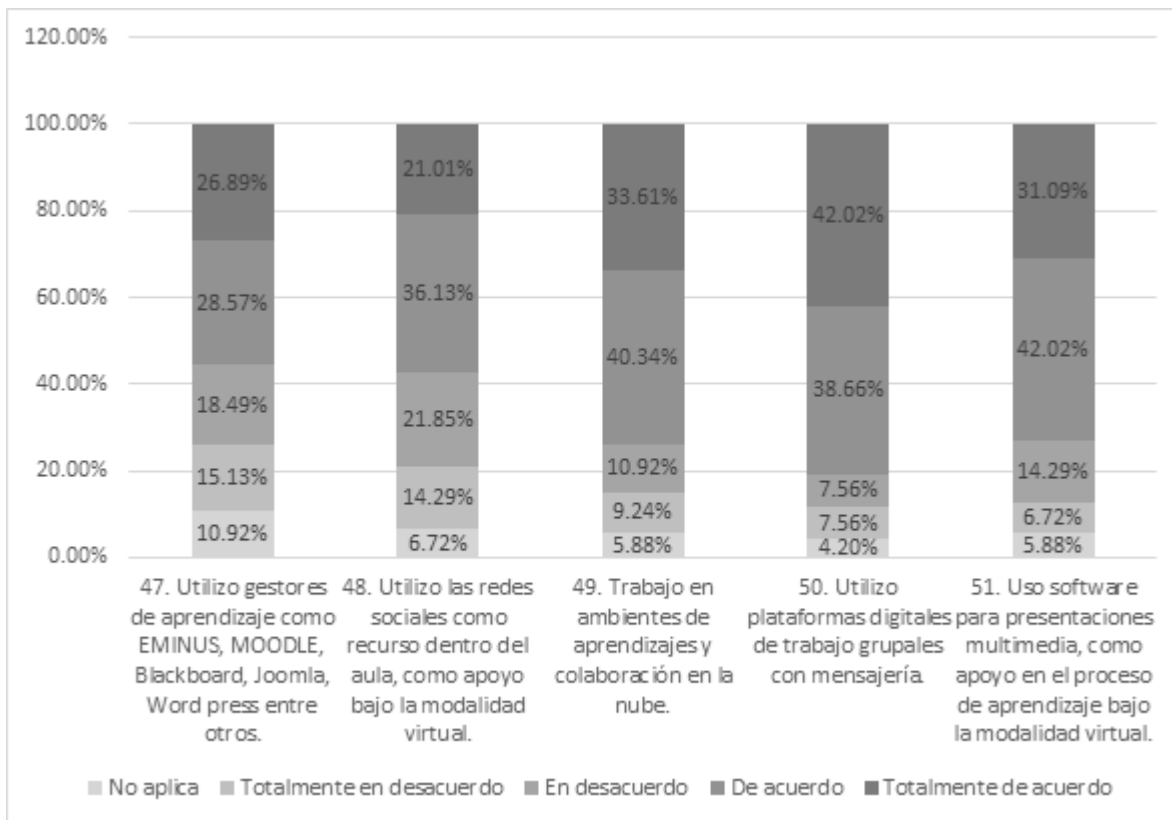


Fuente: Elaboración propia

Regarding the use of applications for the development of collaborative work, based on the results shown in figure 8, it can be mentioned that 73.95% of the students have used Dropbox, Google Drive, MEGA, Office 365, iCloud, among others. , to work in learning and collaborative environments. In addition to this, 80.67% of the students responded that they have used digital group work platforms with messaging, such as Skype, Zoom, Line, WhatsApp and Telegram, among others.

Likewise, the use of social networks has become an ally for communication as a resource in education, not only during confinement. Indeed, 57.14% of the students mentioned that they have used these resources as support during virtual classes, as support in the learning process. Finally, 55.46% of the students surveyed responded that they use learning managers such as Eminus, Moodle, Blackboard, Joomla and WordPress, among others, as learning platforms to carry out activities during the learning processes virtually.

Figura 8. Competencias digitales: colaboración



Fuente: Elaboración propia

Discussion

One of the limitations of this study was the size and type of sample, since only EMS students were taken into account, which allows knowing only a part of reality. Therefore, it would be necessary to broaden the scope of the research and include higher level students to compare the dimensions of the impact of covid-19 and determine if there are significant differences in relation to educational level.

On the other hand, one of the strengths of this work was the performance of a reliability test, using Cronbach's alpha coefficient, for the instrument, obtaining a satisfactory result. Therefore, it can be mentioned that the results obtained are reliable and also allow measuring, through the dimensions considered by Gazca (2020), the impact of covid-19 on EMS students. In this sense, an overview of the situation faced by students in virtual learning processes was obtained, which could allow generating actions to anticipate or simplify educational processes in this context.

These results can support what was presented by Gazca (2020), who, based on a sample of professors from the Universidad Veracruzana, was able to describe the perspective

regarding the impact of covid-19 on the teaching-learning processes in higher education. . Some of the descriptive results were that teachers have technological infrastructure, skills and have taken courses in educational technology, as well as the presence of a learning management platform to teach online classes.

On the other hand, some negative results were the low capacity and preparation of some teachers to master and manage virtual learning environments, as well as risks to physical and emotional integrity caused by confinement (Gazca, 2020).

Taking into account the above, the results obtained by Gazca (2020) in university professors show similarities with those obtained in this research with respect to EMS students. This could serve as an argument to determine the presence of a generalized behavior of the phenomenon in two different types of populations, which could later be verified by means of a hypothesis test.

Conclusions

The impact of covid-19 on the learning processes in the EMS could be defined based on four dimensions that cover technological infrastructure, training, the social-economic and health sphere, as well as digital skills. In this sense, the characteristics of these dimensions could be determined from the perception of the students. What allowed to have a broader panorama of the situation faced, mainly, by students and to give continuity to the learning processes from virtuality.

Fulfilling the objective of the research, based on the results obtained, it can be mentioned that, in most of the cases observed, the students have the adequate technological infrastructure to continue with the learning processes in a virtual way; however, there is a significant proportion that is not in the same conditions, which could lead to some negative effects during the professional training process.

On the other hand, it was possible to obtain evidence that students have the digital skills to use applications that promote communication, for example, the use of social networks as support in academic activities. Likewise, it highlights a significant percentage of the student sample that has not taken any type of training related to educational technology, so we could be talking about digital native individuals.

Another important point that should be highlighted is the health effects caused by the health measures applied by the educational authorities (mainly social distancing and confinement). Indeed, most of the students presented some type of affectation, mainly of an

emotional nature. In addition to this, it is relevant to mention that the confinement caused by covid-19 has been considered a trigger for situations of violence; however, the results obtained showed that only a small proportion of students have experienced some type of violence.

Finally, the results obtained from this analysis mean a contribution to the state of the art that allows addressing the problem from a broader perspective, since the documented literature is in the process of construction and strengthening for future work.

Future lines of research

Subscribing to the follow-up of the study of the phenomenon in question and to give continuity to the construction of knowledge, a possible line of research could consist of expanding the scope to a correlational level, as well as the application of hypothesis tests to determine if there are significant differences taking taking into account different educational levels. Likewise, broaden the horizon of research, including administrative, teaching and non-teaching staff of educational institutions, to open the perception panorama on the impact of covid-19 on educational processes from various approaches.

On the other hand, it could be useful to carry out a regression and correlation analysis to determine if there is a relationship between the factors referring to the impact of covid-19 and a dependent variable that allows establishing models that explain the phenomenon. The foregoing would provide important evidence for the formulation, design, and implementation of institutional policies that help counteract the negative effects of the pandemic on both students and teaching staff.

Another proposal that could complement the study of this phenomenon consists of integrating a scale with which it is intended to measure the resilience capacity of students and educational staff in the face of disruptive events that may be caused by confinement and social distancing measures, as well as those where some family conflict or violence is involved.

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