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Journal Computer Technology

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Presentation of content

In volume four, issue twelve, as the first article we present, *Mobile learning in the teaching of mathematics: a conceptual cartography*, by URIBE-HERNÁNDEZ, Mayra, LARIOS-OSORIO, Víctor and ESCUDERO-NAHÓN, Alexandro, with secondment at the Universidad Autónoma de Querétaro, as a second article we present, *Access to virtual education in students of degree level in the State of San Luis Potosi*, by ALVARADO-SÁNCHEZ, Brenda, MORENO-DE-LEÓN, Romina Sinahí, MACÍAS-PÉREZ, José Roberto and REYES-MUNGUÍA, Abigail, with an appointment at Universidad Autónoma de San Luis Potosí, as a third article we present, *Gamification as a basic tool in distance education*, by ESCAMILLA, Regis Daisy & MARTÍNEZ, Bahena Elizabeth, with secondment at the Tecnológico de Estudios Superiores de Cuautitlán Izcalli, as fourth article we present, *Learning under the assessment of the higher-level student, in times of COVID-19*, by GONZÁLEZ-HERRERA, Karina Concepción, with secondment Universidad Tecnológica Metropolitana.

Content

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Mobile learning in the teaching of mathematics: a conceptual cartography

El aprendizaje móvil en la enseñanza de las matemáticas: una cartografía conceptual

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Abstract

Designing a mobile learning environment for mathematics education requires an understanding of how technology relates to various epistemological and pedagogical systems. The purpose of this study was to systematically analyze scientific literature on mobile learning in mathematics teaching through the axes of conceptual mapping within the framework of qualitative research. The analysis categories were: notion, categorization, characterization, differentiation, methodology and exemplification. The contribution of this work refers to the definition of mobile learning in the teaching of mathematics considering its characteristics, such as context creation, social interaction, multimedia content and usability. It was identified that mobile learning increases the possibilities of electronic learning and enables ubiquitous learning when the student is immersed in the learning context. The studies analyzed do not report a precise methodology that allows evaluating the relevance of the design of a mobile learning environment. However, it was identified that the choice of the pedagogical principles and the definition of a thematic axis are fundamental. In addition to the demand for teachers' theoretical, pedagogical and digital skills. This work provides elements that could guide further research and applications.

Mobile learning, Mobile devices, Mathematics education

Resumen

El diseño de un entorno de aprendizaje móvil en la enseñanza de las matemáticas requiere que se comprenda cómo se relaciona la tecnología con los diversos sistemas epistemológicos y pedagógicos. El presente estudio tuvo el propósito de analizar sistemáticamente literatura científica sobre el aprendizaje móvil en la enseñanza de las matemáticas mediante los ejes de la cartografía conceptual dentro del marco de la investigación cualitativa. Las categorías de análisis fueron: noción, categorización, caracterización, diferenciación, metodología y ejemplificación. El aporte del presente trabajo refiere a la definición del aprendizaje móvil en la enseñanza de las matemáticas considerando sus características, como creación de contextos, interacción social, contenido multimedia y usabilidad. Se identificó que el aprendizaje móvil incrementa las posibilidades del aprendizaje electrónico y posibilita el aprendizaje ubicuo cuando el estudiante está inmerso en el contexto de aprendizaje. Los estudios analizados no reportan una metodología precisa que permita evaluar la pertinencia del diseño de un entorno de aprendizaje móvil. Sin embargo, se identificó que la elección de principios pedagógicos y la definición de un eje temático son fundamentales. Además de la demanda de habilidades teóricas, pedagógicas y digitales de los docentes. Este trabajo proporciona elementos que podrían orientar nuevas investigaciones y aplicaciones.

Aprendizaje móvil, Dispositivos móviles, Educación matemática

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Introduction

The relevant teaching and learning of mathematics involves the development of activities to achieve specific educational objectives. These activities are conditioned by the environment and the use of technological means (Godino, 2013). For the incorporation of technology in the educational field of a disciplinary field such as mathematics, the work that the software manages on school knowledge and its association with the epistemological environment must be considered, as well as the optimal design of the interface to transmit the elements symbolic characteristics of mathematical language (Camacho Ríos, Caldera Franco, & Valenzuela González, 2019).

The use of personal electronic devices in the teaching of mathematics has made it possible to access multimedia content, the creation of diverse learning contexts and diverse means of communication between teacher and student, fundamental components in a mobile learning environment.

The design of this learning environment demands the understanding of how technology is related to the epistemological and pedagogical systems that underpin the learning and teaching process of a disciplinary field (Bano, Zowghi, Kearney, Schuck, & Aubusson, 2018) which evidences the relevance of the implemented didactic rules

The teaching of mathematics presents the challenge of developing skills in the student that allow them to solve problems of daily life through mathematical models (Aragón, Castro, Gómez, & González, 2009), the difficulty in this disciplinary field is due to the characteristic abstract and intrinsic that mathematical meanings possess (Duval, 2006). Therefore, the relevance of analyzing in depth the incorporation of technology in the teaching of mathematics.

The present study had the purpose of systematically analyzing scientific literature on mobile learning in mathematics teaching through the axes of conceptual mapping within the framework of qualitative research.

Methodology

For the development of this work, a documentary analysis was carried out around the concept of "mobile learning in the teaching of mathematics", within the framework of qualitative research. The stages that refer to the documentary research process were followed. These are search, selection, analysis and interpretation of secondary data, that is, those obtained and recorded by researchers in documentary sources, with the purpose of providing new knowledge.

For the analysis stage, the axes proposed by conceptual cartography were considered, which is defined as a strategy to systematize, build, communicate and learn academic concepts, considering previous knowledge and theoretical references around an area of interest, following 8 axes (Hernández-Mosqueda, Tobón-Tobón, & Vázquez-Antonio, 2014):

- Notion: Describes the etymology of the concept, its historical development and the current definition with its different meanings.

- Categorization: Refers to the definition and characteristics of the immediate class and subsequent class, considering the concept in a general class as part of a whole.

- Characterization: Describes the key features of the concept taking into account the notion and categorization.

- Differentiation: Identifies similar concepts, they are defined and they differ from the analyzed concept.

- Classification: Determines in which subclasses or types the study concept is classified.

- Linkage: Links the concept with theories, social-cultural processes and epistemological references that are outside the identified categorization, which provide contributions to the understanding, construction and application of the concept.

- Methodology: Describes the key elements of the methodology to apply the concept in situations and problems of the context.

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- Exemplification: Describes an example of how the concept is applied in activities or problems in the social, work or professional context.

In this work, the axes proposed by Tobón (2017) were considered with the exception of classification and linkage, since the studies analyzed did not yield enough information to identify subclasses of these concepts. Due to the fact that "mobile learning" arises in the educational field, the studies did not provide data on disciplinary processes outside this field that were related to the study concept. The information referred to in each axis was systematically analyzed in order to evaluate the reported results, define possible gaps and communicate data for future studies.

Document selection criteria

Considering the axes of the conceptual cartography, research articles referring to mobile learning in mathematics teaching were searched. The period of the publications was established between 2010 and 2019, considering that the first studies on mobile learning date from 2010 (Borba *et al*., 2016). Studies referring to mobile learning for the teaching of thematic axes other than the area of mathematics were excluded.

Study categories

Table 1 describes the six axes considered in the conceptual mapping, through which the information gathered from the research articles selected for analysis was organized.

Analysis axis	Core ítems
Notion What is mobile learning in the teaching of mathematics?	Current definition. Historical development of mobile learning.
Categorization To which category does the mobile learning concept belong in the teaching of mathematics?	Immediate class: definition and characteristics.
Characterization What are the elements that give identity to mobile learning in the teaching of mathematics?	Key characteristics considering the notion and categorization.
Differentiation From what other similar concepts does mobile learning differ in the teaching of mathematics?	Similar concepts are described, defined, and differentiated.
Methodology What are the essential axes for the implementation of a mobile learning environment in the teaching of mathematics?	The essential axes for the implementation of the approach are described.
Exemplification What could be a relevant example of a mobile learning environment in teaching mathematics?	Describe a concrete example that illustrates the application of the methodology with details of the context.

Table 1 Axes of the conceptual mapping on mobile learning in mathematics teaching

Phases of the study

Figure 1 illustrates the stages of the present work. The first phase of the conceptual study was carried out by searching for research articles considering two main fields: mathematics education and mobile learning. Search terms (math * education AND "mobile learning") were used in three electronic databases: ScienceDirect, Web of Science and Springer Link. In the case of the Springer Link database, Education was selected as the specific discipline.

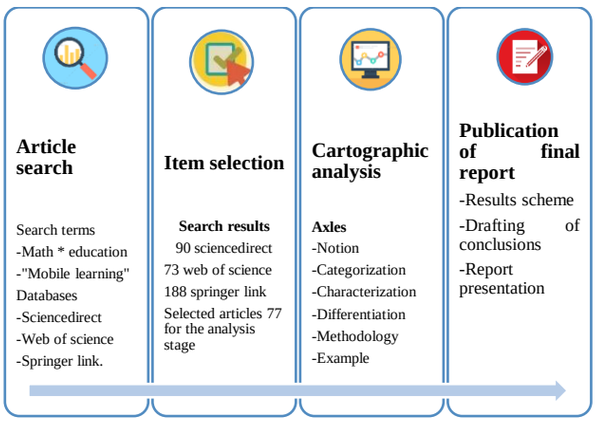

Figure 1 Phases of documentary research

The second phase consisted of the selection of research articles relevant to the study concept. We found 90 articles from ScienceDirect, 73 from Web of Science and 188 from Springer Link, giving a total of 351 articles. For the present work, 77 articles were analyzed, which were considered relevant in relation to the axes of analysis of the conceptual cartography.

The third phase was carried out through cartographic analysis. After the selection of the research articles, the conceptual cartography was elaborated considering the six axes proposed in Table 1.

The fourth phase refers to the publication of the results, through the presentation of a report and the writing of the conclusions, identifying the contribution of the present work for future research on the relationships between the technology of a mobile learning environment and the pedagogical components in the teaching of mathematical knowledge.

Results

This section reports the results that refer to the analysis of the axes proposed in the conceptual mapping, which are illustrated in Figure 2 in a general way.

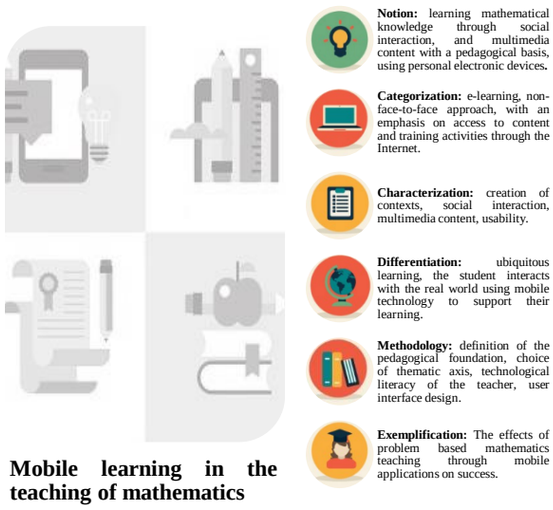

Figure 2 Diagram of the results of the analysis based on the axes of the conceptual mapping

Notion of mobile learning in the teaching of mathematics

The concept of "mobile learning" emerged as an extension of distance education and distributed technology, through the use of mobile devices and wireless networks (Liu & Zhang, 2017). This approach links individualized learning with learning at any time and in any place, it focuses on the student's experience, providing a diversity of multimedia content through touch screens (Skiada, Soroniati, Gardeli, & Zissis, 2014).

Various authors (Borba *et al*., 2016; Bray & Tangney, 2015; Roberts, 2014) refer to the definition proposed by Crompton (2013, p. 4): "learning in multiple contexts, through social and content interactions, using personal electronic devices".

Therefore, learning must be significant as a factor of formal or informal education (Fessakis, Karta, & Kozas, 2018), due to the properties of mobile devices, the dependence on fixed locations decreases (Juhan & Halkias, 2017). that allows the creation of new learning contexts (Joo Nagata, García-Bermejo Giner, & Martínez Abad, 2017; Schuck, 2016) that are enriched thanks to the characteristics of multimedia content, giving a new dimension to the school curriculum in the formal educational context (Handal, Campbell, Cavanagh, & Petocz, 2016), learning can occur in an informal context when the opportunities offered by mobile technology are taken advantage of (Ludwig & Jesberg, 2015; Rodríguez, Spiegel, Salviolo, & Peña, 2015).

The notion of mobile learning has components that have been analyzed in research studies for the teaching of mathematics, which refer to context, social interaction and content. The possibility that learning occurs in various contexts is relevant to the fact that when mathematics is taught, "classroom practice can be seen as a system of adaptation of the student to society" (D'Amore, Radford, & Bagni, 2006, p. 27), doing mathematics refers to a human activity, which is developed in a context, uses various instruments and provides techniques for the achievement of specific tasks (Chevallard, 1992).

The approach and resolution of mathematical problems encourages communication, discussion and validation of solutions, so that social interaction acquires relevance in the construction of knowledge. The dialogue between teacher-student allows to identify the acquisition of erroneous meanings, false conclusions and the timely resolution of doubts (Alsina & Domingo, 2010).

Mobile learning allows the interaction of multimedia content, which for mathematical work refers to concepts such as procedures, algorithms, propositions, demonstrations, problems or language. For the teaching of mathematics, the theoretical content and the way in which it is transmitted and how the student acquires it is relevant (Radford, 2004).

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Categorization of mobile learning in the teaching of mathematics

The use of mobile technology in education considers electronic learning (e-learning) through mobile devices to create a ubiquitous educational experience (Nicolete, Bilessimo, Cristiano, Simão, & da Silva, 2017). Electronic learning is a non-face-to-face approach, with an emphasis on access to content and training activities through the Internet, which promotes interaction and communication among participants. It is aimed at the acquisition of skills in a social context through a technological ecosystem, in which the teaching actors contribute to guaranteeing the quality of the various factors involved, mainly the pedagogical design.

A fundamental characteristic of electronic learning is the student's capacity for self-regulation in her learning process, since she must define objectives and strategies considering attributes such as personalization, interaction, authenticity, scaffolding and reflection. In this approach, the autonomy of the student is a crucial factor for the achievement of goals (Salvat, 2018), since in the process of teaching mathematics the subjects dialogue and regulate the expressions and actions before certain mathematical problems, systems of shared practices within a specific context, but subjective knowledge also arises in relation to the student's thoughts and actions (Godino, 2003).

Characteristics of mobile learning in the teaching of mathematics

The understanding of "the nature of the mathematical concepts and propositions themselves and their dependence on the contexts and situations-problems from whose resolution they come" (Godino, 2003, p. 22) is fundamental in the learning process, which shows the relevance of the characteristics that identify mobile learning in the teaching of mathematical knowledge.

- Creation of contexts. Portability, the integration of a Global Positioning System (GPS) and access to the Internet of mobile devices have allowed their integration in the educational field to generate personalized, connected and collaborative learning environments. The creation of contexts is a relevant feature of mobile learning in the teaching of mathematics, it allows exploring the learning process through everyday situations or contextual problems to form formal relationships and abstract structures. The relevance in mathematics teaching is related to the degree of adequacy of the study process in the conditions of the student's environment inside and outside the school classroom.

- Social interaction. For mobile learning, social interaction refers to communication between the various agents involved in a learning environment; In the teaching of mathematics, argumentation, agreements, the identification of erroneous concepts and dialogue are fundamental in collaborative environments and their practice is promoted in the school classroom.

- Multimedia content. It refers to that which uses several means simultaneously in the transmission of information. Multimedia content, therefore, can include photos, videos, sounds, and text. It makes possible the diversity in the contents, the didactic activities and the evaluation methods; creates new forms of interaction and communication between the agents involved; these media interact with mathematical problems, representations, definitions, propositions and arguments. The relevance of the learning process is related to the availability of material resources and their adequacy with the intended meanings.

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- Usability In mobile learning, the interaction between subjects and shared content occurs through the interface of mobile devices, this process is inherent to the user experience, which describes the need to design an efficient environment for the correct reading of the information, which implies that distractions are avoided in a learning environment; In the teaching of mathematics, the theoretical content and the method to transmit it must be considered, so the usability characteristic refers to the design of didactic activities through the collaboration of expert teachers in the disciplinary field and experienced developers.

Differentiation of mobile learning and ubiquitous learning in mathematics teaching

Mobile learning enables the interaction of the various agents of a learning process through various contexts and everyday situations, this due to the inherent characteristics of mobile devices that allow communication at any time and place. This ubiquity encourages the creation of learning environments adapted to the social and educational context that students experience. These possibilities of access and interaction between the subjects and the contents have led to the design of learning environments that consider contexts in which the participants are immersed, it is this deliberate adaptation of the teaching proposal with the context that differentiates ubiquitous learning of mobile learning. Therefore, in a ubiquitous learning environment, the student is totally immersed in the learning process and could even learn without being fully aware of the process (Zhao, Wan, & Okamoto, 2010).

Ubiquitous learning creates a didactic experience "in which the student is interacting with a real world environment while using mobile technology to support their learning" (Borba et al., 2016, p. 20), so the relevance of the Ubiquitous learning largely depends on the surrounding context of the students.

Ubiquitous learning is based on the principles of adaptive learning, the potential of ubiquitous computing and the flexibility of mobile devices; focuses on the individual needs and learning styles of the student for the relevant design of educational settings (Joung-Souk, 2009).

To facilitate the learning process, the monitoring of the activity, the interpretation of results, the analysis of requirements and student preferences are considered.

Ubiquitous learning has potential for the teaching of mathematics considering that the appropriation of mathematical knowledge is attributed to its relationship with the cultural reality of students (Godino, 2003).

Methodology to evaluate the efficiency of a mobile learning environment in the teaching of mathematics

The studies were not conclusive regarding the methodology for evaluating a learning environment focused on the teaching of mathematics, in which social interactions and multimedia content occur through mobile devices. However, it was possible to identify methodological components considering the teaching of mathematical knowledge as an objective. These components are:

- Definition of the pedagogical foundation. The Didactics of Mathematics in the field of research studies the factors that condition the process of teaching and learning mathematics, and the development of programs to improve these processes. For the design of a mobile learning environment in the teaching of this disciplinary field, it will be essential to start with the definition of the pedagogical approach to the use of technology, to guarantee that the implemented didactic standards are based on a theoretical framework, the result of research and analysis of the nature of mathematical knowledge.

- Choice of thematic axis. The choice of a thematic axis should consider the analysis of the mathematical contents to be problematized, as well as their cultural and personal development in the didactic systems. This process will allow the definition of feasible learning objectives and the pertinent evaluation of the learning process, that is, to evaluate whether the knowledge transmitted corresponds to the knowledge acquired.

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- Technological literacy of the teacher. In a mobile learning environment, usually in formal educational contexts, the technological literacy of the teacher acquires relevance and is fundamental for the design of educational environments with pedagogical considerations. A deep reflection on the meaning of mathematical content and knowledge about the use of technological tools that allow modifying, enriching and diversifying their academic work through resources from their daily context is required from the mathematics teacher. Digital skills must be defined in relation to the curriculum of each educational level, in addition to considering the academic discipline as a fundamental axis in a technological development project (Ramírez Martinell, Casillas Alvarado, & Aguirre González, 2018).

- User interface design. The challenge in teaching mathematics is to achieve in the student the development of thinking skills and the use of tools to solve problems in their daily context through mathematical models (Aragón *et al*., 2009), a mobile learning environment in the The teaching of mathematics should consider that access to content through mobile devices requires the effective design and development of user interfaces, considering the characteristics of the resources that will be used to convey mathematical meanings. An efficient interface design will facilitate the interaction between the subjects of the environment and the multimedia content, which is why the collaborative work of teachers and designers is essential.

Exemplification of the methodological components of a mobile learning environment for the teaching of mathematical knowledge

This section analyzes the study the effects of problem based mathematics teaching through mobile applications on success (Çetinkaya, 2019). The purpose of the research was to determine the effects of problem-based math teaching through mobile applications as assistive technology.

The following research questions were posed:

1. Is there a significant difference between the success scores of students who are taught with the problem-based app with mobile assistance and the success scores of students who are educated in the traditional setting?

2. What are the opinions of the students about the effectiveness of the study process?

- Research model. The explanatory design of the mixed method was used; For the quantitative dimension, the quasi-experimental design was used with a pretest-posttest control group.

- Study group. The quantitative dimension of the study refers to a total of 62 students (16 girls and 15 boys in the experimental group, and 17 girls and 14 boys in the control group). The participants had smartphones, internet access and the WhatsApp application. Information was provided on the mobile applications that were used in the process, considering technical requirements.

- Implementation phase. Figure 3 illustrates the components described in the study during this stage. It begins by defining the didactic design in relation to the content of the subject area; The terms and concepts of: data, discrete data, continuous data, arithmetic mean, median, mode, interval, maximum value, minimum value, lower quartile, upper quartile, interquartile range, standard deviation, line graph, bar graph are covered, pie chart, histogram, group count, group width.

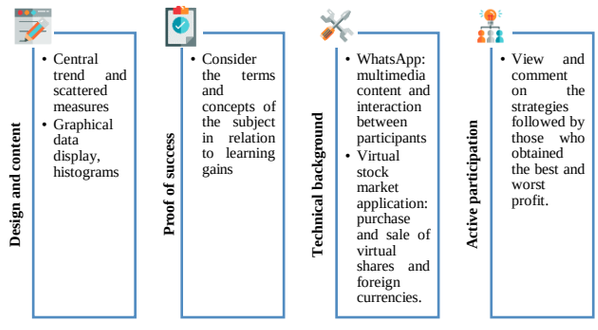

Figure 3 Detail of the components considered in the implementation phase of the study

- A success test was designed, which consisted of a series of questions to determine the level of understanding of the students considering the terms and concepts included in the subject.

- Technical aspects were defined in relation to the selected technology, the WhatsApp application was used for the interaction and support of multimedia content. A virtual stock market application was used for the students to graphically monitor the buying and selling of foreign stocks and currencies, using data from the Istanbul stock exchange.

- All participants were able to see and comment on the strategies followed by those who made the best and worst profit, increasing their active participation.

- Data collection. Quantitative study data was collected using the 80-item success test for evaluations.

- Qualitative data were collected using an open questionnaire.

- Data analysis. A two-factor analysis of variance was performed for the mixed measures, since the distribution fulfilled the assumption of normality and there were two groups. For the open questions, which refers to the qualitative dimension of the study, the data of the students of the experimental group were analyzed using categorical and frequency analysis techniques.

- Study results. Problem-based learning supported by mobile technology is effective in increasing students' understanding. The students emphasized elements such as learning anytime anywhere, sharing resources and materials, organizing activities for academic purposes. According to the findings, the use of mobile technology provided technical, educational and academic advantages. A natural environment of competition was formed during the process thanks to the interaction of the students with real life and with each other.

Conclusions

The results of this study define the notion of mobile learning in the teaching of mathematics as the learning of mathematical knowledge in different contexts of the real world, through social interaction between students and teachers, and multimedia content with pedagogical basis in the disciplinary field , using personal electronic devices.

The notion of mobile learning in the teaching of mathematics has components that refer to the creation of contexts, social interaction, multimedia content and usability. Considering that doing mathematics refers to a human activity, a mobile learning environment allows the development of contexts associated with daily life, thereby promoting the use of multiple tools and techniques to achieve mathematical learning; Communication in these contexts allows dialogue between student-teacher, this social interaction facilitates the timely resolution of doubts, allows identifying the acquisition of erroneous meanings and promotes argumentation, fundamental elements in the teaching of mathematics. The multimedia content presents possibilities that for the teaching of mathematics have an implication in the theoretical knowledge that is transmitted, the way in which it is transmitted and how the student acquires the meanings; This implies that the design of the didactic activities impacts usability, which describes the need for an efficient design of the interface, which will be the medium where the participants and the content interact.

The use of mobile technology in the educational field boosted the possibilities of electronic learning, by creating a ubiquitous educational experience, so that access to content and interaction among participants presented new possibilities in the teaching of mathematics. This ubiquity has allowed the design of learning environments that consider contexts in which the participants are immersed, this characteristic makes the difference between ubiquitous learning and mobile learning.

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Although the studies were not conclusive on the definition of a methodology for the design of a mobile learning environment focused on the teaching of mathematics, methodological components were identified that refer to the definition of the pedagogical foundation, the choice of the thematic axis, literacy teacher technology and user interface design.

The relevance of the definition of the pedagogical approach to the use of technology has the objective of guaranteeing that the didactic strategies implemented are based on the results of the research. In the teaching of mathematics, the choice of a thematic axis facilitates the definition of viable learning objectives, so the analysis of mathematical content and its relationship with the cultural and personal context of the didactic systems should be considered.

By incorporating technology, the teacher is required not only to have a deep knowledge of the mathematical meanings that she will teach, but also about the use of technological tools that diversify her academic work, with which digital literacy is a crucial factor for the relevant designTo convey the mathematical meanings in a pertinent way, the design and effective development of user interfaces should be considered, since this will be the means to visualize and interact with the information, its correct operation will avoid distractions.

The contribution of this work refers to the definition of mobile learning in the teaching of mathematics considering its characteristics, the similarity with ubiquitous learning in relation to the creation of various contexts, and the identification of components for the relevant design of a learning environment. learning. In addition, the demand for theoretical, pedagogical and digital skills of teachers presents a challenge in formal education. These results could be of interest to future research on the relationships between technology and the various epistemological and pedagogical systems in the teaching of mathematical knowledge, so this work provides elements that could guide new research and applications, both in educational institutions and in schools. organizations and society.

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Access to virtual education in students of degree level in the State of San Luis Potosi

Acceso a la educación virtual en alumnos de nivel licenciatura en el Estado de San Luis Potosí

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Abstract

The life changes associated with the health emergency caused by the SARS-CoV2 epidemic have tested the adaptation skills of the population, and the education sector has been no exception. This study aims to have an approach to the real panorama that the students of the Biochemistry Degree of the Faculty of Professional Studies of the Huasteca Zone of the Autonomous University of San Luis Potosi live with respect to the conditions that they have with the new form of learning. An electronic survey was used, solved by 232 students (76%). Among the most important results, it was found that 85.7% of the students do not have an electronic device of exclusive use to carry out academic activities and that 10.8% do not have internet services at home, which can seriously affect their academic performance; situation that should be analyzed in due time.

New normality, Learning conditions, Digital gap

Resumen

Los cambios de vida asociados a la emergencia sanitaria por la epidemia SARS-CoV2 han puesto a prueba las habilidades de adaptación de la población y, el sector educativo no ha sido la excepción. En este estudio se pretende tener un acercamiento al panorama real que viven los estudiantes de la Licenciatura en Bioquímica de la Facultad de Estudios Profesionales Zona Huasteca de la Universidad Autónoma de San Luis Potosí respecto a las condiciones que viven con la nueva forma de aprendizaje. Se utilizó una encuesta electrónica, resuelta por 232 alumnos (76%). Dentro de los resultados más importantes, se encontró que un 85.7% de los alumnos no cuentan con un dispositivo electrónico de uso exclusivo para realizar actividades académicas y que un 10.8% no cuentan con servicios de internet en casa, lo que puede afectar gravemente su rendimiento académico; situación que deberá ser analizada en su momento.

Nueva normalidad, Condiciones de aprendizaje, Brecha digital

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Introduction

For a long time, a large part of the education sector has incorporated technology as a work tool, however, this has been gradually but not mandatory. This resistance to change has arisen due to different circumstances, including myths about virtual and distance education, such as the belief that learning can only take place in the face-to-face mode, although there are also realities derived from the social context of the population in Mexico and from the natural history of education in our country. One of them is the access that students have to adequate technology that allows them to achieve learning through the use of digital media and, not only that they can access it, but also that they know its use and that the environment that surrounds them is favorable for its optimal use (Cabral-Vargas, 2008).

The Faculty of Professional Studies of the Huasteca Zone of the UASLP is located in a region where at least two Nahuatl and Tenek ethnic groups converge, in addition to the mestizo population and a large part of the student body comes from medium and low economic-social strata, it limits in a certain way their ability to access technological means that facilitate their learning in virtual mode. At the moment, it has been possible to demonstrate that socio-economic conditions have an important influence on the educational performance of individuals, which impacts the development of the regions (Luna, et. Al, 2020) Which, in the current scenario Learning without a doubt has important repercussions, since the necessary tools for this involve the acquisition of various technological resources, as well as the proper handling of them, which entails training in their use, in some cases through payment systems.

At this time there is no diagnosis on the learning scenarios that are presented in the so-called new normal within the FEPZH, so it is essential to carry it out to identify those factors or deficiencies that can become areas of development opportunity and achieve the improvement of learning (Torres, 2020).

Therefore, the objectives of this study were to evaluate the digital services, electronic media and skills in ICT of the students of the Degree in Biochemistry of the FEPZH-UASLP, as well as to identify the academic needs presented by the student population.

Methodology

The disclosure of a link was requested to answer an electronic survey, the invitation was sent through the coordination of tutorials, with the application period from September 02 to 25. In the case of the Degree in Biochemistry, 232 students answered the survey out of a total of 302 students (76.8%), one of the critical points of this is that we do not know if the students who did not answer the survey were because they did not have the means to access it since it was carried out in electronic format, however, depending on the current health emergency conditions, it was the most viable option to massively reach the population of students without putting their health at risk.

Results

Table 1 describes the general characteristics of the population studied and we can see that most of the participants are women and are concentrated in the fifth, first and ninth semester.

No. of people who answered the survey:			232	100%
No. of women:			165	67.2%
No. of men:			76	32.7%
Survey application period:			02/09/20	25/09/20
Age range:			17 to 23 years	
No. of people per semester				
First	Third	Fifth	Seventh	Nineth
72 (31.0%)	50 (21.5%)	68 (29.3%)	13 (5.6%)	29 (12.5%)

Table 1 Description of the population.

Regarding the academic situation of the students at the time of answering the survey, we can observe that the majority (87.2%) of the population is regular student (data not shown). This information is relevant since at a given moment a follow-up can be done to determine how this value is modified or not after the August-December 2020 semester in which teaching will be practically in virtual mode.

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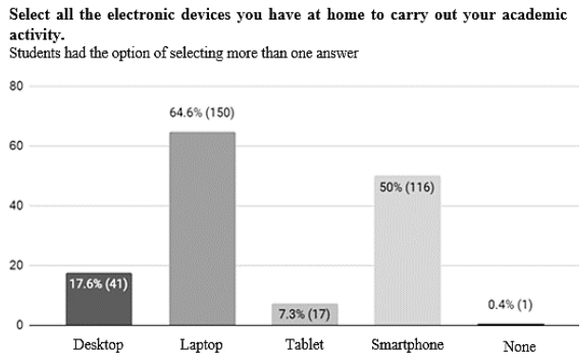
Access to electronic media and digital services

Once the general characteristics of the population had been described, we proceeded to request information on the electronic media to which they have access and the digital services they have, for this, several questions were established that allow us to assess this aspect. When questioned about access to electronic devices for use in academic activities, it was found that 90.1% of students have at least one tool that allows them to carry out such work. However, 9.9% do not have an electronic device for exclusive use. With an answer to the previous question, it is understood that most of the students have at least one electronic device to carry out their academic activities, however, when asked how many people they should share them with, surprisingly 52.6% answered that they share the equipment with at least one person, reaching in some cases (10.3%) to share it with more than 3 people (data not shown).



Graphic 1 Electronic devices available at home for students

In Graphic 1 we can see that 50% have at least a smartphone, however, only 64.4% have a laptop and 17.6% have a desktop computer.

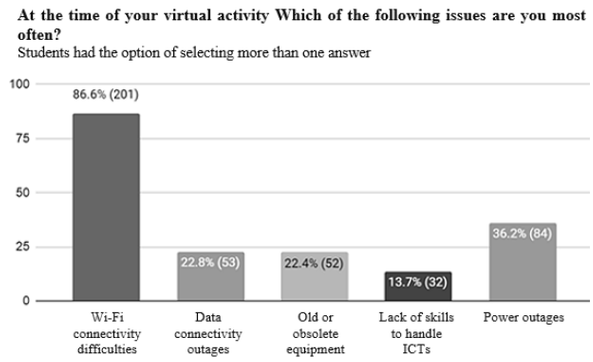
Unlike similar surveys in other UASLP Faculties, the desktop computer is a device that is still used by a good part of the student population, it is probably related to the socioeconomic status in the region. Let us remember that generally a greater investment is required to acquire a laptop computer than a desktop one and that a large part of the student population at FEPZH is low-income.

Handling digital tools.

To have a good academic performance it is essential to have a good internet connection, so students were questioned about the type of service they currently have. To which 89.2% responded that they have a wireless connection, and a small part of the population of 2.5% does not have internet service at home or data plan.

That leaves 34.4% of the population that accesses academic content through a data plan, this is undoubtedly worth considering when selecting materials since they will undoubtedly consume a good part of their data plan and will have an impact on their economic and academic situation.

In addition to the situations already described, there are other conditions that affect access to learning materials; In this sense, 86.6% of the students reported having Wi-Fi connectivity problems, in addition to having problems with data connection (22.8%), handling old or obsolete equipment (22.4%), lack of skills in handling ICTs (13.7%) and even power outages (36.2%), see Graphic 2.



Graphic 2 Problems presented to access academic activities

The problem of internet connection is a generalized situation in the region due, among other things, to the geographical conditions that make it difficult for the signal to pass through, however, this situation has worsened due to the fact that a large number of families found themselves in need of hiring internet services in a hasty manner due to the health contingency, which has led to a saturation of services (Mera-Mosquera & Mercado-Bautista, 2019).

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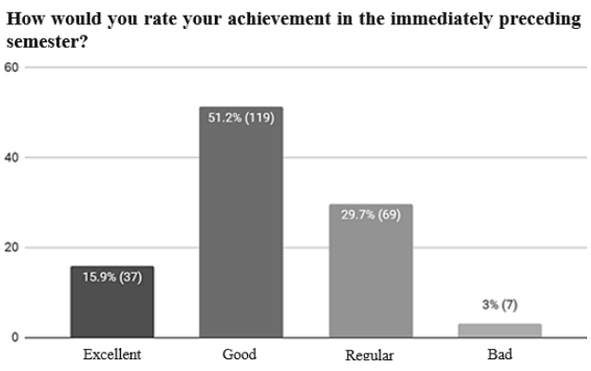
In addition to the problem with access to efficient Internet services, an important part of the students (33.8%) is developing work activities, so this is another important factor when defining the learning activities to be developed since, in in some cases (73%), working hours coincide totally or partially with school hours (data not shown). Although the majority of students who are working (88.3%) are allowed access to their academic activities, the concentration and dedication they can give to these will not be the same as that of a student who is exclusively dedicated to studying (Suing, 2018).

Ergonomics

In the case of education, ergonomics has an impact on the academic performance of students. A simple example is the acquisition of furniture that allows you to sit comfortably for long periods of time, the installation of artificial light that facilitates reading and even the isolation of the area to reduce loud or annoying noises. Therefore, the real learning scenario of the students in which they are developing their academic activities was explored.

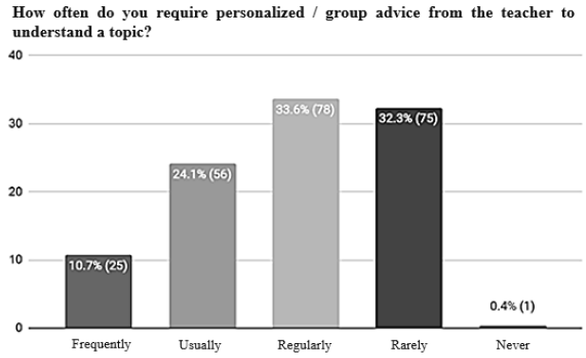


Graphic 3 Assessment of academic performance by students

It goes without saying that 54.5% of the students reported having distractors in their work areas (data not shown) and this coincides with the fact that it is approximately the same proportion of students who state that they use shared rooms to develop their school activities. Interestingly, 71.2% of the students declared that these distractors did not affect their academic performance (data not shown), a situation that can be evaluated when analyzing their academic condition at the end of this semester, as well as their perception of it; since, at this moment, only 3% of the population considers that their academic performance is bad (Graphic 3).

Academic needs.

One of the main objectives of this study was to explore the real conditions of access to learning for students of the Bachelor of Biochemistry, with the ultimate aim of influencing the teaching strategies used and therefore the academic performance of the students. Therefore, one of the questions they were asked was, How often do you require personalized or group advice from the teacher to understand a topic? To which only 32.3% answered that rarely and 0.4% never (Graphic 4).



Graphic 4 Assessment requirements for learning

Given that the Biochemistry career has a significant proportion of practical subjects, students were questioned about the tools that allow them to better understand these types of topics, to which 78% stated that demonstrative practices are the ones that best allow them to understand topics, followed by tutorials (67.6%) and simulators (43.2%).

However, the skills of teachers in the generation, search and management of these types of tools are unknown. Regardless of this, it is obvious that the development of technological and innovation competences in teachers should be sought, since, although it is possible to restore normality in the educational environment, undoubtedly these types of tools are already part of the forms of learning of students (Bernate & Guativa, 2020).

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Conclusions

It is necessary to design the teaching and / or learning activities taking into consideration that a portion of the study population does not have electronic devices for exclusive use and therefore their access to information will be limited to their availability. It is important to consider that only 89.2% of students have internet at home, so the rest will not be able to access digital services 24 hours a day, it is recommended to reduce the mandatory nature of synchronous sessions outside office hours. It is also important to take into consideration that a significant proportion of the students (33.8%) are working, so the time they can dedicate to academic activities will be limited (data not shown). It is advisable to include videos, electronic presentations or readings in each topic or content to be reviewed, since these media are the ones that, from the student's perspective, provide the best results for student learning (data not shown). It is necessary to replicate the efforts to diagnose learning scenarios in the new normal, since as Yáñez et al. (2020) show, the forms of communication, as well as the technological tools available vary depending on the educational level that the students are studying, as well as the geographical region where they are. Undoubtedly, higher education is no exception, so educational institutions must carry out their own diagnoses to adapt the tools and train the teaching staff in their use.

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Gamification as a basic tool in distance education

La Gamificación como herramienta básica en la educación a distancia

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Abstract

"The use of mechanisms, aesthetics and the use of thought, to attract people, encourage action, promote learning and solve problems" (Karl. M. Kapp (2012), Zichermann & Cunnigan).

Currently there are various teaching-learning strategies, which are useful and can be implemented according to the objective that is had with the group of students, it is there, where gamification is implemented, whose main objective is to influence behavior of people, since it can be a motivator to continue experimenting with new learnings, which lead the student to solve problems through games, having an assignment of points or feedback, as a result of it, and with it taking gamification as a basic tool in distance education

Objectives, methodology. Through this research, it is sought to demonstrate that within distance education there are various strategies that can be implemented in the material that makes up each subject, but this time we wanted to focus on gamification as a tool that can be implemented in the designs of Each of the materials of the distance subjects, so that, with this, it can be seen as another motivational alternative, so that the student becomes even more integrated in the training process of their learning.

Contribution. This research aims to demonstrate that gamification tools can be basic in the teaching-learning process of distance education, since this is where it is required that the student be motivated and generate a greater commitment in the process of their learning. The results of implementing gamification in distance education subjects bring us beneficial results in the implementation, thus having significant changes for the students, thus better professionals.

Gamification, Feedback, Basic tool, Distance education, Learning, Strategy

Resumen

"La utilización de mecanismos, la estética y el uso del pensamiento, para atraer a las personas, incitar a la acción, promover el aprendizaje y resolver problemas" (Karl. M. Kapp (2012), Zichermann y Cunnigan).

En la actualidad existen diversas estrategias enseñanza-aprendizaje, las cuales son útiles y se pueden implementar de acuerdo al objetivo que se tenga con el grupo de estudiantes, es ahí, donde se implementa la gamificación, la cual tiene como objetivo principal influir en el comportamiento de las personas, ya que puede ser un motivante para seguir experimentando con nuevos aprendizajes, que lleven al estudiante a la resolución de problemas por medio del juego, teniendo una asignación de puntos o bien un feedback, como resultado de la misma, y con ello tomando a la gamificación como herramienta básica en la educación a distancia.

Objetivos, metodología. Mediante esta investigación, se busca demostrar que dentro de la educación a distancia existen diversas estrategias que se pueden implementar en el material que conforma cada materia, pero en esta ocasión se quizo enfocar a la gamificación como una herramienta que se puede implementar en los diseños de cada uno de los materiales de las materias a distancia, para que, con ello, se pueda ver como una alternativa más de motivación, para que, el estudiante se integre aún más en el proceso de formación de su aprendizaje.

Contribución. Esta investigación, tiene como objetivo demostrar que las herramientas de gamificación pueden ser básicas en el proceso enseñanza-aprendizaje de la educación a distancia, ya que, es aquí donde se requiere que, al estudiante se le motive y genere un compromiso mayor en el proceso de su aprendizaje. Los resultados de implementar gamificación en las materias de educación a distancia nos traen beneficos resultados en la implementación, teniendo así cambios significativos para los estudiantes, formato así mejores profesionistas.

Gamificación, Feedback, Herramienta básica, Educación a distancia, Aprendizajes, Estrategia

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Introduction

> There is something about games that we must not forget: they amuse us. The playful attitude offers an opportunity to increase participation, build loyalty, promote learning, communicate in a different way, solve problems, impact as a way to raise awareness and empower (Quotes: Games and gamification, 2020)

We are immersed in a global stage where all paradigms have to be modified, proposing new working methods that allow us to continue with our activities efficiently and effectively, trying to be as much or more productive than a few months ago, where tools Technological techniques give us the guideline to be able to combine all the knowledge in one place and thus be able to fulfill our teaching work; so meaningful in these changing times and so full of expectations.

Previously, the elements that made up "Traditional Education" included a classroom, a responsible teacher or instructor, books and books and other materials that we could access physically to make inquiries, all processes were based on reading and memorization and were guided by the instructor, who decided what to do, with what, how and in how much time. The games were only part of the recreation space and were sometimes also supervised by adults who set the tone to indicate how it should be played.

The most conservative position indicates that it cannot be instructed or trained without being followed to the letter, but as time goes by, we find ourselves in the need to think about expanding our preconceptions and taking away the idea that mature people, first comply and are sure of what they must carry out in order to ensure really meaningful knowledge.

This article will show the importance of the game as a fundamental part of current teaching-learning processes, which allows students to apply the knowledge of a specific topic or area, in a fun and sometimes competitive way, forcing themselves to answer Against the clock or against other colleagues, in healthy fights where the most important motivation will be to put into practice what has been understood.

Some digital tools are shown that have the game as a focal point as a fundamental part of the acquisition of knowledge, which at present is of great support for the teaching area that sees how the topics and the review can be intrinsically involved and obtain satisfactory results; Taking these procedures to a higher education level has shown that they are also of great impact and this is favorable in all areas of instruction.

The central hypothesis that is handled lies in the fact of demonstrating that, if gamification elements are included in the topics and adaptations to the study plans, they will allow to encourage students to generate new cognitive processes to know, investigate and empathically expand new ways to treat the information that is being imparted to them, so that the level of understanding will increase, also strengthening empathy, teamwork and cooperation.

The contents that are included will allow students to show their playful side and encourage research processes that motivate them to carry out the activities proposed in a specific application, giving their opinion, drawing, discovering and even guessing the answers to show the percentage of understanding about contents seen "normal" in classrooms.

Gamification: What is it?

Gamification can be defined as a technique that allows the inclusion of games in the educational field, in order to allow an improvement in the absorption of knowledge or processes shown in the classroom, to increase skills, actions that are carried out or increase the percentage perception of what has been learned.

It is based on playful processes (which are strategies designed to generate environments that facilitate the integration of students from the participation of different kinds of games); that encourage the learner to actively participate in activities that will allow them to show progress in the level of knowledge, immediately after a lesson or as a review at the end of a specific unit or topic.

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According to psychology, the processes that go hand in hand with the playful part allow the human being to be able to express feelings and attitudes that lead him to develop in an integral way and goes hand in hand with the emission of enjoyment, enjoyment, pleasure and satisfaction of instinctive demands, hence it is of great impact to allow the incorporation of gamification activities as an important complement in the application of knowledge.

Types and examples of gamification

Some virtual tools for gamification in classrooms are:

- EDUCAPLAY. It allows the creation of activities focused on education, it is very easy to use and allows the incorporation of these contents to the educational platforms that we are using, it has free service options and it also allows the use of different contents that are active on the Internet.

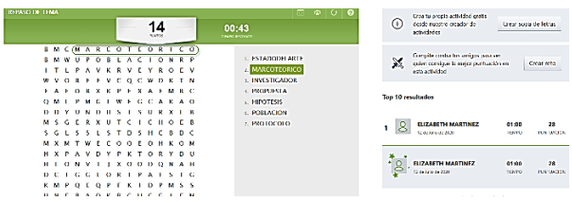

Figure 1 Educaplay Crossword resource
Source: (Bahena, Educaplay, 2020)

- GENIALLY. It allows creating interactive content, anyone can use it since the development of activities can be generated by anyone who has an active session, manages free content and premium content that gives access to more complete tools and allows content to be downloaded to be used on any platform or digital tool.

Figure 2 Genially Memory Game Resource
Source: (Bahena, Genially, 2020)

- GOCONQR. It is a very complete educational tool that allows you to adapt content to various activities, it has the disadvantage that the free version generates a large number of ads that can be very cumbersome for the user.

Figure 3 Goconqr Resource Review
Source: (Bahena, Goconqr, 2020)

- PADLET. It is a digital platform that allows the creation of collaborative murals, offering the possibility of building spaces where multimedia resources can be presented, be it videos, audio, photos or documents; These resources are integrated as sticky notes, just as they were "reminder notes".

Figure 4 Padlet Opina Resource
Source: (Bahena, Padlet, 2019)

- MOODLE. Despite being an educational platform by itself, Moodle allows adding gamification options to its resources, such as review questions, crosswords, hot potatoes, etc..

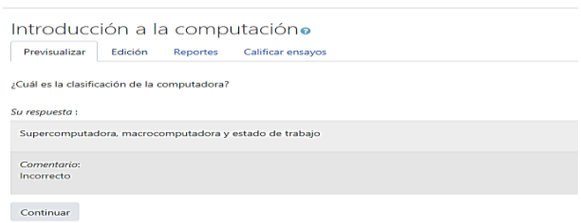

Figure 5 Moodle Resource Question
Source: (Regis, 2019)

As we can see, there is a great variety of digital options that offer us an unlimited variety of content that we can easily adapt to the subjects we handle semester by semester

Relationship of gamification and Higher Education

At present, a problem is experienced worldwide that has generated a significant number of challenges to allow continuing with the usual activities without reducing the quality or the completion times not increasing; A problem that arises in education is that, in addition to having to encourage students to attend their classes virtually, the level of interest in the student is maintained so that further training in the academic aspect is guaranteed , regardless of the educational level in which it is located.

Derived from this, procedures must be implemented that lead us to make use of virtual tools that allow complementing activities inside and outside all virtual classrooms, that is, looking for options so that teachers not only dedicate themselves to showing academic topics and content, but also that in addition, it can be encouraged in a fun and interesting way from activities that allow them to continue forming their knowledge.

For this, it is important to train teachers first so that they can include the use of cutting-edge technologies and tools within the content.

Now, we must also take into account that the requirements and needs in higher education are different from the other educational levels, they are changing and depend on the requests of the area professional, for which institutional governments must focus a large part of the resources that are assigned to the improvement of technological equipment within institutions.

The student, on the other hand, is responsible for forming knowledge processes that allow generating responses to the required requests, many times that go hand in hand with problems in their working life; This could be a coadjuvant in these procedures and give a break in the activities solely focused on knowledge, knowledge ... knowledge.

Impact of gamification on current education

The research was focused on students of a higher education institute (IES), where currently three distance engineering careers are taught and from which one subject of each career was taken as a sample, giving preference to theoretical subjects, since they are subjects in which the student's attention must be attracted more, due to being distance study, and that sometimes it is more complicated for students to acquire significant knowledge due to the too much information that is provided, this is how it was used study and apply gamification strategies, within the designs and materials provided in the subjects.

For this research, a quantitative method and descriptive research design was carried out, which allows to know the assessment of the students before the strategy called gamification, that is, if knowledge has been acquired through games that will allow them to have meaningful learning same as apply throughout your career. The use of gamification as a teaching-learning strategy in theoretical subjects was applied as shown in the following figure 6, where the sample taken with respect to careers, subject, number of students and semester is seen.

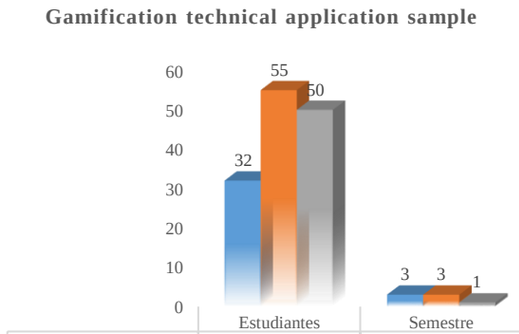

Figure 6 Initial sample

Once the sample was taken, work was done on gamification designs, only for one unit of each selected subject, this in order to observe the impact of the gamification tool within the subject, in comparison with the design and strategies that are commonly used in them. To carry out the design by implementing gamification,

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He resorted to certain platforms such as Genially, Educaplay, Goconqr, Padlet and those found in Moodle, the latter being the base platform for the design and support of the subjects that make up distance careers, the following figures show some examples of used gamification.

Figure 7 BookCreator example

In Figure 7, it shows an example using Genially, where a short topic is explained as a comic strip.

Figure 8 Educaplay example

In figure 8, feedback is given in such a way that each letter provides a random question and is very appealing to students.

Figure 9 Educaplay example

In figure 9, another type of feedback is shown, but this with the help of videos, that is, in the sample of the resource it has a video and within this there are pauses where they are asked questions in such a way that makes the participant more student.

It is worth mentioning that, in the IES, three evaluation stages are carried out, therefore, to make a comparison of the traditional model with gamification tools, it was decided to apply the latter in the second evaluation, to evaluate if gamification is a basic tool in distance education.

Once counting on this, they began to apply satisfaction questionnaires to the students about the learning game tools that they visualized in the matter and another questionnaire to the facilitating teachers, to see the comparison of evaluation and impact that these tools had had. taking what is shown below.

In figure 10, the satisfaction of the student is shown, which is seen as a favorable result, since 85% of them mention that they liked this way of learning and the topics of the unit were clear.

Evaluation from the point of view of the student			
What did you think about the design of unit two of the topics of your subject?		Do you think that you understood the topic seen?	
Good	85	85-100%	80
Regular	10	70-84%	15
Bad	5	Less than 69%	5
Unit two has fun.			
Good	90		
Regular	10		
Bad	0		

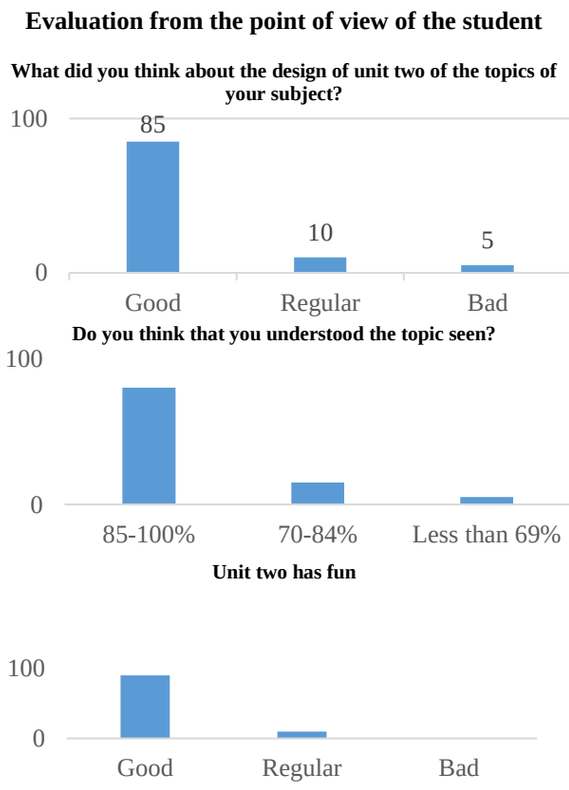

Figure 10 Student satisfaction

Evaluation questions			
How do you assess the student's learning in unit 2?		What percentage of failure rate did you have in Unit 2?	
Good	75	85-100%	0
Regular	22	70-84%	4
Bad	3	Less than 69%	96
What percentage of participation did you have in unit 2?		Compared to unit 1, do you think you had more student participation in unit 2?	
85-100%	90	Yes	98
70-84%	10	No	2
Less than 69%	0		

Evaluation of the gamification unit, by the facilitator teacher

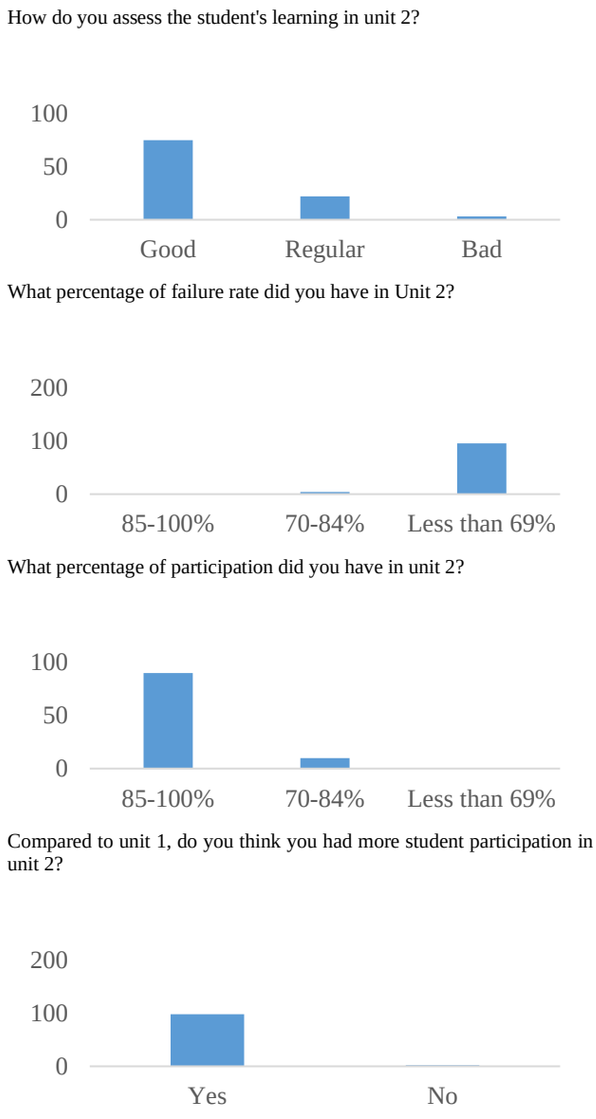

Figure 11 Teacher evaluation on gamification

In Figure 11, the survey carried out to the facilitating teachers is shown, making a comparison of evaluations obtained in the first part (traditional distance career strategies) and second part (gamification strategy), in which it can be determined that there was an improvement in grades and, above all, in the learning that students acquired, since there was more participation on the part from them.

In general, based on the survey carried out to the teacher and the student, a great agreement is observed, in the aspect that when using gamification tools for the subject in the second unit, there was a high approval rate and greater participation of the students.

Results

With this research it has been found that for students who study distance careers, the design with the use of gamification strategies is more attractive, since, more than 85% consider that the subject seen understands it more, and they find it more fun type of learning; on the other hand, the teacher-facilitators had greater participation in their subject by the students, and less failure rate compared to the evaluations they had in the first unit, which shows more motivation on the part of the students in the participation of the subject viewed.

Conclusions

Currently there are various strategies that can be applied as part of the teaching-learning process for students with distance modality, in this case the research that was carried out and which turned to verify the importance of play as a fundamental part of current teaching processes. - learning, allows detecting that gamification can be beneficial to implement it in higher-level students, who having a different way of acquiring knowledge was motivating and resulted in better grades in the second unit of their subject.

On the other hand, it shows that the gamification elements in the topics that make up the unit and adaptations to the study plans will allow students to be encouraged to generate new cognitive processes to know, investigate and empathically expand new ways of treating the information that is teaching them, increasing the level of understanding and further strengthening the strategies that are already contemplated in the design of each subject.

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Learning under the assessment of the higher-level student, in times of COVID-19

El aprendizaje bajo la valoración del estudiante de nivel superior, en tiempos de la COVID-19

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Abstract

Learning through virtual scenarios is today the way in which education has to reach higher level students, however it contracts, multiple scenarios, which do not only integrate the teaching or guide of the current subject, it also encompasses the tasks , practices, exercises, among others, that could value learning, however, it is there where the student's perception becomes valuable when considering the aspects that strengthen knowledge, learning and skills, under the modality that the conditions of health allow, considering the presence of the pandemic derived from the SARS-CoV2 virus. The purpose of this document is to analyze the perception of the higher-level student regarding the guidance provided regarding the subjects taken in time of the COVID-19 pandemic as a result of the transition from face-to-face classes to online teaching, considering the learning achieved by the student. Among the results that were obtained, it can be mentioned that face-to-face learning is today the scenario that is longed for among students, however, it is the scenario that today cannot be accessed, being valued the level of learning, skills and knowledge acquired in person with a greater presence by more than 90% of the study subjects. Contrary to this, the orientation, and solution of doubts under the various virtual scenarios, the doubts generated and the clarification of the doubts present regarding the tasks, practices, among others, are correctly and positively perceived, that is, they were solved with an arithmetic mean between both aspects of 88%.

Learning, Online learning, Virtual learning

Resumen

El aprendizaje mediante escenarios virtuales es hoy la forma en cómo tiene la educación para llegar con los estudiantes de nivel superior, sin embargo esta contrae, múltiples escenarios, que no integran únicamente la enseñanza o guía de la asignatura en curso, también engloba, las tareas, prácticas, ejercicios, entre otros, que pudieran valorar el aprendizaje, sin embargo, es allí en donde la percepción del alumno se vuelve valiosa al considerar los aspectos que fortalecen los conocimientos, el aprendizaje y las competencias, bajo la modalidad que las condiciones de salud permiten, considerando la presencia de la pandemia derivada del virus SARS-CoV2. El objeto del presente es analizar la percepción del estudiante de nivel superior con respecto a la orientación brindada relativa a las asignaturas cursadas en tiempo de la pandemia COVID-19 como resultado de la transición de las clases presenciales a la enseñanza en línea, considerando el aprendizaje alcanzado por el alumno. Dentro de los resultados que se obtuvieron se puede mencionar que el aprendizaje presencial es hoy el escenario que se añora entre los estudiantes, sin embargo, es el escenario que al día de hoy no se puede acceder, siendo valorado el nivel de aprendizaje, competencias y conocimientos adquiridos de forma presencial con mayor presencia por más del 90% de los sujetos de estudio. Contrariamente a ello, la orientación, y solución de dudas bajo los diversos escenarios virtuales se percibe de forma acertada y positiva las dudas generadas y la aclaración de las dudas presentes con respecto a las tareas, prácticas, entre otros, es decir se solucionaron con una media aritmética entre ambos aspectos del 88%.

Aprendizaje, Aprendizaje en línea, Aprendizaje virtual

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Introduction

On March 11, 2020, the World Health Organization (WHO), through its director general Tedros Adhanom Ghebreyesus, declared that COVID-19 went from an epidemic to a pandemic worldwide (Arroyo, 2020). In the same way, the director of the WHO emphasized that all sectors will be affected, in that sense he mentions that each sector must do the same to face the pandemic. Among the symptoms that were identified of the coronavirus (COVID 19) of the SARS-CoV2 virus, there is "fever (> 90% of cases), malaise, pulmonary infiltrates when performing chest X-ray, dry cough (80%), dyspnea (20%) and respiratory distress (15%) considering the first 5 days of incubation on average "(Cohen & Normile, 2020; Hui, Azhar, Madani, Ntoumi, Kock, Dar, et al, 2020; Bogoch, Watts, Thomas -Bachli, Huber, Kraemer, Khan, 2020) cited in (Cortés, 2020). According to severity and need for management, it is classified as mild-moderate (80%, non-severe pneumonia), severe (15%, severe pneumonia) and critical (5%, SARS, sepsis and shock) disease. What was identified was that children, adolescents and young people under 24 years of age have mild disease, adults between 25 and 65 years old evolve, although they do not present risk factors, but those over 65 years with comorbidity are the most vulnerable. The identified risk factors are: cardiovascular disease, arterial hypertension (HT), diabetes and chronic lung, liver or kidney disease. (Deng & Peng, 2020; Ralph et al. 2020; Huang, et al. 2020; Zhu, et al. 2020) cited by (Villegas-Chiroque, 2020).

> The coronavirus (COVID-19) is the first pandemic in human history in which technology and social media are being used on a massive scale to keep people safe, productive and connected despite being physically separated (War, 2020).

However, not all sectors of the economy took the pace of technology and internet connection, because physical spaces and contacts between people meet a distance parameter to avoid contagion, which reduces the possibility to enjoy certain products and services that are offered such as tourist destinations, the purchase of shoes that needs to be to the taste of customers, among other examples.

The reduction in mobility generates a decrease in gasoline consumption and an increase in the use of electrical energy in homes. Similarly, the non-existence of homogeneous territories with internet access, and the resources to have a laptop and various means for connectivity must be considered.

Before the diagnosis of the first positive case of COVID-19 on February 26, 2020 in Brazil (La Jornada, 2020), immediately the scenario was presented in Mexico on February 28, 2020 (Adn40, 2020), in the Yucatan peninsula The first case was present on the following dates: Campeche on March 22 according to (La Jornada, 2020), Quintana Roo reports the first case on March 13 by (Quintana Roo Health Secretariat, 2020), the same day in Yucatán it is announced (Government of the State of Yucatán, 2020).

Faced with this health contingency, the government of Mexico decreed the following in accordance with (Cruz Reyes & Patiño Fierro, 2020):

- Avoid attending workplaces, public spaces and other crowded places, adults over 65 years of age or over and groups of people at risk of developing serious disease and / or dying from it, who at all times and in a way paid leave, they will enjoy their salary and other benefits.

- Temporary suspension of school activities at all levels, until April 17, 2020, as established by the Secretary of Public Education.

- Temporary suspension of the activities of the public, social and private sectors that involve the physical concentration, transit or movement of people from the entry into force of this Agreement and until April 19, 2020.

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In relation to the suspension of school activities, the longer the time, the greater the negative impact on students from homes with high vulnerability indicators, as well as the detection of less resilience, since many students have fewer learning opportunities, because they do not have the appropriate means and technological tools for this, among other obstacles that are presented directly to parents in caring for them (Fernández, Hernández, Nolasco, de la Rosa, & Herrera, 2020). However, the results become uncertain, which can be measured as the virtual teaching period progresses and the semesters, semesters and educational cycles conclude.

On April 20, 2020, records of 8,772 positive cases of people with COVID-19 were presented in Mexico, with 712 deaths (Secretariat of Health Mexico, 2020). In the Yucatan peninsula on the same date there were positive records of 614 people infected with COVID-19, which represented 7% with respect to the national data, with a total of 47 deaths in the territory, the above positioned the state of Quintana Roo (30 deaths), as an entity with the highest cases, Campeche was the state with the least presence of the pandemic in its inhabitants (63 positive cases and 3 deaths) (El Universal, 2020), in view of this situation the peninsula does not present a direct association of the behavior of infections with the number of inhabitants of the entities of Quintana Roo and Yucatán, considering that the total population of the peninsula is equivalent to 4,498,671 inhabitants (National Institute of Statistics and Geography [INEGI], 2015), where Campeche It has 20% of the population in its territory, 46.6% is in Yucatán and 33.4% lives in Quintana Roo. It should be noted that the state of Quintana Roo is one of the ones with the highest incidence of positive infections to COVID-19. However, the measures were intensified, due to the fact that the pandemic in Mexico reached phase 3, on March 21, 2020, which consisted of strengthening these as the distancing between people, reducing mobility in public spaces, as well as promote awareness in citizenship. Since non-essential economic activities no longer physically maintain the offer of their services and / or products.

Face-to-face teaching in educational institutions is maintained in virtual learning scenarios, before an uncertain date of return to normality or when infections are minor and the traffic light of the corresponding entity is green and the health conditions of the inhabitants allow it (that is, the return to face-to-face classes is safely for students of all academic levels), in this study the higher level of studies is approached, where the transition to the virtual modality has been generated under complex and uncertain scenarios for these, considering the socioeconomic conditions that currently present the same.

Problem Statement

At the beginning of the pandemic and in view of the suspension of academic and school activities, the use of platforms such as Microsoft office 365, Zoom, Google meet, Classroom, etc. was promoted to continue with educational programs in institutions, however, many educational institutions do not have or did not have the necessary digital technology infrastructure to teach online classes, nor were the subjects designed to be taught in virtual mode. It was identified that the same economic possibility of access to the Internet and computers is presented in the homes of people who have the least (marginalized). In the absence of prior planning, virtual (online) teaching and learning are not guaranteed (Economic Commission for Latin America and the Caribbean [ECLAC], 2020). However, the time to conclude the current semester (January-April 2020) under the educational modality studied, was with an advance of approximately 70%.

Faced with this pandemic, all public and private educational levels resort to distance education as necessary. Regardless of the amount of resources, teacher training or preparation, the measure is implemented to protect students, teachers and the academic community in general, following government guidelines. (Valdez-García, and others, 2020).

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This has generated educational progress, however, it does not allow the evaluation of competencies in accordance with the planning of teaching by subject that is taught. In this sense, it is possible to identify the disparity related to access to technological tools and equipment to take the subjects with respect to students, in such a way that, identified the above for (Sánchez Mendiola, et al., 2020) indicate as a result of a study directed towards teachers that becomes relevant to direct "supports for students who do not have access to technological resources so that they can join this form of work", that is, to guide academic training through complementary means to conclude on time the semester or semester completed. It should be noted that this requires the attitude, disposition, enthusiasm and interest of the student, since, without this, any effort from the counterpart (teachers and institutions) it will hardly have the expected effect.

Objective

Analyze the perception of the higher-level student regarding the guidance provided regarding the subjects taken in time of the COVID-19 pandemic as a result of the transition from face-to-face classes to virtual teaching, considering the learning achieved by the student.

Research question

What is the assessment assigned to virtual learning considering the orientation, guidance and clarification of doubts regarding tasks, practices and projects from the student's perception in the period March-August 2020?

Study justification

This project will allow to propose the educational strategies for the pertinent virtual teaching required, to attend in a timely manner and in accordance with the needs identified in the planning of the teaching of the teachers, with a local approach, aimed at education students. higher, to reduce academic loss and promote educational continuity. It will be possible to identify the areas of opportunity in the virtual learning of higher education students, to specify the teaching processes for adaptability.

Being that learning through virtual means refers to the knowledge obtained through technological means that guide and orient the progress of the assigned student and that he could replicate the information in other settings (home, office, social environment, etc.). Being that meaningful learning is conceived as "the interaction between previous knowledge and new knowledge and that this interaction is not literal and not arbitrary. In this process, new knowledge acquires meaning for the subject and previous knowledge acquires new meanings or greater cognitive stability" (Moreira, 2012).

Advantage	Author
1. Excellent lessons on the net	(Feito, 2020)
2. Instructors who know how to communicate, using different techniques in teaching	
3. Students have the opportunity to expand their cognitive experience by using new technologies as tools for constructivist learning (p. 164)	Hernández (2008) citado en (Vargas & Jiménez, 2013)
4. The recipients can be variable, from the initial ones, from researchers to students of different educational levels, as well as the geographic scope of reaching is unlimited, specifically using learning and knowledge technologies (TAC)	(Verdencia, Cecilia, & Jimena, 2016)
5. It allows "integration with other electronic tools, it can become a central means of dissemination, communication and collaborative work", considering the creativity and commitment of the teachers who teach under this modality (p. 3).	(Galeana-Victoria, Flores-Azcano, Gacía-León, & Ruiz-Nartínez, 2016)
6. It is to provide an educational space in which teachers and students can develop their academic activities, finding in these environments their own community, intercommunicating effectively with the use of tools that support and facilitate the teaching-learning processes through network (Salinas, 2011).	(Salinas, 2011)
7. Depending on the degree of skills and knowledge that teachers have of the subjects (it will be the result of teaching-learning) and the motivation that is transmitted through virtual platforms, linked to the use of ICT.	(Díaz, Peña, Macías, & Moreno, 2019)
Disadvantages	**Author**
1. Online instructors are not always teachers.	(Feito, 2020)
2. Dropout, lack of motivation and a feeling of loneliness in students or institutional problems, as one of the facts to give the same recognition that studies deserve (p. 164).	
3. In this sense, the main disadvantage is the distractions to which both students and the instructor, professor or teacher who use virtual educational platforms are exposed, when having access to the Internet.	In (Marqués, 2000) cited by (Vargas & Jiménez, 2013)
4. Some of the limitations in the use of e-elearnig (use of ICTs to transmit information and knowledge) in Ecuadorian higher education, were caused by ignorance of the functions and characteristics of the virtual tutor, lack of preparation and laziness of teachers.	

5. The limitations in the development and practice of oral skills, and the lack of interaction or direct contact with classmates and the teacher (p.12).	(Salinas, 2011)
6. Based on the results of the study carried out by the authors, they determine that, the greater volume of higher-level students consider virtual classes little understandable, considering the presence of various distractors that they present in the virtual space or the poor quality of the internet.	
7. The technological equipment available for remote work and prior knowledge of the use of the platform to be used for teaching and learning becomes an obstacle, perceived as a disadvantage, this with 70% of opinions (p. 316).	(Espinoza & Ricaldi, 2018)

Table 1 Advantages of teaching through virtual learning media
Source: Self made

Methodology

Among the characteristics that distinguish the quantitative research approach, it is identified that, to obtain the information, it uses the collection and later analysis of the data collected to answer the research questions posed and test the hypotheses generated from the study, also the numerical data allow to establish the behavior patterns of the study subjects, among others mentioned (Vega-Malagón, and others, 2014). The research approach used was quantitative, considering 94% confidence, with a value for Z equivalent to 1.88 and for the proportions for p and q (0.5) respectively, the estimation error is equal to 0.05, with a total of questionnaires to apply. of 418, collected in total are 442 instruments. Which were applied to higher-level students studying in Yucatán, with a record of 120,290 students in the state (Ministry of Public Education [SEP], 2019). Derived from the above, we proceeded to select the data that were part of the present result that represent the students of the technological universities in Yucatan, being of the 5 institutions mentioned in the entity, in two of them the students who answered the instrument, equivalent to 94% confidence, with a margin of error of 0.06, with p and q 0.5 respectively, with a calculated sample of 245 questionnaires and with a total record of 258 applied instruments, equivalent to 58% and the remaining percentage students from other educational institutions were addressed.

The instrument designed was a questionnaire which was standardized and, according to its definition, it is used to collect information on the work of a sample of people (Meneses, 2016, p. 9). Made up of a total of 51 items, with a multiple response option.

Results

Based on the information collected, it was obtained that the profile of the study subjects is mainly female with 58%. Regarding the data collected on sex, it is identified that it has a negative asymmetry -0.316, which indicates that the values are gathered to the right of the mean. With a platicúrtic name kurtosis derived from its negative distribution -1.915. Families obtain between 1 to 2 minimum income wages (from $ 3,747 to $ 7,492), the average income being $ 5,881 pesos in the families of the students studied. With positive asymmetry equivalent to 0.970 and a kurtosis called leptokurtic with a value of 1.449. In relation to the number of members per dwelling, it is obtained that the arithmetic mean is equal to 4.76 equal to 5 people. With a high positive asymmetry value of 1,068 and a leptokurtic kurtosis of 2,476 (see table 1). As a result of the above, it was possible to determine that with respect to monthly income and the number of inhabitants per dwelling there is a low correlation of 0.28.

Data	N	Asymmetry		Curtosis	
Gender	258	-.316	.152	-1.915	.302
Monthly income	258	.925	.152	1.449	.302
Inhabitants of the house	258	1.068	.152	2.476	.302

Table 2 General characteristics of the study subjects
Source: Self made

On the other hand, it is possible to determine that the consultation sites that are frequented for reasons of illness are public health institutions (SSA, IMSS, ISSSTE, etc.) with 57%, followed by medical attention in various pharmacies with 24.4% and with 12.4% private medical offices. An arithmetic mean of 4.38 and a standard deviation of 1.046 are identified. The perception of health services that is equivalent to an assessment of fair, which is related to 52.3% of frequency, followed by 23.3% as good and with 13.6% as bad. Returns a mean of 2.96 with a standard deviation of 0.896. The existing correlation between the place to which one goes and the perception of public services is known as a negligible correlation with 0.096.

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Regarding the main sites consulted by higher-level students, to be informed of the behavior of COVID-19, it is firstly social networks with 37.5%, followed by information generated through television by 26.9%, and in the third place are the official health pages of the WHO, SSA, IMSS, ISSSTE, etc., (see figure 1). The first consultation scenario being the most fragile, since false information or news can circulate online that can encourage alarm and generate negative situations in the population. In addition to this, the educational programs were not designed to be taught online, so many of the teachers do not have infrastructure in their homes, such as internet and / or computer to monitor their classes and in the complementary phase the student does not always It has the equipment required for learning its subjects for the period covered by the higher education system. But the final assessment of learning will be reached at the end of the educational period, where the economic situation of the country has slowed down, and the homes of student students will be affected in income. Based on the sample size determined for the present study, a similar behavior is identified (see table 3).

Stage	a. I do not consult the information	b. Social networks	c. Printed newspapers	d. Online newspapers	e. TV	f. Official health pages	g. Other
Total sample	12	158	5	33	119	109	6
	2.7%	35.7%	1.1%	7.4%	26.9%	24.6%	1.4%
UT	5	99	4	20	69	59	2
	2%	38%	2%	8%	27%	23%	1%

Table 3 COVID-19 behavior consultation spaces
Source: Self made

In the months (from March to August 2020) with the presence of COVID-19, virtual assistance and monitoring by the student as well as the teacher was important for teaching and online classes, in that sense regarding the doubts that arose, the clarification of them and the means used to do so were paramount. It was obtained that, regarding the clarity of the orientation of the doubts towards the tasks, practices, exercises and others generated by the teachers, 85% of the interviewed students indicated that it was clear, 91% of the study subjects indicated that the doubts raised were clarified in their entirety and in relation to the hours in which the consultations and follow-ups were generated, 44% indicated that it was not during the class schedule (see figure 1).

Given this last answer, it is important to mention that the definition of the schedules assigned to doubts by the teachers, provided better results for the students in relation to the doubts generated by the synchronous virtual class sessions.

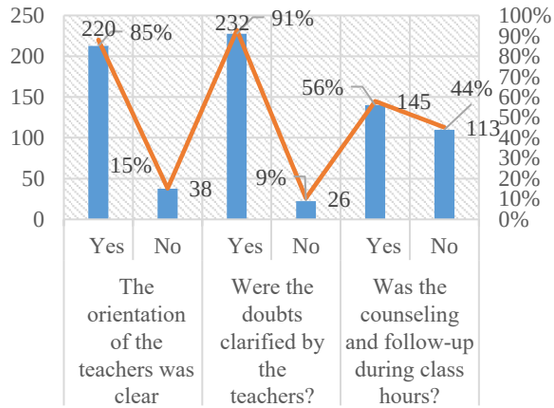

Figure 1 Perception of the higher-level student in relation to the doubts of the activities, tasks, exercises
Source: Self-made

Derived from the above, it was calculated that the existing correlation between the clarified doubts and the clarity of the doubts with a measure of 0.515 identified as a moderate correlation; a 0.228 with a low correlation of the advice and follow-up with respect to the clarity of the guidance generated and a negligible correlation with 0.120 between the hours of the counseling and follow-up with respect to the clarification of the doubts generated from the online sessions.

In the same way, it was determined that under the perception of the higher level student, face-to-face teaching is the modality in which it obtains better results regarding knowledge, clarity of doubts and competencies to be achieved with more than 90% of the mentions (see figure 3). That is, the notion of learning in strengthening it, is acquired from the student's perspective through face-to-face teaching, which is what is missed, during the time of the pandemic, but it is the one that it cannot be accessed due to current conditions.

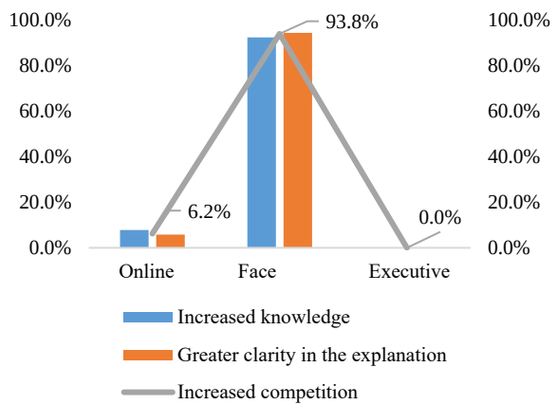

Figure 2 Assessment of teaching based on the modality
Source: Self-made

Discussion of results

It can be mentioned that online teaching under the synchronous and asynchronous sessions used for the generation of classes has generated in the students an absence of concentration in the first place, in turn provoked as indicated by Castaño, R., Jenaro, C., & Flores, N. (2017) citing Pascual (2003) for the absence of human contact and the feeling of belonging to the institution to which he belongs, as well as a lack of motivation for an educational continuity, among other circumstances of the modality . To this must be added the health conditions that prevail in the world and the infrequency of physically interacting with other individuals (Covid-19), as well as the growth of the feeling of stress and claustrophobia, among other circumstances that affect the concentration of upper-level students.

Conclusions

In teaching, the perception of students becomes relevant because with their contributions, a proposal for improvement or solution can be proposed to the areas of opportunity that they detect, today we face the challenges of the new normal where, the Education is in a process of adjustment and adaptation of its thematic contents, low and with the technological resources that the institutions have, these being limited and scarce, especially when they are public institutions, in which the present study was focused, before it the next:

1. Generate virtual scenarios 100% online (except for the asynchronous form, promoting independent and autonomous study) in permissive subjects
2. Establish virtual scenarios with synchronous orientation, under the established times of concentration of the students and based on the thematic content of the class (allusion to the freedom of teaching in virtual scenario), that is, classes of no more than 90 minutes.
3. Establish the regulation of the subject from the beginning of classes (by the teacher), making clear the way of teaching, the tone of the teacher's voice and the forms of communication and communication channels between the teacher and the students.
4. Establish agreements regarding interruptions to orientation (synchronous classes) when it is appropriate and when it is not.
5. Clarify the importance of the teacher taking control of the microphones, to avoid disorders or interruptions that are not their own, in class sessions.
6. Assignment of the times of the doubts clarification sessions, when the evaluation instruments are presented and explained.
7. Establish the responsibility and commitment that students contract in the face of virtual absence and lack of concentration to the explanations of the assessment instruments of the subject by partial.
8. Establish co-responsibilities for monitoring the sessions and recording them for subsequent repetition by the students, in extemporaneous time.
9. Provide complementary materials to students, as well as search spaces for them.
10. Promote the use of academic databases, to strengthen the results of research to the awareness of students
11. Establish clearly that the responsibility for synchronous virtual assistance corresponds exclusively to the student.

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12. Define the respect required with the fulfillment of the times and schedules of delivery of the evaluation instruments, tasks, practices, exams and others as a result of the subjects.

13. Refine the requirements of the background content and the structure of the tasks, activities, projects and others that derive from the subject.

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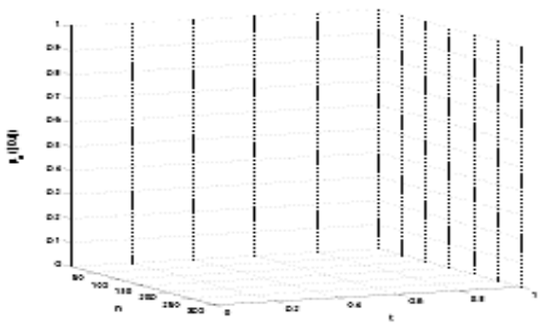

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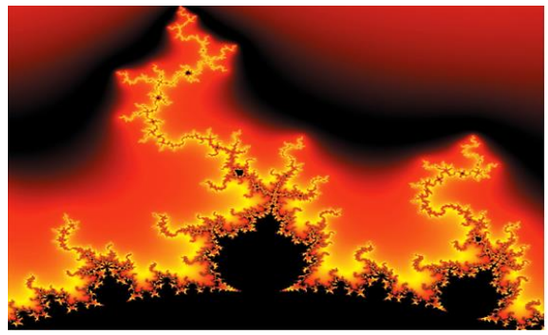

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