Journal of
Technology and
Education

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Journal of Technology and Education

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Support the international scientific community in its written production Science, Technology and Innovation in the Field of Engineering and Technology, in Subdisciplines Standards of digital skills for education, learning projects through the use of information and communication technologies, development of digital teaching skills, digital skills programs, management of technological and educational consultancy, technological training fields applied to education.

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The works must be unpublished and refer to topics of Standards of digital skills for education, learning projects through the use of information and communication technologies, development of digital teaching skills, digital skills programs, management of technological and educational consultancy, technological training fields applied to education and other topics related to Engineering and Technology.

Content Presentation

As first article we present, *Promoting gender inclusion in education through ICT*, by MEJÍA-SALAZAR, Gilberto, CARRILLO-BELTRÁN, Julio César Cuauhtémoc, GÓMEZ-CAMPOS, Sinahí Gabriela and RAMÍREZ-JIMÉNEZ, Armando, with adscription in the Universidad Autónoma de Nayarit, as second article we present, *Preparation stages for a live transmission of an academic event with three simultaneous room*, by CURIEL-ANAYA, Arturo, POZAS-CÁRDENAS, Mariano Javier, GUTIERREZ-SÁNCHEZ, Ma. de Jesus and CURIEL-CASTILLO, Flor de María, with adscription in the Universidad Autónoma del Estado de Hidalgo, as the third article we present, *The integration of digital technologies in tutorial management. Positive impacts and areas of opportunity*, by REYES-MONJARAS, María Elena & REJON-JIMENEZ, Ysela, with affiliation at the Universidad Tecnológica de la Selva, as last article we present, *Learning experience in a virtual environment: student perception*, by FLORES-GONZÁLEZ, Efigenia, MARTÍNEZ-OSIO, Carlos, ARENAS-CRUZ, María de los Ángeles and SÁNCHEZ-MUÑOZ, José Luis, with affiliation at Benemérita Universidad Autónoma de Puebla.

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Promoting gender inclusion in education through ICT

Promoviendo la inclusión de género en la educación a través de las TIC

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Abstract

The research was conducted with a descriptive quantitative approach. The main objective is to investigate the impact of digital tools on gender inclusion and student support in their school education to enhance academic quality. Additionally, the study aims to understand the frequency and level of utilization of these technologies in educational, social, and work-related activities. To achieve the research objective and address the stated question, female students from upper secondary education were specifically selected, representing first, second, and third-grade levels, respectively. Based on the provided data, it is evident that digital technologies play a crucial role in the current educational environment, particularly among younger students. The use of ICT in the learning process is highly valued by the respondents. Most consider that ICT provides them with relevant information, knowledge, and facilitates their learning process. ICT offers a powerful means to transform education and address gender inclusion in the classroom. Its capacity to improve access to education, provide innovative learning opportunities, and promote gender equality is invaluable.

Resumen

La investigación se desarrolló con un enfoque cuantitativo descriptivo, el objetivo principal es indagar el impacto de las herramientas digitales en la inclusión de género y el apoyo al estudiante en su formación escolar para mejorar la calidad académica. Asimismo, conocer la frecuencia y el nivel de utilización de estas tecnologías en actividades educativas, sociales y laborales. Que, para lograr el objetivo de esta investigación y dar respuesta a la pregunta planteada, se seleccionaron alumnos especialmente del sexo femenino del nivel medio superior, los cuales pertenecen a los grados de primero, segundo y tercer grado respectivamente. En base a los datos proporcionados, queda claro que las tecnologías digitales juegan un papel crucial en el entorno educativo actual, especialmente entre los estudiantes más jóvenes, el uso de las TIC en el proceso de formación es ampliamente valorado por los encuestados. La mayoría considera que las TIC les proporcionan información relevante, conocimiento y facilitan su proceso de aprendizaje. Las TIC ofrecen una forma poderosa de transformar la educación y abordar la inclusión de género en el aula, su capacidad para mejorar el acceso a la educación, brindar oportunidades de aprendizaje innovadoras y promover la igualdad de género es invaluable.

Learning, Digital Divide, Education, Teaching, Social Inclusion, ICT

Aprendizaje, Brecha Digital, Educación, Enseñanza, Inclusión Social, TIC

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Introduction

These innovative tools have brought with them a world of possibilities, revolutionizing the way we access information, interact and acquire knowledge. However, their reach goes beyond simply facilitating online learning; they have also become valuable tools for addressing the issue of gender inclusion in education.

Despite the progress made in the fight for gender equality, disparities in access to education and learning opportunities for women and girls persist in many countries. Gender inequality in education remains a significant obstacle that requires attention and innovative solutions. This is where Information and Communication Technologies (ICT) play a crucial role in offering unprecedented opportunities to close this gap. ICTs are presented as an effective tool for improving access to education. Thanks to them, geographical and socioeconomic barriers can be overcome, allowing women and girls to access knowledge that would otherwise be inaccessible to them.

Online platforms and virtual courses have democratized learning, making it possible to study from anywhere and at any time, which is especially beneficial for women who face restrictions due to family responsibilities or travel.

In addition, ICTs provide new learning opportunities through more interactive and personalized didactic approaches. The diversity of multimedia resources, such as educational videos, simulations and augmented reality tools, enrich the educational experience, capturing the interest and attention of learners of all genders. By addressing different ways of learning, it ensures that each student can find his or her own path to knowledge, regardless of gender.

Another significant advantage of ICTs is their potential to promote greater gender inclusion in the classroom. By providing a virtual environment, active participation and collaboration among students is encouraged, facilitating the exchange of diverse ideas and perspectives. This is especially relevant in gender-sensitive topics, where an environment of respect and openness allows women to express themselves with confidence and without fear of judgment.

However, it is important to recognize that the effective use of ICTs to promote gender equality in education also faces challenges. The digital divide, which still exists in some places, must be addressed to ensure that all women have access to these tools. There is a need to promote digital literacy and provide technical support to ensure that no one is left behind due to a lack of technological skills.

In addition, it is essential to address entrenched gender stereotypes that could be perpetuated in online educational content. ICT should be used as a platform to challenge and eradicate bias, rather than perpetuate it. It is the task of educators and content designers to ensure that gender representations are equitable and free of harmful stereotypes.

Background: digital divide

Since the 1970s, ICTs were popularized and gradually boosted in the 1980s. This being the basis for promoting the information society in the 1990s (Gómez et al., 2018), which established the first research on the digital divide at the end of this same decade, and the phenomenon of the "gap" was attributed to the lack of computers and internet, which reflected the difference. The mastery and use of technology depends not only on the individual, but also on the opportunity, support and recognition that the community gives to this type of routines (Zapata et al., 2017). Likewise, new technologies offer the opportunity for integration towards positive gender inclusion, i.e., at the Fourth World Conference on Women held in Beijing in September 1995, its manifesto identified new technologies as an indispensable space for the struggle for equality. Given the massive use of the web and its increasing involvement in almost every aspect of our daily lives, empowering women and girls to effectively manage communications and information and communication technologies (ICTs) is considered fundamental to achieve equality in many other areas (Sanchez, 2018).

In this regard, Sunkel and Ullmann (2019), state that the World Summit on the Information Society (WSIS) aims to:

to realize the shared vision, aspirations and commitment to build a people-centered, inclusive and development-oriented information society where everyone can create, access, use and share information. Since the first summit in Geneva in 2003, ICTs have become a key tool for development, with a direct impact on education, health and human services, as well as strengthening democracy, reducing poverty and promoting innovation and economic growth (p. 245).

The digital divide is a quantitative and comparative representation of certain social developments in the use of digital media in the workplace. It is meaningless outside certain social and regional frameworks (Thirion and Zarate 2018). This indicates that the gap is not just an absolute problem, but must be analyzed in relation to other social, economic and cultural factors. For example, there may be significant differences in technology adoption between generations, genders, educational levels, or geographic areas. Understanding these relationships can help develop more personalized and effective approaches to address the gap.

Inclusion in education

Inclusion seeks the presence, engagement and success of all students, regardless of their specific characteristics. It also requires identifying and removing barriers, a process of continuous improvement, and a challenge to the educational system (Cancela, 2022). That is, inclusion in education creates revisions so that everyone has access to education and provides opportunities for instruction and inclusion for those with special abilities, making the necessary reforms in curricula, providing adequate facilities, teaching materials and teacher training (Escalante et al., 2022).

Inclusive education aims to adapt the education system to the diversity that exists in a school or school environment. It is therefore a human right that requires, first and foremost, that the authorities are willing to accept inclusive education. The State must guarantee this right and persons with disabilities must have access to education. Therefore, teachers and families must be aware of the bias that people with disabilities cannot learn like other people (Niembro et al., 2021). In recent years, inclusive education has acquired a fundamental role in education systems, based on the idea that all people have equal rights.

Therefore, it is crucial to ensure that all students, as rights holders, have guaranteed access to inclusive, equitable and excellent education (Simari-Bertagno, 2021).

In this way, integration and active participation are fundamental aspects to discuss, support, present and establish monitoring. Guaranteeing the same rights in social, educational, health, safety, labor and political areas for all people, regardless of race, religion, economic status, disability or any other difference (Plancarte, 2017), is to foster coexistence and cooperation among people of diverse backgrounds and characteristics. It is an approach that seeks to overcome barriers and divisions that may arise due to cultural, racial or economic differences. By fostering integration, it seeks that all individuals can participate fully in society and have equal opportunities to access services and resources.

Technological pedagogical tolos

Since the 1990s, ICTs have attracted significant attention due to the expansion of e-learning in both developed countries in the West and Asia. The use of these technological tools has been formalized through various educational policies, even being recognized as the fourth sustainable development goal by the United Nations Educational, Scientific and Cultural Organization, with the purpose of reducing educational gaps worldwide (Cabrera-Calle and Ochoa-Encalada, 2021).

Therefore, the use of these didactic tools constitutes a means of change given the current negative notions of social values such as cooperation, solidarity and consensus. However, cooperative learning and dialogic communication strategies also have a positive side, related to social integration and inclusion, linked to the development of fundamental skills to overcome current barriers and problems of coexistence (Carrasco-Mullins and Villero, 2022

Thus, immersing subjects in the formal educational process facilitates access to formal information and, in addition to strengthening their decision-making skills, they can also be trained in the use of this information, which means having access to digital information literacy mechanisms (Ordoñez, 2021).

To consider the above, the association of ICTs in the educational process provides a more active learning dynamic for both teachers and students, since the teacher also learns by teaching. In addition, the increasing use of ICT in projects, assignments and exercises in class will drive a higher level of competitiveness in the educational environment (Molinero and Chávez, 2019). Finally, these tools bring value to the development of virtual environments that have as their main objective to constantly motivate and stimulate students to continue with their university studies. The planned spaces, known as Virtual Environments, are used to improve the results in the teaching-learning process (Medina, 2021).

Research objective

To investigate the impact of digital tools on gender inclusion and student support in their school education to improve academic quality. Also, to know the frequency and level of use of these technologies in educational, social and work activities.

Research question

From the above, and derived from the main objective, the following research question is developed:

How can digital tools contribute to the development of skills and strengths in women, improving the quality and efficiency in their daily academic activities?

Methodology

The research was developed with a descriptive quantitative approach, that is, it is carried out when it is desired to describe, in all its main components, a reality. In addition, it is the objective collection of data that focuses mainly on numbers and values. The results of the quantitative approach are obtained using statistical and numerical analysis methods such as age, shape, weight, volume, scale, etc. (Alban et al., 2020), which, in order to achieve the objective of this research and answer the question posed, students were selected especially of the female sex of the upper secondary level, which belong to the first, second and third grade respectively.

Sample

To determine the sample, the stratified random sampling technique with proportional allocation was used, that is, from this sampling each stratum is of homogeneous type with respect to the characteristics to be studied, in this way, a subsample is taken from each stratum through a simple random procedure (Porras, 2017), obtaining 100 students.

Data collection and processing

For data collection, a survey structured by closed-ended questions was applied. The SPSS statistical program was used to process the information, analyzing the data by means of contingency tables, and thus interpreting the results obtained by means of graphs.

Results

Thus, different age ranges are presented: 15 to 25 years, 26 to 35 years, 36 to 45 and 46 to 50 years. Being the 15 to 25 years (67%) the most preponderant, it is observed that most students are young people who interact in an environment of digital technologies inside and outside the institution.

The information provided shows the percentage of students who make use of technologies (such as computer, internet, programs, email, social networks, etc.) in different years of study. In the first year, 47% of students use technologies. In the second year, this percentage decreases to 20%, while, in the third year, 33% of students make use of technologies. Table 1 clearly shows the distribution of these data for each year of study.

Year of study	Uses technologies (%)
First year	47%
Second year	20%
Third year	33%

Table 1 Do you make use of technologies?
Source: own elaboration

The information shows the percentage of students in each year of study who use the Internet for consultations and homework in different places. The data are presented sorted by the places of internet use (home, school, cybercafés, work and other places) and the corresponding percentages for the first, second and third year of study.

In the first year, most students (43%) use the Internet at home, while only a small percentage (3%) use it in Internet cafes, and 1% at work. Internet use at school and elsewhere is not reported for the first year. In the second year, internet use at home decreases significantly to 14%, while use in cybercafés remains at 3%. There is also an increase in internet use at work, reaching 2%, and 1% use at school. In the third year, Internet use at home increases again, reaching 27%, while Internet café use increases significantly to 10%. Internet use at school and elsewhere remains at 1% for both cases. In general, Table 2 clearly shows how the place of internet use for consultations and homework changes as students advance in their university studies. Home is the most frequent place in all years, followed by Internet cafes and, to a lesser extent, work and school. Other places have a very low percentage of use in all years.

Location of Internet Use	First year (%)	Second Year (%)	Third Year (%)
At home	43%	14%	27%
At school	0%	1%	1%
In Internet cafes	3%	3%	10%
At work	1%	2%	0%
Other places	0%	0%	1%

Table 2 Where do you use the Internet for consultation and homework?
Source: Own elaboration

The information provided shows the type of equipment that students in each year of study have (desktop, laptop, tablet, mobile and other). In the first year, 17% of the students have a desktop computer, while 11% have a laptop and 2% have a tablet. On the other hand, 13% use their mobile as a computer. Only a small percentage of 2% use other types of equipment. In the second year, the percentages of students who have a desktop and a laptop decrease to 6% and 7%, respectively.

Tablet and mobile use also decreased, reaching 3% and 2%, respectively. The use of other types of equipment is not reported for the second year. In the third year, the percentage of students with a desktop computer increases again to 10%, while the use of a laptop increases to 13%. Tablet use disappears (0%), while mobile use remains at 8%. Use of other types of equipment is not reported for the third year.

Table 3 shows how the type of equipment students have varies as they advance in their university studies. Desktop and laptop are the most common in all three years, while tablet use is less frequent. The use of cell phones is maintained in all years, and in the third year, the use of other types of equipment is not reported.

Type of Technological Equipment	First Year (%)	Second Year (%)	Third Year (%)
Desktop Equipment	17%	6%	10%
Laptop	11%	7%	13%
Tablet	2%	3%	0%
Mobile	13%	2%	8%
Other type	2%	0%	0%

Table 3 Type of technological equipment
Source: own elaboration

The frequency with which students use a computer during their studies. The majority of students (33%) use a computer every day for their academic activities. Sixteen percent use it once a week, while 43% use it two to three times a week. Only a small percentage of students, 1%, use it monthly, and 7% use it rarely.

Table 4 shows that most students use a computer quite frequently for their studies, either daily or several times a week. This suggests that the use of technology is an integral part of their academic activities. However, it is also observed that there is a small percentage of students who use the computer less frequently, which may be due to different reasons such as personal preferences or limitations of access to technology.

Frequency of Use of Computer Equipment	Percentage (%)
Every day	33%
Once a week	16%
Two to three times a week	43%
Monthly	1%
Rarely	7%

Table 4 Frequency of use of technological equipment
Source: Own elaboration

The frequency of use of different Internet services by respondents. The Internet services (e-mail, chats, websites and digital resource downloads) and the corresponding percentages are shown.

According to the survey results, 18% of the respondents frequently use e-mail services, while 45% make frequent use of chats. Thirty-four percent use websites regularly, and only a small percentage of 3% frequently use downloads of digital resources. Table 5 clearly shows the preference in the use of Internet services by the respondents. Chat rooms are the most used service with a high percentage, followed by websites. E-mail is also frequently used, although to a lesser extent compared to chats and websites. On the other hand, downloads of digital resources are used less frequently by respondents.

Internet Service	Percentage of Use (%)
E-mail	18%
Chats	45%
Sitios web	34%
Descargas de recursos digitales	3%

Table 5 Frequently used services
Source: Own elaboration

Which social networks do respondents constantly connect to (Facebook, Google, YouTube, Instagram, WhatsApp and other type of social network). According to the survey results, the majority of respondents (83%) constantly connect to Facebook, making it the most used social network. Google is the second most used social network with 6%, followed by YouTube with 3%. Instagram and WhatsApp are constantly used by 1% and 5% of respondents, respectively. A small percentage of 2% constantly connect to another type of social network.

Table 6 clearly shows the preference and frequency of use of different social networks by respondents. Facebook is the most popular and used platform by far with respect to the other social networks. Google and YouTube are also used, although to a lesser extent. Instagram and WhatsApp have a constant use, although at a lower percentage, and only a small group of people use other social networks frequently.

Social Network	Constant Connection Percentage (%)
Facebook	83%
Google	6%
YouTube	3%
Instagram	1%
WhatsApp	5%
Another social network	2%

Table 6 Which social networks do you constantly connect to?
Source: Own elaboration

According to the students' responses, the majority (71%) consult education-related information on the Internet, which indicates that they use this tool to complement their studies and search for educational resources. Scientific information is consulted by 8% of the students, while 11% search for information of a social nature. To a lesser extent, 2% of students search for information on business and politics.

In addition, a small percentage of 6% search for other types of information not specified in the previous categories. Thus, Table 7 clearly shows which are the topics of greatest interest to students when consulting information on the Internet. Education ranks first with a significant difference with respect to the other types of information, followed by social and scientific information. Business and politics are less frequently consulted compared to the other types of information.

Type of Information	Consultation Percentage (%)
Education	71%
Scientific Information	8%
Social Information	11%
Business	2%
Policy	2%
Other information	6%

Table 7. *What kind of information do you consult on the Internet?*
Source: Own elaboration

Do you use the computer to develop team tasks, a small percentage of 7% never use the computer for team tasks. The majority of students, 35%, do it occasionally and another 35% do it constantly. In addition, 23% of the students use the computer very constantly for teamwork. Table 8 clearly shows how students' use of the computer for teamwork varies. The majority use it constantly or occasionally, while a small percentage never use it or use it very constantly. This indicates that the computer is a widely used tool for teamwork, but its use varies according to students' individual preferences and needs.

Use of Computer for Team Tasks	Percentage of Students (%)
Never	71%
Occasionally	8%
Constantly	11%
Very Consistent	2%

Table 8 *Do you make use of the computer to develop team tasks?*
Source: Own elaboration

Do you use communication tools such as chats, forums, instant messaging, etc., a small percentage of 11% never use these communication tools. The majority of respondents, 39%, use them occasionally, indicating that they use them on certain occasions, but not on a constant basis. In addition, 31% use them constantly, suggesting frequent and regular use. On the other hand, 19% of respondents use them very constantly, indicating intensive and regular use of these tools.

Table 9 clearly shows how the use of communication tools varies among respondents. While the majority use them occasionally or constantly, a small percentage never use them, and another significant percentage use them very constantly. This suggests that communication tools are an important part of communication and collaboration for many of the respondents, but there are also differences in their use according to individual preferences and needs.

Use of Communication Tools	Percentage of Users (%)
Never	11%
Occasionally	39%
Constantly	31%
Very Consistent	19%

Table 9 Do you use communication tools such as chats, forums, instant messaging, etc.?
Source: Own elaboration

Which of these programs do you constantly use for academic activities? According to the students' responses, 38% constantly use a word processor to carry out their academic activities, suggesting that this type of program is essential for tasks such as writing essays and written work. Thirty percent use electronic presentations consistently, indicating that these are widely used to present information in the academic environment. Spreadsheets are used consistently by 11% of students, suggesting that this type of program is useful for performing calculations and data analysis. Only a small percentage of 2% use databases consistently in their academic activities. In addition, 19% of the students use other types of programs constantly.

Table 10 clearly shows how the use of programs for academic activities varies among students. Word processors, electronic presentations and spreadsheets are the most consistently used programs, while databases are used much less frequently. In addition, a significant group of students use other types of programs on a consistent basis, which may reflect the diversity of needs and preferences in the academic environment.

Academic Activities Program	Percentage of Constant Use (%)
Word processor	38%
Spreadsheets	11%
Electronic presentations	30%
Databases	2%
Other types of programs	19%

Table 10 Which of these programs do you consistently use for academic activities?
Source: Own elaboration

According to the answers obtained, 33% of the respondents consider that ICTs provide them with relevant information in their training process. This suggests that digital technologies provide access to a vast amount of data and educational resources that are useful for learning. 29% of the respondents mention that ICTs provide them with knowledge. This indicates that technological tools enable them to acquire new knowledge and understanding of study topics. 23% of the respondents highlight that ICTs facilitate the learning process. This implies that digital technologies make learning more accessible, interactive and self-directed. In addition, 15% of the respondents mention that ICTs provide them with other types of reinforcement.

Table 11 clearly shows how ICTs provide different benefits in the training process according to the perception of the respondents. This reinforces the idea that digital technologies are a valuable tool that can enrich and improve the educational experience of students, providing access to relevant information, new knowledge, ease of learning and other additional benefits.

Contribution of ICTs to the Training Process	Percentage of Responses (%)
Information	33%
Knowledge	29%
Ease of learning	23%
Other type of reinforcement	15%

Table 11 What do ICTs contribute to your training process?
Source: Own elaboration

Are technologies important for your current academic performance, a small percentage of 7% consider that technologies are not important for their academic performance, suggesting that these students do not see significant value in the use of technologies in their studies. Some 4% of respondents mention that technologies are of little importance to their academic performance. This indicates that for some students technologies may have some degree of relevance, but are not a determining factor in their academic success.

A large percentage of 45% consider that technologies are important for their academic performance. This reflects that a considerable group of students value the use of technologies as a useful and relevant resource for their learning activities. In addition, 44% of the respondents consider technologies to be very important for their academic performance. This suggests that a significant portion of students see technologies as a fundamental and essential element in their training process. Table 12 clearly shows how opinions on the importance of technologies vary among respondents. While a large proportion consider them to be important or very important, a small percentage do not give them as much relevance in their academic performance. This indicates that perceptions about the role of technologies in education may differ according to the individual needs and preferences of the students.

Importance of Technologies for Academic Performance	Percentage of Responses (%)
Nothing important	7%
Not very important	4%
Important	45%
Very important	44%

Table 12 Are technologies important to your current academic performance?
Source: Own elaboration

Discussion

Based on the data provided, it is clear that digital technologies play a crucial role in today's educational environment, especially among younger students. The fact that the 15-25 age group is the most preponderant in the study reflects how this generation has grown up in a highly technological world and has quickly adopted digital tools in their daily lives.

The use of the Internet for consultations and homework is more frequent at home, suggesting that students prefer to carry out their academic activities in a comfortable and familiar environment. However, there is also an increase in internet use in internet cafes and at work during the second year of study, indicating that some students may rely more on these places to access the internet.

The type of equipment used by students also evolves over time. In the first year, laptops are more common, but in the third year, the use of desktops increases again. It is likely that this variation is due to the mobility and changing needs of students as they progress through their studies.

In terms of social networks, Facebook stands out as the most used, with a large majority of respondents connecting constantly. Google and YouTube also have a significant presence, suggesting that these services are well integrated into students' daily lives for activities such as searches and multimedia content.

The use of ICT in the training process is widely valued by respondents. Most consider that ICTs provide them with relevant information, knowledge and facilitate their learning process.

On the other hand, a small percentage of students do not see significant value in the use of technologies, which highlights the importance of finding an appropriate balance in the integration of ICT in the educational environment. It is essential to consider the individual needs of students and ensure that technologies are not used as a mere replacement for traditional methods, but as an effective tool to enhance the learning process.

Conclusions

In conclusion, ICTs offer a powerful way to transform education and address gender inclusion in the classroom. Their ability to improve access to education, provide innovative learning opportunities and promote gender equality is invaluable. However, for ICTs to truly become agents of positive change, these tools must be used judiciously and responsibly to overcome challenges such as digital divides and gender stereotypes.

In addition, inclusive education helps to increase diversity in the classroom, which has a positive impact on learning. Exposure to diverse perspectives and experiences enriches discussions and stimulates critical thinking, preparing students for an increasingly global and multicultural world. In addition, inclusive education is not only about providing educational opportunities, but more importantly, it is about ensuring the quality of education. Teaching methods that focus on the needs and abilities of each student and promote meaningful learning and active participation must be promoted.

In summary, most of the students surveyed demonstrate a high adoption of digital technologies in their academic and daily lives. ICTs are considered useful and valuable for learning and are frequently used for team tasks, communication, access to educational resources and development of academic activities. However, it is important to continue to evaluate and adapt the use of technologies in the educational environment to ensure that they contribute positively to students' academic performance and personal growth.

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Preparation stages for a live transmission of an academic event with three simultaneous room

Etapas de preparación para una transmisión en vivo de un evento académico con tres salas simultáneas

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Abstract

The results of the experience of the process of the massive transmission in synchronous form of an international congress are presented where its greatest challenge was the simultaneous transmission in three rooms with different conferences in a professional, dynamic and attractive way for all the people interested in the congress. and where the central theme was robotics. To cover the objective, it was based on analysis, planning and development as a basic methodology, as well as the use of Facebook as one of the most popular and far-reaching social networks, as well as the free tools OBS and Irium WebCam. This project highlights the effect of the transmission of this type of event on social networks, due to the continuous visits that are made to the site, thus allowing the preservation and continuous dissemination of knowledge spilled at the event through social networks.

Simultaneous transmission, CONROB, Social networks, OBS, Iris WebCam, Academic events

Resumen

Se presentan los resultados de la experiencia del proceso de la trasmisión masiva en forma síncrona de un congreso internacional en donde su mayor reto era la trasmisión simultánea en tres salas con diversas conferencias de forma profesional, dinámica y atractiva para todas las personas interesadas en el congreso y en donde la temática central fue la robótica. Para cubrir el objetivo se basó en el análisis, planeación y desarrollo como una metodología básica, así como el uso de Facebook como una de las redes sociales más populares y de mayor alcance, asimismo se utilizaron las herramientas libres OBS e Irium WebCam. En este proyecto se resalta el efecto de la trasmisión en redes sociales de este tipo de eventos, por las continuas visitas que se realizan al sitio, permitiendo así la preservación y la continua difusión de conocimientos vertidos en el evento a través las redes sociales.

Trasmisión simultánea, CONROB, Redes sociales, OBS, Iris WebCam, Eventos académicos

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Introduction

Productive institutions or service providers face multiple challenges day by day. Currently many events of daily life, such as family gatherings, social events, academics, scientists, politicians, among others, are disseminated and transmitted massively by the organizers as an important part of their agenda of activities. Each organizer or logistics group aims to highlight and preserve the most essential or transcendent activities of their event, practically many people turn to the Smartphone, since it is a tool that are at hand and can be used to stream on social networks such as Facebook, Twitter, Instagram and YouTube.

Even though it is true that it is so easy to broadcast live, if proper planning is not done, what you want to highlight, publish or disseminate, as something significant or important, will end up minimized or overshadowed. All this by not taking care of the technical aspects of a broadcast. With the COVID-19 pandemic, some videoconferencing platforms such as Meet, Zoom, Webex, Teems, among others, became popular to convene virtual meetings using only a computer and the camera integrated into it. Still some disadvantages of transmitting an event in this way, are that mobility is lost or the scene frames remain fixed when transmitting such events. Also, if the access service to a video conferencing platform is basic, access of users or focal working groups to the meeting or event is very restricted. Unlike social networks that have greater coverage and also can follow the transmission on a large variety of devices without many technical requirements.

However, if we combine the main features of social networks on the receiver side with the computer, the smartphone and some streaming program such as OBS (Open Broadcast Software), X-split, Wirecast Play, vMix or Livesstream among others on the transmitter side, it is possible to broadcast events professionally, with good quality. In addition, it can include information that allows a dynamic and more fluid communication, which includes logos, identification tags, commercials, changes of programmed scenes without the audience feeling out of control by the path of the camera abruptly or feel bored because a single angle is presented for a long time (WeAreContent.com, 2022).

This article presents the way in which the transmission of an International Congress like COMROB 2022 can be organized through the social networks Facebook and Youtube and it can be useful for those organizers who want to broadcast their event in a professional way. For this purpose a generic and intuitive methodology was proposed that consists of three stages:

- Analysis
- Planning
- Development

The analysis stage discusses what is intended to be transmitted? On which platforms? What are the characteristics of the event to be transmitted? it analyzes if you have the human and technological resources to carry out the transmission and how it will be performed (Graham, 2022). In the planning stage, it is proposed to develop a schedule of activities to be carried out, which includes the dates and times of transmission, objectives, managers, participants, location, equipment and software. Also in the last stage is carried out the planning or development to achieve the transmission in a professional way.

The following explains how the methodology was applied.

Analysis Stage

The problem that was raised is: The transmission of the International Congress of Robotics called COMROB 2022, which would be carried out with simultaneous conferences given in three different rooms and in days of 8 hours for three days. It was determined to transmit the COMROB 2022, through the official Facebook page of the Institute of Basic Sciences and Engineering (ICBI) from the Autonomous University of the State of Hidalgo (UAEH) (ICBI-UAEH, 2022) and the official website of the congress (CONROB, 2022). The main problem that had to be resolved was the simultaneous transmission of the conferences of three different rooms of the UAEH, which would be held in the Josefina García Quintanar Auditorium and the Agustín Ramos and Gonzalo Marté Rooms.

Likewise, it was analyzed if they had the human and technological resources to achieve it. So it was thought to make a selection of the students who studied the subject of multimedia systems of the Computer Science. They chose the most apt in the editing of images, audio and video, since they had to prepare scenarios prior to the transmission. As well as that the students or members had knowledge of the tools to use. It was also required of personnel who knew and could make decisions in moments of pressure in a live broadcast, such as in moments when the transmission is down, the internet speed decreased, or a device stops working. Since that, the hardware and software tools were identified that were needed to make the transmission of each of the spaces where conference sessions were held simultaneously (Graham, 2022), (WeAreContent.com, 2022).

The proposed tools are: OBS and Irium WebCam, the first was selected because it is free software, it allows the creation of scenes and the incorporation of various sources (screens, microphones, cameras, electronic presentations), effects. It also contains configurable tools that allow transmission to different social networks.

Irium WebCam software enables up to four phones to be activated as a webcam with HD resolution, low latency and direct wired or WiFi connection (OBS Studio, 2022), (Iriun.com, 2022).

Planning stage

In this phase, the following activities were carried out:

- Selection of transmission team members.

- Training of members.

- Selection and identification of available equipment to use or if necessary to purchase them.

- Design the templates and formats that will enhance the transmission such as: headings, intros, logos, visual backgrouns, musical backgrounds, among others

- Visits and practices on the streaming site.

- Schedule where dates, times, objectives, managers, participants, place of activity are established.

- Event broadcast.

Development Stage

At this stage, the previous plans were followed, which are detailed below.

Selection of transmission team members

From the fifth and sixth semester those students who showed greater skill in the design of multimedia systems like image editing, audio, video, video streaming, knowledge of social network, management, work under pressure, capacity in decision making when working with stress, in addition to having values of responsibility, initiative, creativity, were selected.

Of these, 24 chosen students, eight were assigned per room, and four per shift in each of the rooms, since the broadcast schedule was from 9:00 am to 4:00 pm for three days as well as one responsible teacher per room.

Training of members

It is difficult sometimes that all members know all the tools to use. Therefore, the selected were trained in the use of the OBS, this software was selected for its capabilities and features to make live broadcasts.

Figure 1 Multimedia Lab Training Room

They were trained in the use of Irium WebCam, which was installed on three computers one for each room with the use configuration of four cameras simultaneously, as well as installed in six cellphones two for each room which must connect to the same network segment to which each computer connects wirelessly so that they can communicate. Figure 1 shows the group of students training in the use and installation of Irium WebCam software.

Selection and preparation or adaptation of hardware and software

One of the most important activities is to have prepared and tested each equipment that will be used in each room at least one day in advance. Otherwise we can have very unpleasant results, not only in the technical part as could be an outdated transmission. Also sought that there was harmony in the group of people in charge of the transmission, the relationship between people during the execution of a project can be seriously damaged by not fulfilling the commitment, this feeling of non-compliance is increased since the event is not only local, but would be seen massively by a very large external population, and of course we all want to give our best image. (Plaza, 2020)

The minimum equipment required for each room is as follows:

-   An i5 or i7 computer with 16 GB RAM or higher.
-   An ambient microphone, with connector to the computer (mini plug).
-   A Full HD video camera.
-   A video capture card
-   Three triples for the camera and cell phones.
-   Two Smartphones.
-   Internet connection whose upload speed is at least 30 Mbps or higher.
-   It was determined to broadcast on social networks Facebook and YouTube.

Design the templates and formats that will enhance the transmisión

Generic templates or interface diagrams must be developed to show the information in an orderly and harmonious way, the distribution of actors such as electronic presentations, monitors, lecturers, audience in the forum (Dondé, 2020) must be taken into account. Below are the main templates of the scenes developed. Figure 2 shows Scene 1, which is used to start each presentation starting an introductory video to the congress with a format of 1280 x 1080 pixels and on it will appear the text "At a time we started".

Also at the bottom it shows a slipper in motion with the logos of the sponsors. In Figure 3 It is showed the design of Scene 2 where the title of the presentation and the image of the speaker captured by a camera are displayed, and at the bottom the supplementary data of the speaker. In Figures 4 and 5 are presented the templates corresponding to scenes 3 and 4 in which the presentation with different views is presented. Scene 5 shown in Figure 6 displays a closing video of the presentation and the announcement of "We start in a moment", it should be noted that the exposure time of each of the scenes is between 25 and 30 seconds in order to create an attractive, dynamic and professional transmission.

Loop1 de comrob

Text: "We start in a moment"

Heading: sponsors' logos
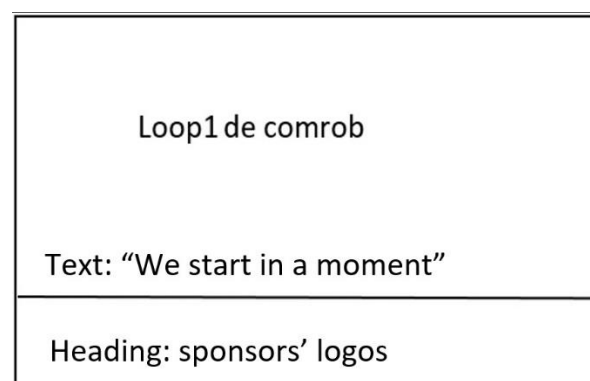
Figure 2 Template for Scene 1

Figure 3 Template for Scene 2
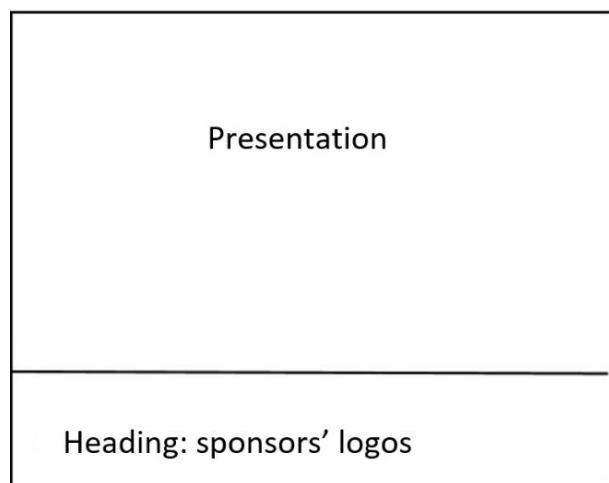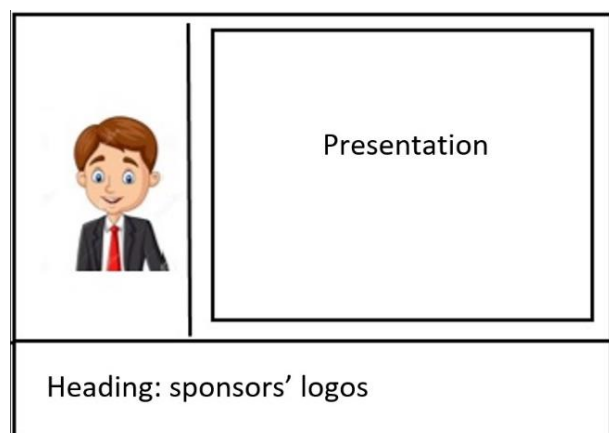

Figure 4 Template for Scene 3
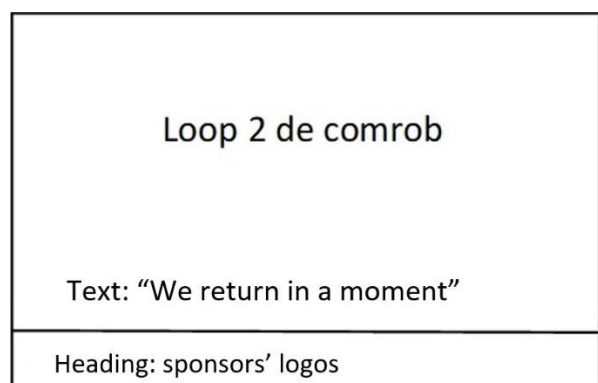

Figure 5 Template for Scene 4

Figure 6 Template for Scene 5

Figure 7 ComRob 2022 Conference Program

Each conference manager must have the program of the conferences that includes schedules of the presentations, titles, authors, exhibitors, academic degrees, additional information as representing institution, position or outstanding function that performs, important achievements worth mentioning an more. It is also important to recognize the institutions or companies that have promoted the development of the event as participating universities or sponsoring companies and for this you must have their logos or official digitized shields. Figure 7 shows the Event Program Image.

Some templates can be prepared in advance but others must be updated at the last minute or in real time, such as the case where the main author scheduled does not present and the presentation is made by a co-author, but other templates or videos must be ready, because they will not change, such as the videos of start, end of recess, start of questions, etc. An example of the templates prepared is shown in Figures 8 and 9 and correspond to the videos of intro and end of each conference.

Figure 8 Heading: Enter to start conferences

Figure 9 Heading: End to place at the end of each lecture

Event Broadcast life visits to the place where the it was done

At least three visits were made to the auditorium and the rooms where the conferences were held, in order to get to know the place and identify the strategic places to place the equipment, in addition to knowing the network resources available and in the third visit a test was carried out.

Broadcast of the event

Broadcasting the event process consisted of enabling 3 rooms where the exhibitions were held simultaneously, one of them was in the Josefina García Quintanar Auditorium, with capacity for 500 people, the second was Sala Agustín Ramos and the third Sala Gonzalo Marté, both with capacity for 40 people. Both in the auditorium and in the halls, the equipment was installed as planned to cover the lectures, face-to-face lectures and synchronous virtual presentations, allowing greater flexibility to speakers from other countries.

Eight people were assigned to each room in two shifts, this is four people per shift. One person was in charge of the computer and the transmission of the conferences to the social networks through the OBS software, also this person has the task of loading the scenes as planned, so that the intro of the conference, the speaker with his presentation, the full-screen presentation and the video of the end of the lecture will go on air. And the other three are camera people, and they're tasked with having three different shots: full shot, American shot and midshot.

Considering that the broadcast was in three simultaneous rooms to a single channel, Facebook is activated in one room and the OBS in each of them through the following steps:

1. Sign in to Facebook with the official ICBI account.

2. Tap the start live video icon.

3. Generate transmission code.

4. Fill in the description "Event Details", from the Facebook live video being transmitted.

5. Go to the OBS settings in the broadcast section and write the code generated by Facebook, and by pressing accept automatically Facebook receives the data from OBS.

6. To start, press the broadcast button on Facebook.

7. So far it is only being broadcast in one room, if we want to include another room you must repeat steps 3 to 6, maximum 3 rooms, which is a restriction of Facebook.

8. On Facebook, the official page of the CONROB was cross-posted

9. To end the transmission press the end of transmission button on Facebook.

10. And press the "Stop Transmitting" button on the OBS.

Below are some pictures and links of the broadcast in the different rooms. Figure 10 and Figure 11 show the scenario where the students are performing the transmission of the event from different rooms.

Figure 10 Students broadcasting in the Josefina García Quintanar Auditorium.
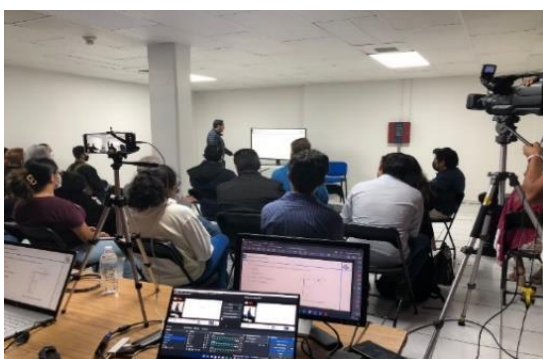
Figure 11 Students broadcasting in the Agustín Ramos Hall.

Results

The transmission of the event took place in a timely and smooth manner as planned as can be witnessed in the transmissions on Facebook through the league https://www.facebook.com/watch/live/?ref=watch_permalink&v=799366337838254 (ICBI-CONROB 2022, 2022a) that corresponds to the room of the Josefina García Quintanar Auditorium, league of the transmission of conferences of the Room Agustín Ramos and Gonzalo Marté https://www.facebook.com/watch/live/?ref=watch_permalink&v=5376281229148638 (CONROB 2022, 2022 b), https://www.facebook.com/watch/live/?ref=watch_permalink&v=3293232410914628 (CONROB 2022, 2022 c).
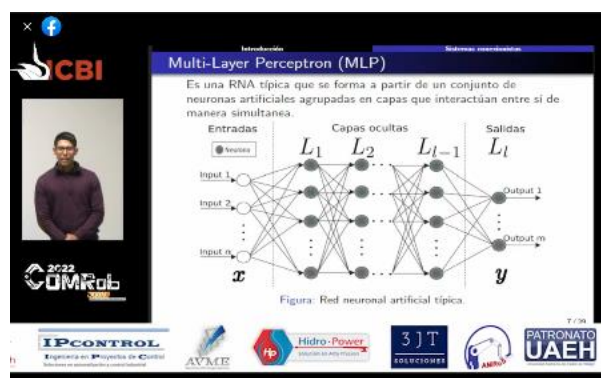
Figures 12 and 13 also show how the conference was conducted live and Figures 14 and 15 show how the conference looked like through the social network

Figure 12 *Live Speaker at Gonzalo Marté Hall.*

Figure 13 Live speaker at the Josefina García Quintanar Auditorium.

Figure 14 View in social networks of exhibition in the Gonzalo Marté room.
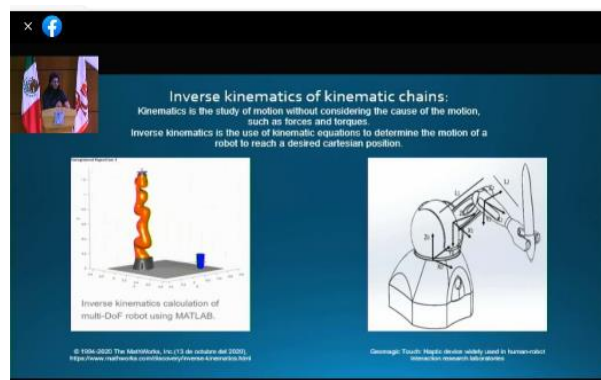
Figure 15 View in social networks of exhibition in the Auditorium Josefina García Quintanar.

CURIEL-ANAYA, Arturo, POZAS-CÁRDENAS, Mariano Javier, GUTIERREZ-SÁNCHEZ, Ma. de Jesus and CURIEL-CASTILLO, Flor de María. Preparation stages for a live transmission of an academic event with three simultaneous room. Journal of Technology and Education. 2023

You can also see in Figures 14 and 15 different ways to show the presentation of the exhibitor theme, in Figure 14 it is to show a balance between the exhibitor and the presentation without losing sight of the main objective and Figure 15 gives a little more emphasis to the presentation, so the exhibitor is only shown in a small box, also in Figure 16 shows the integration of ribbons where additional information is included, name of the speaker, title of the presentation or logo of sponsors.

Figura 16 *Vista en redes sociales de exposición en la sala Gonzalo Marté.*

Conclusion

The Covid-19 pandemic has forced the development of digital skills and the acquisition of knowledge in the transmission of information through social networks for the dissemination of scientific outreach events, and although many scientific events have retaken in person, we can conclude eight months after the event and after consulting the statistical data of the Facebook page, which continues to fulfill the role of the dissemination of knowledge by universities in a free and massive way not only nationally, but also internationally, Figure 17 shows the number of people who have consulted the Facebook Social Network of the CONROB, in the last 28 days which amounts to 237 users and Figure 18 shows a statistic of the audience which corresponds to 65.6% of men, 34.4% of women and access to information is made by a young population ranging from 25 to 34 years, also the population of users are distributed in nine countries around the world, highlighting the presence of Mexico.

It can also be concluded that streaming live video is relatively easy, given the evolution of ICT, but it requires the integration of multiple knowledge, ranging from image editing, audio, video, streaming, design, in addition to having the basic knowledge of a cameraman. Do not forget that it is necessary to adopt a methodology as basic as this is, as it will help us to organize the essential processes of transmission.
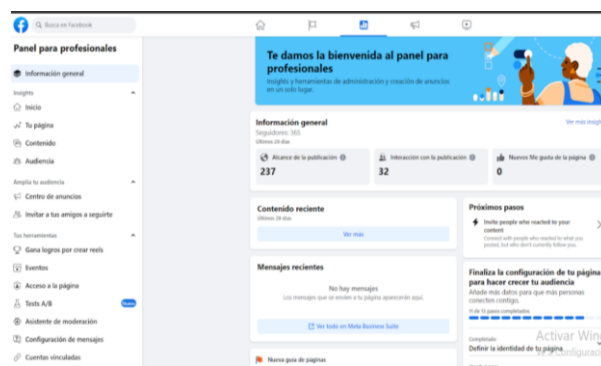

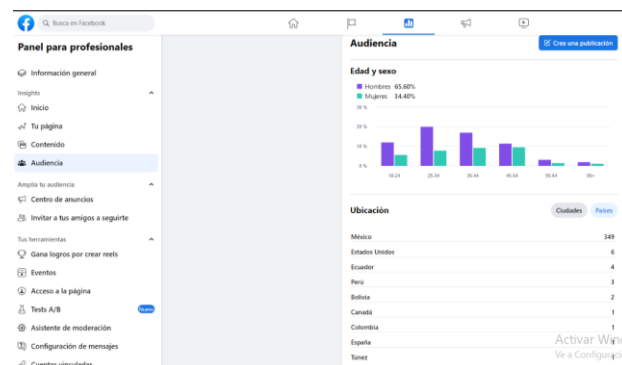**Figure 17** 28-day Facebook conference access statistics.

Figure 18 Statistical graph of access to conferences on Facebook.

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The integration of digital technologies in tutorial management. Positive impacts and areas of opportunity

La integración de las tecnologías digitales en el manejo tutorial. Impactos positivos y áreas de oportunidad

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Abstract

In this paper, the importance of integrating digital technologies to the tutorial function at a higher level is raised as a fundamental, useful and effective tool to support the monitoring of students. For this reason, it was considered relevant to indicate the positive impact from the point of view of teaching point of view, as well as to determine the areas of opportunity for continuous improvement, in order not only to support students but also to share experiences among peers to enrich the tutorial work.

Tutoring, Digital technologies, Impacts

Resumen

En la presente ponencia se plantea la importancia de integrar las tecnologías digitales a la función tutorial a nivel superior como una herramienta fundamental, útil y eficaz para apoyar en el seguimiento de los estudiantes, por ello se consideró relevante indicar el impacto positivo desde el punto de vista docente, así como determinar las áreas de oportunidad para la mejora continua, con la finalidad no solo de apoyar a los estudiantes sino también de compartir experiencias entre pares para enriquecer la labor tutorial.

Tutoría, Tecnologías digitales, Impactos

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Introduction

Tutoring is understood as the function performed by a lecturer with the aim of providing follow-up and support to the students assigned during their professional career, in the case of higher education, this function is assigned within the activities that the lecturer must perform as part of their academic workload.

This activity is fundamental for the correct performance of students throughout the various stages of their professional career, entry, permanence, graduation and graduation, so the follow-up and support must be strategically planned so that the objective is achieved.

During the Covid 19 pandemic, we faced the transition from the face-to-face to the virtual modality in the various educational programmes, and in terms of tutoring it was also necessary to implement digital tools to maintain communication with those being tutored, as well as for orientation, follow-up, guidance and support in various areas, which is why at the Universidad Autónoma del Carmen, as in many higher education institutions in Mexico, it was necessary to implement digital tools to maintain communication with those being tutored, as in many higher education institutions in our country, a teacher training day was held for the management of the Microsoft teams platform through which classes were taught by videoconference, as well as through various digital media and social networks, which favoured the monitoring of the teaching-learning processes.

In the case of tutoring, individual and collective planning of various strategies was required to avoid interruption of the tutorial processes, which through the aforementioned digital strategies allowed for significant progress in the academic performance of students, the detection of cases of risk of failure, as well as the timely psychological channelling of students with personal and family problems.

Tutoring at higher education level

Tutoring has been understood as the accompaniment of a teacher to the student in all stages of their university education, entry, permanence, graduation and graduation to support decision making, completion of various procedures, academic guidance and referral to various areas.

According to (Narro and Martiniano, 2013), it can also be defined as the intentional teaching intervention in the educational process, which consists of close, systematic and permanent accompaniment of students to support them and facilitate the process of constructing learning of different types: cognitive, affective, socio-cultural and existential.

Tutoring at the higher level involves the management of strategies by the tutor with the support of the institution to provide guidance, support, monitoring and channelling of students at all stages of their academic training, which requires that the tutor not only has the necessary openness, empathy, respect, opportunity, relevance, creativity, willingness and leadership, but also has the knowledge and suitable tools to perform their role in the most efficient and appropriate manner.

For this reason, tutors must be constantly updated in their academic and disciplinary training as well as in the use of pedagogical and tutorial tools that allow them to perform their work properly.

It is worth mentioning that tutoring has also been understood as the hours that the teacher invests in advising the student in relation to their subject; however, this concept has been extended to what we identify today in many higher education institutions as a monitoring and teaching intervention in the educational process in order to accompany, guide and orient the student at all stages of their training.

As part of this work assigned to the teacher within their activities, such is the case of our institution, the Universidad Autónoma del Carmen, from the academic regulations, which involves developing a series of skills, attitudes and aptitudes for the benefit of students.

Tutoring is a fundamental function for students, which if developed in an adequate manner, allows for the promotion of values, stimulates students to avoid desertion, reduces failure rates and increases terminal efficiency.

In general, it is considered that tutoring can contribute to the training of professionals capable of facing the problems of the labour field (Reyes M.M, 2021).

It is important to point out that the strategies applied vary according to the institution and to each teacher, but it has been observed that a good management of tutoring, i.e. the implementation of suitable and relevant strategies, has contributed to the improvement of academic performance, reduction of dropout and dropout rates, to achieve better job opportunities upon graduation, to motivate students to undertake national and international mobility and in the field of interpersonal relationships and emotional and personal aspects, all of which contribute to their comprehensive training.

A relevant criterion for understanding tutoring is from educational guidance, since from it it is possible to recognise and identify the objectives and scope of tutorial action and understand that it is a continuous and permanent process of support that is not only evident during their school career, but throughout their lives (Torres, V. T and Torquemada G. A.D, 2016).

Although the management of tutorial action depends on each teacher, in our institution there are certain provisions that guide our work, set out by the department of the general directorate of institutional tutoring, which allow us to guide our work towards the fulfilment of the axes and strategies that the institution itself sets.

In this order of ideas, it is important to indicate that given the circumstances that we have experienced worldwide derived from the health contingency, measures were taken in the educational field from 2020, such as migrating from the face-to-face to the virtual modality to continue with the teaching of courses at various levels, In the case of the Universidad Autónoma del Carmen, digital platforms such as Microsoft Teams were implemented, with prior teacher training, as well as the use of various means of communication through digital devices, which also had an impact on the tutorial function, since for almost two years it was necessary to resume communication and monitoring between tutor-tutored.

Integration of digital technologies in tutorial management as a consequence of the pandemic

Although digital technologies were integrated with greater emphasis after the health contingency caused by Covid 19 two years ago, it is well known that the process of including them in educational processes around the world began some years ago, which has undoubtedly facilitated the transmission of knowledge, Even though virtual education has generated diverse points of view, some considering the disadvantages such as the barriers between students and teachers, which implies a lack of feedback and often limits meaningful learning, however, the advantages have been evident in many areas.

As for the management of tutoring, technological and digital tools have also permeated, especially since the current pandemic, since they have allowed distance communication with students, the transmission of information in the various educational institutions, as well as the treatment and attention to various problems that students face on a daily basis.

The Universidad Autónoma del Carmen has been no stranger to the process of transition from face-to-face to virtual mode as a result of the measures taken by the Mexican government to avoid interrupting the educational process, and in the case of tutoring, the transition to virtual mode has also been necessary.

This transition process, which was preceded by teacher training in the use of digital platforms, led the teaching staff to become involved in the use of these tools, initially for teaching, but also worked effectively for tutoring.

With regard to tutoring, according to the United Nations Educational Scientific and Cultural Organization (UNESCO), it is part of the teaching function, so the teacher must provide support and follow-up to the student to achieve better performance and comprehensive training that allows optimal professional development, such attention that at the time was developed personally or in groups, with the pandemic was temporarily interrupted, until the teachers were implementing communication tools and strategies, being digital, suitable and relevant for this purpose in most of the Higher Education Institutions.

In the case of the Universidad Autónoma del Carmen, in the various faculties, as already mentioned, the use of the Microsoft Teams platform was implemented in which both individual and group sessions were attended by the assigned tutors, in particular the personal experience in the area of law with up to 67 assigned tutors approximately, group sessions were scheduled in which in principle the interaction began with new entrants, as well as students in more advanced semesters, in which they were made aware of the generalities of the tutorial action, important topics were also programmed for the integral formation for social integration, construction and promotion of values, support in personal and professional development and even topics of emotional relevance such as stress management, how we face the pandemic, resilience, decision making in the professional field, even strategies of oral and written expression, many of them were developed with the support of the psycho-pedagogical department of the institution.

In our experience, these activities were very satisfactory, since the students participated actively and even had openness in expressing difficult situations experienced during the pandemic, which allowed us to detect cases of students who required support from the psycho-pedagogical department, as well as from other areas such as student services in professional practices and social service, since even virtually they were carried out by several students; however, in the case of national and international mobilities they were temporarily suspended to avoid contagion by COVID-19.

In short, when information and communication technologies are applied, their potential transforms teaching and learning environments, allowing the creation of virtual environments with non-traditional methodological approaches, which move from individual to collaborative learning and contribute to the effective transmission of knowledge, where the role of the tutor is fundamental for the success of the student's training activity (Silva Q. J, 2010).

Positive impacts

As we have already mentioned, tutoring is a means that helps students at the higher level, since through it the students receive accompaniment and guidance from their tutors.

Although it is true that higher education students are coming of age, it is no less true that they still need the support of their teachers to provide them with all the necessary support to find solutions to their doubts as quickly as possible.

Despite the negative impacts that the pandemic had on school classrooms at the beginning of the pandemic, today and almost at the end of the year 2022, when most students and teachers are already vaccinated, UNACAR, as an educational institution, has the technological resources for internet connection, so students can make use of this resource, and most of them have internet connection in their homes, so the teaching-learning process was not hindered.

As for the effects left by COVID-19 in relation to the teaching-learning processes and tutorial activities, it can be determined that UNACAR students, as part of their training, participated in synchronous activities, which was of total help to them, since they were able to relate to each other, It was also taken into consideration as a positive impact that our university has implemented the competency-based education system, which is why it was considered smooth to work under the virtual modality approach.

We can also mention as a positive impact, the fact that virtual education, during the pandemic, became a challenge for students and teachers, as all students had access to the official teams platform, in the same way, they performed satisfactorily in terms of searching for information to carry out their tasks, used various internet search engines as support to expand knowledge and made use of various digital tools at their disposal, a consequence of being in the era of knowledge and having passed the digital age.

Thus, the virtual classes gave us the opportunity for both teachers and students to develop the necessary skills, which represented a greater effort, dedication and joint work for the academic year to be of use, the classes were given at a distance, achieving the objectives of the syllabus in competences.

Now, as for the tutorials, it is worth mentioning that they were of total support for those being tutored, as the accompaniment that was given in a group and personal way, transitioned to the virtual modality, but with the same quality, and with greater support, as some young people were going through delicate processes, both in their family environment, with a sick person at home or, unfortunately, with a sick person at home or, unfortunately, with a family member at home, This required greater awareness on the part of teachers in their role as tutors to give full support to students in situations of distress. These were difficult times, but at the moment, the situation of our students is relaxing.

The tutors have been a fundamental pillar in this process and by virtue of the openness and trust that we have with the students, we were able to interact and these conversations in times of crisis were essential for their academic and personal development, we made teams so as not to leave alone those who most needed our support, together tutors and students in this essential work.

Another of the positive impacts that we currently have, on returning to our classrooms, is the awareness that we have on both sides Tutor-Tutored; since we have worked so that our students-tutored were integrated quickly, without any problem to do so, so that today we are working with them to ensure that as future professionals, they become well informed and deeply motivated citizens, provided with a critical sense, and able to analyze the problems of the society in which they live, seek solutions, apply these and assume social responsibilities.

Thus, academic tutoring is an important tool to strengthen the teaching-learning process, since the current educational models must be transformed to enhance the skills and competences of the students-tutored, (Ahumada García F. N & Nieto, C. I, 2015).

Given the challenges faced by the student-tutored, face-to-face tutoring is an effective strategy, given its potential to personalise the training processes and the monitoring of student trajectories, as a personalised strategy, it can be fundamental, even more so if it assumes inclusive principles, as is the case of our educational institution.

Finally, we can affirm that tutoring has a positive impact on the student as part of their integral formation, since it represents a fundamental tool, it is conceived in the new educational model at the Universidad Autónoma del Carmen and from the actions implemented since its creation and during this transition process, problems were detected around the tutored students, both in the academic and personal areas, which were dealt with in an adequate and timely manner, and where appropriate, channelled with areas such as the psycho-pedagogical department, which has been very useful and supportive.

Areas of opportunity

At the Universidad Autónoma del Carmen, tutorials have two aspects, an individual one, in which only matters that concern a tutor are attended to, and group tutorials in which integration, follow-up, support and training strategies are implemented through talks, dissemination of institutional communications and indications regarding the processes in various matters or administrative procedures concerning their admission, continuance, graduation and graduation, among other things, and there is also an institutional tutoring timetable, There is also an institutional tutoring schedule, in which the student is nourished, attending conferences, symposiums, lectures, master lectures, also, there is individual interaction in the registration of activities of integral formation and channelling to the different institutional areas, likewise, students can attend different congresses, or academic events or carry out student mobility, both national or international to broaden their knowledge in general, as well as contribute to their professional future.

In the face-to-face tutorials, we work with the students to address their strengths and weaknesses, supporting them in identifying their strengths and weighing them up, as well as working with them when their weaknesses may cause them conflicts in their studies that lead them to fail one or more subjects.

In this order of ideas, we can mention that the institution, from the tutoring area, organises various activities and events to support both the students and the training and updating of the tutor-teachers, in order to improve the tutorial action, always for the benefit of the students.

Derived from the above, a tutorial action plan is implemented, which the tutor prepares each semester, so that on a secure basis, appropriate scenarios are planned and activities are developed with the group, that is, the actions to be implemented in the group of assigned tutors are designed, the sessions are organised in such a way that they do not interfere in the already called institutional hour of tutorials that are carried out every Friday, from the coordination of tutorials at institutional level, so that students attend these activities.

The aim of the tutors is to guide the student towards a life project, to orientate his or her actions in the personal, academic and professional spheres or to channel his or her project towards a productive activity, but also to make him or her feel satisfied with him or herself, to link him or herself with the goals set in his or her student life, to achieve them and also to set a promising future for himself or herself.

Nowadays, tutoring plays an important role, in particular as a guide in their academic training, preventing school dropout in higher education students.

Other areas of opportunity in tutoring, according to Quispe Gavid, M. & Arellano C. O, 2017), tutoring is designed for the achievement of educational quality, which means that terminal efficiency is weighted, since most of the students who finish their profession, take their exam with the option of a degree and graduate in a shorter time, in order to successfully enter the labour market.

Therefore, it is necessary to point out that this process is not easy, but it tends to be an opportunity to support the tutored student to get ahead in their studies, to conclude their university career and to integrate into the labour field, with the best opportunities that the human being deserves, to achieve success in the different areas of their life.

Conclusions

Derived from the reflections of the present study, the tutorial actions that are carried in the curricula of universities, such as UNACAR, it is worth mentioning that these promote the development of skills that allow students to review and understand their learning processes, seek solutions, given that their skills already allow them to recognise and solve their difficulties and how to improve in order to achieve their student purposes.

Hence, tutorials represent the accompaniment of the student, with emphasis on the academic performance of the tutored, with the aim of expanding their knowledge and also to promote the cultural aspect through the arts, sports and personal/emotional aspect, which will serve for their future and as a life learning as part of their comprehensive training.

It is important that the tutor's function starts from the moment the students enter higher education and accompanies them in all their stages, such as entry, permanence, graduation and graduation, so it is the tutor's job to carry out an analysis at each stage and monitor their progress and development, which will allow the timely detection of various problems that may arise and provide solutions to them in a timely and effective manner.

This requires all the institutional support, which is aimed at the comprehensive development of the tutored, being necessary to continue the incorporation of tutoring programs that have allowed to focus on students to know what their weaknesses are but also their strengths and enhance their skills for a comprehensive education that contributes in the future in its integration as a professional in the workplace, allowing the achievement of their goals and be worthy citizen for the society in which it develops.

Finally it is possible to affirm that the digital tools have been of great utility in the processes and tutorial actions since it allows the tutor-tutored approach contributing in the update of the handling of these tools as much for the tutor as for the tutored, even at a distance it was possible to fulfil the goals and objectives around the academic performance, desertion, school abandonment, graduation and graduation, even in the period considered within the pandemic from 2020 to date, two generations of students graduated from the Bachelor's Degree in Law and the Bachelor's Degree in Criminology and two generations entered the same way, which shows that academic activities were not interrupted and consequently the tutorial actions, this for the benefit of the tutored students.

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Learning experience in a virtual environment: student perception

Experiencia de aprendizaje en un entorno virtual: percepción del estudiante

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Abstract

As a result of the COVID-19 pandemic, the working dynamics in the educational area have been transformed. An important change has been the incorporation of digital tools, which have taken a leading role in the learning process. For this reason, the goal of this research is to identify the perceptions that students have regarding the use of technology and how it relates to their learning experiences online or virtual modality. To achieve the research objective, a qualitative methodology was applied; a questionnaire consisting of 9 items was applied to collect the data, of the characteristics and the assessment of the technological tools and online experience in virtual learning. The sample was taken from high school students. The results confirmed that virtual learning provided students with positive experiences. The students gave a favorable evaluation of the digital tools applied to virtual learning. The main advantages were; it took less time to finish activities. These activities were focus on learning for life. Therefore, the use of technology applied in a virtual learning environment allowed students to experience emotions such as curiosity, doubts and insecurity, all of these factors contribute to their learning process.

Resumen

Derivado de la pandemia de la COVID-19 la dinámica de trabajo en el ámbito educativo se ha ido transformado, un factor importante en este cambio ha sido la incorporación de las herramientas digitales las cuales se han apropiado de un papel protagónico en el proceso de aprendizaje. Es por ello que la presente investigación tiene como objetivo identificar las percepciones de los estudiantes con respecto al uso de herramientas tecnológicas durante su formación en la modalidad virtual. Para cumplir el objetivo, se empleó una metodología de corte cualitativa, para la recolección de datos se aplicó un cuestionario conformado por 9 ítems, los cuales indagaban las características y valoración de las herramientas y experiencia virtual en el aprendizaje virtual. La muestra estuvo conformada por estudiantes del Nivel Medio Superior. A partir de los resultados obtenidos se corroboro que los estudiantes vivieron más experiencias de aprendizaje positivas durante la modalidad virtual, evaluaron positivamente el empleo de herramientas digitales para el aprendizaje y enlistaron ventajas como menor inversión de tiempo, actividades mediadas por tecnología acorde al contexto y contribución a un aprendizaje para la vida. También afirman haber experimentado emociones como curiosidad, dudas e inseguridad, factores que influyen en la percepción de su experiencia de aprendizaje en un entorno virtual.

Virtual environment, Experience, Perceptions

Entorno virtual, Experiencia, Percepciones

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Introduction

As a result of the COVID-19 pandemic, the educational process was transformed by the incorporation of technology in the new ways of teaching. Technology played a leading role in the learning process since it became the only means to establish communication and interaction to make teaching possible for each and every class subject.

Under this confinement condition, teachers and students had to play different roles than the traditional ones they were used to. Due to the implementation of digital methodologies and the use of different applications there was a need to adapt to the changes in class time and space. Also teachers had to update class activities in order to provide ideal learning spaces, willingness and openness to the new learning modality.

It is in this context, that teachers had to adapt and implement techno-pedagogical tasks in a virtual environment in order to contribute to the objectives demanded by the study programs. The need arises to evaluate and describe the experience and perceptions of students regarding the implementation of these new classroom scenarios.

The core themes that support this research are described below.

Virtual environment

The incorporation of technology into the social context and into people's daily lives has impacted all scenarios and the educational area is no exception. Society demands innovations in regards to the aspects of information and knowledge. The transformations in society come as a result of the implementation of technological information and communication. Therefore education becomes the engine of change in society. Education must not only incorporate technological aspects it must also apply them (Pablos y Villaciervos, 2005).

This is how technology gives rise to virtual environments, which demand new teaching methods and innovative learning practices, thus transforming the teaching-learning process.

This transformation triggers the implementation of new tools for teaching-learning, the use of technology, learning management and new forms of evaluation (García, 2012).

According to Perea and Cubo (2010), technology allows interaction with a greater number of people, promotes personalized attention, displaces traditional teaching, integrates new learning contexts, adapts to the needs of the target population. Also, it promotes self-learning and time management. These elements generate a virtual learning environment that enables flexibility in ideal contexts for academic achievement (Prendes, 2011).

Experience and perception

According to Domingo (2010), the educational process is linked to experience and thought. For Arendt (2005) there is no thought without personal experience. Subjects think about what they experience at a given moment, according to the context in which they are immersed and to what they consider their own.

Educational practices seek to generate experience, that is, to promote thinking based on what has been experienced and to provide educational actors with meaning (Flores-González, 2022).

Therefore, this research aims to identify the student´s perceptions, from their personal experiences triggered by the implementation of virtual learning environments in the post-pandemic stage.

Under this line of research, teachers have a need to identify the students' perceptions, their experience and assessment of the teaching and learning processes. The student is the main resource of information. The student´s perceptions are essential to gather elements to analyze and implement a virtual environment, with the purpose of identifying the strengths, weaknesses and opportunities for improvement in the educational process. (Barberá y Fuentes, 2012).

It should be noted that a virtual environment transforms the role of the teacher and the student, the former adopts the role of manager and facilitator of knowledge, while the latter takes a positive, active role and takes ownership of long-term learning. On the other hand, the contents become flexible and varied. The interaction is based on student-student and student-teacher, regardless of space and time (Barroso y Llorente, 2006). In this sense, the main objective is to describe the learning experience that the high school students encounter in a virtual environment.

Methodology to be developed

For this research, a qualitative methodology was used with the purpose of identifying the student's perceptions regarding the use of technological tools in the virtual modality.

To meet this objective, the questionnaire designed by Ardini et al., (2020) was used as an appropriate instrument, to the context without altering its purpose.

This questionnaire was made up of 9 items, with the purpose to investigate the perceptions of the attribute characteristics and assessment of the tools and the experiences encounter in virtual learning (Table 1).

The sample was made up of 40 students of biology class in the sophomore year of high school whose ages range between 16 and 17 years.

Category	Attribute
Virtual learning experience.	1. Virtual experience 2. Time spent 3. Emotions experienced
Characteristics and assessment of the tools	1. Use of digital tools 2. Difficulties, advantages and disadvantages

Table 1 Instrument categories and attributes
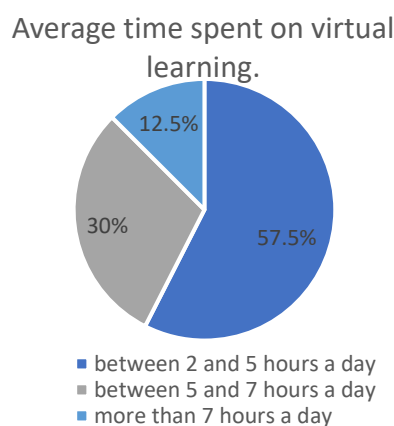*Own elaboration*

Results

Virtual learning experience

On a rating scale of 1 to 5, 19 students, corresponding to 47.5% of the total population, rate their virtual experience during the semester with 3 points, followed by 27.5% with 4 points, 20% with 5 points and only 2.5 % with 1 and 2 points (Graphic 1).
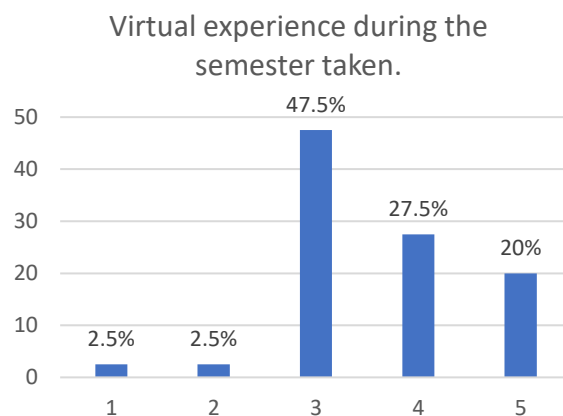
Graphic 1 Virtual experience during the semester taken
Source: Own elaboration

The results show that at least 2 students of the total population faced difficulties during the virtual learning process, which triggered dissatisfaction. On the contrary, more than 50% express having had a satisfactory experience, since they are within the average (3 points) and even exceed the score. This agrees with the studies of Fernández-Pascual et. al, (2013), He states that a large number of students feel satisfied with the use of methodologies in virtual environments.
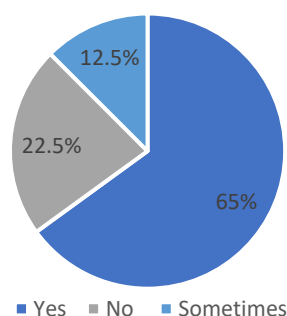

Graphic 2 Average time spent on virtual learning
Source: Own elaboration

57.5% of the population claims to study between 2 and 5 hours per day, followed by 30% who spent between 5 and 7 hours per day and only 12.5% more than 7 hours per day.

FLORES-GONZÁLEZ, Efigenia, MARTÍNEZ-OSIO, Carlos, ARENAS-CRUZ, María de los Ángeles and SÁNCHEZ-MUÑOZ, José Luis Learning experience in a virtual environment: student perception. Journal of Technology and Education. 2023

Time management is decisive to understand the score they gave to the learning process, since virtual modality allows them to be connected anywhere, which modifies the student's daily routine, fragmenting the time spent studying and their leisure activities, and this is reflected in the fact that more than 50% of students claim to spend more time in this modality (between 2 and 5 hours per day) compared to face-to-face. Studies carried out by Marcén y Martínez-Caraballo (2012), they point out that there is a direct relationship between time management and academic achievement. The aforementioned is corroborated in the following graphic.

Emotions generated by technology-mediated learning.

Graphic 4 Emotions generated by technology-mediated learning
Source: Own elaboration

Virtual learning requires more time than in-person learning.

Graphic 3 Virtual learning requires more time than in-person learning
Source: Own elaboration

For 65% of the students, the time investment in virtual modality is greater than in the face-to-face mode, for 22.5% it is less and for 12.5% it is sometimes less. These results show that virtual environment conditions the hours allocated to carry out activities; however, it is not a guarantee that these hours are continuous or independent. On the other hand, it is important to consider the distractions that the student faces, since these are factors that can directly affect academic achievement.

According to studies carried out by Monsalve y Romero (2014), points out that there is no significant relationship between time management and academic achievement in virtual environments. Subsequently, the emotions that students experienced regarding technology-mediated learning were identified.

Escaping from the comfort zone involuntarily will always trigger a series of emotions that will often emphasize disadvantages rather than opportunities.

Even though the students of high school are characterized by being part of the technological era, it is inevitable to see in graphic 4 how frustration with 65% was the emotion that accompanied the students during their experience in a virtual environment, followed of confusion with 57.5% and boredom with 55%. Regarding the positive emotions identified, 45% indicate having felt curiosity and enthusiasm, elements that according to Sastoque et al. (2022), are determinants to guarantee meaningful learning in a technology-mediated environment.

Characteristics and evaluation of the tools used
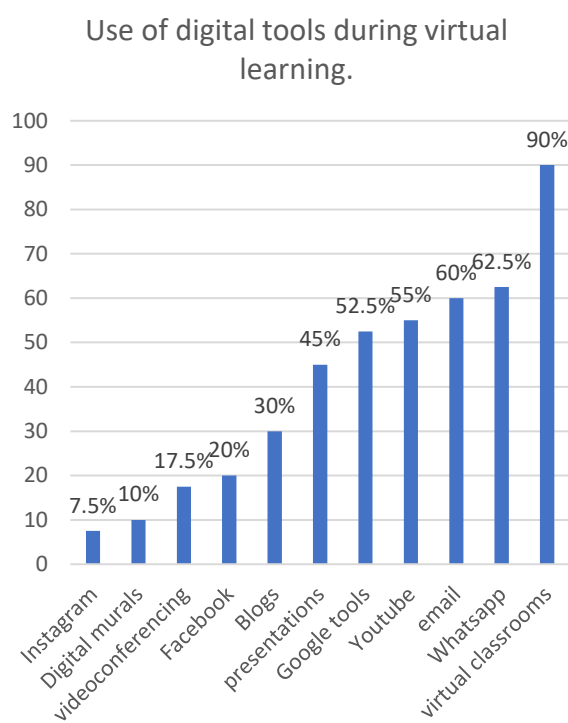
Graphic 5 Use of digital tools during virtual learning
Source: Own elaboration.

Graphic 5 shows the digital tools that the students used to face a new teaching dynamic, 90% used virtual classrooms, which shows that the facilitator established synchronous means of communication to interact with the student. 62.5% use WhatsApp, followed by 60% email, 55% YouTube, 52.5 Google tools, 45% presentations and 30% Blogs. Facebook, videoconferencing, Digital murals and Instagram were used to a lesser extent.

It is evident that students explored social networks at a low percentage when it comes to educational purposes. On the other hand facilitators concentrated their praxis in virtual classrooms. According to Martínez (2020), Virtual classrooms provide control and monitoring of work dynamics. These advantages allow facilitators to focus on different moments of the teaching process. It facilitates communication, interaction during sessions and the designation and reception of tasks effectively.

This graphic shows the multiple technological applications that students used to take in information that helped them in the development of knowledge. In contrast, the following graphic shows an overview of how satisfy students felt after using different applications in their learning achievement.
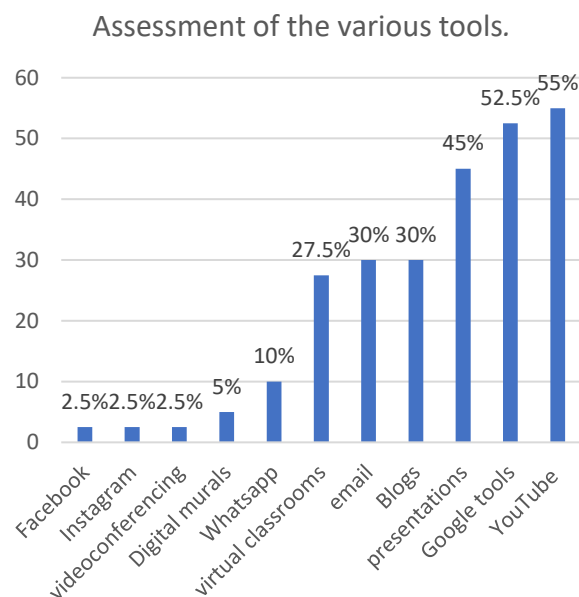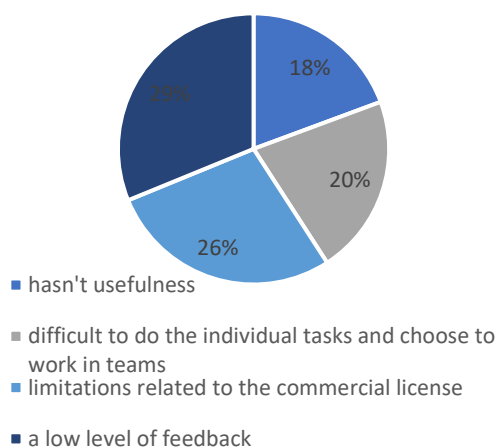

Graphic 6 Assessment of the various tools
Source: Own elaboration

After identifying the main applications used by students in a virtual environment, they were asked to indicate those they considered valuable and that helped them the most to achieve their academic purposes. The results show that 55% of the students found academic support on YouTube, 52.5% Google tools, 45% presentations, 30% Blogs and email, 27.5% virtual classrooms and in a lower percentage WhatsApp, digital murals , video conferences, Instagram and Facebook. These findings are important as they give teachers an indication of which applications should be considered in technology-mediated strategies. According to Ardini et al., (2020), the tools with the highest percentage (YouTube, Google tools and presentations) have characteristics that must be present in the learning process, in order to provide a better experience and guarantee the appropriation of knowledge. These characteristics are usefulness, speed, audiovisual format, interaction with classmates and teachers, constancy of content and self-management of time, space and content, as it provides students with a scenario that adds to their learning process.

In contrast to the previous question, the students were asked to express what they considered inadequate and the difficulties that triggered a negative evaluation of the applications used.

Difficulties of tools that evaluate negatively

- hasn't usefulness
- difficult to do the individual tasks and choose to work in teams
- limitations related to the commercial license
- a low level of feedback

Graphic 7 Difficulties of tools that evaluate negatively
Source: Own elaboration

The gather results are important, as they show characteristics that must be considered when designing a strategy for virtual education.

For the students, the difficulties they faced and found inappropriate were the applications that presented a low level of feedback, represented by 29%, in addition to the limitations of the platform itself related to the design of the interface and the difficulties of interacting in a synchronous or asynchronous way (Rosero, 2021).

For 26%, the applications have limitations related to the commercial license, since they required a membership or a login to unlock them. 20% found it difficult to do the individual tasks and choose to work in teams. Finally, 18% had doubts regarding the usefulness of the applications that were given a negative evaluation.

In the learning process it was necessary to identify what the students consider to be the main advantages in respect to the development of knowledge mediated by technology (Graphic 8).
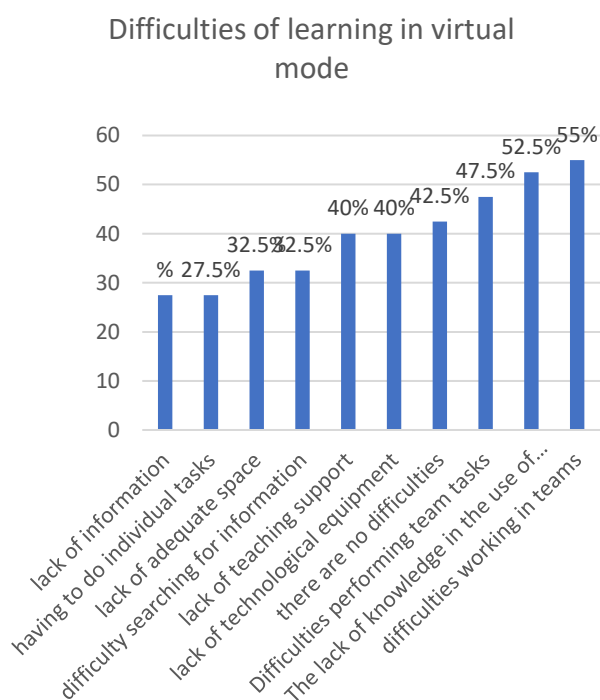
Main advantages of learning in virtual mode

- were up to date in technological development
- effective communication with teacher
- the experience facilitates learning
- time management
- comfort
- achieve adequate learning
- invest less time
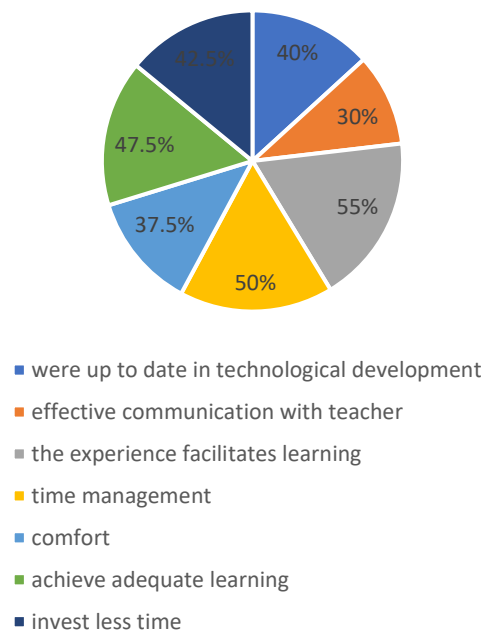
Graphic 8 Main advantages of learning in virtual mode.
Source: Own elaboration

The findings corroborate the statements of Cobos, et al. (2018) since 55% of the students indicated that having experience facilitates learning, promoting the deconstruction of previous knowledge during the synchronous session. Another advantage is having extra time, since students do not need to travel, which allow students to have more leisure time. On the other hand, 47.5% confirm that they achieve adequate learning and 40% consider they were up to date in technological development. The following graphic shows the difficulties they experienced when learning under the virtual modality.

Difficulties of learning in virtual mode

Graphic 9 Difficulties of learning in virtual mode
Source: Own elaboration

For 55% of the students, one of the difficulties were having to do the individual tasks, this data goes hand in hand with the traditional dynamic based on shared tasks that is triggered in face-to-face teaching, and is corroborated by 47.5% of the population that claim to have difficulties working in teams, which shows the search for constant interaction. In this order of ideas, virtual communication and interaction are determining factors in the educational area to guarantee learning whether in a face-to-face situation or at a distance (Salmerón et al., 2010)

The lack of knowledge in the use of technology can be attributed to the sudden implementation of virtual environments; however, for 52.5% it was a limitation. A relevant fact is that 42.5% claim to have no difficulties.

Conclusions

Students positively evaluate the teaching process through a virtual environment, as it adjusts to today´s needs of time and space, in addition it allowed them to explore new applications that become technological tools that contribute to their learning process.

The sample students consider that a virtual environment gave them the possibility to manage their time. They found this advantageous, since it took less time to complete their school activities in comparison to the in-person modality.

The results show that previous activities facilitate the development of knowledge. Therefore, the facilitator has the responsibility to design activities based on didactic situations that favor the connection of a conceptual structure of the disciplinary field with the previous structure.

To guarantee meaningful learning, performance products must be based on previous experiences, allowing the student to apply them to everyday life situation in order face today´s world.

The negative emotions are factors that arise from the unexpected implementation of technology; however, even when positive emotions are scarce, technological applications used as educational tools can contribute decisively to the learning process.

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Implementation of emerging virtual classrooms: case study, master in innovation and creativity in education

Implementación de aulas virtuales emergentes: caso de estudio maestría en innovación y creatividad en la educación

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Abstract

Emergent virtual classrooms served as a rapid solution for millions of students worldwide to continue their professional-level teaching and learning processes during the COVID-19 pandemic. However, despite the significant efforts made by institutions, educators, and services, school dropout rates, socio-economic issues, and health problems had a substantial impact, causing students to abandon their studies. In the quest to provide different alternatives that motivate future professionals to resume their academic lives, it was found that the implementation of emergent virtual classrooms combined with an adaptive learning strategy tailored to the contexts of students and teachers yielded findings that could be considered within the new hybrid learning strategies now being promoted in the post-pandemic era.

E-Learning, LMS, Chamilo, Emerging Virtual Classrooms, adaptive learning

Resumen

Las aulas virtuales emergentes sirvieron como solución rápida para que millones de estudiantes en todo el mundo continuaran con su proceso de enseñanza y aprendizaje en nivel profesional durante la pandemia provocada por el COVID-19. Sin embargo, a pesar de los grandes esfuerzos por parte de instituciones, docentes y servicios la deserción escolar, los problemas socio económicos y de salud permearon de manera considerable para que estudiantes abandonen sus estudios. En la búsqueda de ofrecer alternativas diferentes que motiven a futuros profesionales a retomar su vida académica se encontró que la implementación de aulas virtuales emergentes combinadas a una estrategia de aprendizaje adaptativo y acorde a los contextos de los estudiantes y profesores resultaron hallazgos que podrían ser considerados dentro de las nuevas estrategias de aprendizaje hibridas impulsadas ahora por la era post pandemia.

E-Learning, LMS, Chamilo, Aulas Virtuales Emergentes, aprendizaje adaptativo

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Introduction

The confinement caused by the pandemic in the early 2020s in the field of education generated significant changes in the implementation of virtual classrooms, previously learning management systems (LMS) and virtual classrooms already existed, their adoption and use were limited with face-to-face education being the norm in most educational institutions, it also brought with it the need to maintain social distancing and all schools found the need to move their educational processes to virtual environments leading to an expansion and rapid adoption of online learning platforms (Salazar Padilla et al., 2022) (Posso Pacheco, 2022).

The main objective of this paper is to present the results obtained from a case study of the collaborative project between academics from the Universidad Politécnica del Valle de México and the Universidad Tecnológica Tula-Tepeji to implement emergent virtual classrooms using the LMS Chamilo system at the Instituto de Integración Cultural located in Tultepec, Estado de México, for the master's degree in Innovation and Creativity in Education. The initiative arises as a response to the needs posed by distance classes during the COVID-19 pandemic in the year 2020 and that to date had a series of adjustments and modifications that make it a fundamental tool in post-pandemic times (Mukhammad Nur Chasani & Agung Suci Dian Sari, 2023) (Farokhi & Haryadi, 2021). In previous years the Cuerpo Académico Tecnologías Emergentes had worked on the design of didactic strategies applicable to different learning environments (Flores-Azcanio et al., 2020) (Sanchez-García et al., 2019) in addition to which 2020 served as an impetus for research to analyse learning processes (Galeana-Victoria et al., 2020).

Prior to the implementation of virtual classrooms the institute faced significant challenges in adapting to the distance learning modality during the COVID-19 pandemic, the lack of a robust and specialised platform hindered effective interaction between students and teachers, as well as the management of didactic resources and the evaluation of academic progress.

LMS systems and emerging didactic strategies

Chamilo is an open source learning management system (LMS) that emerged in 2010, developed by an international group of developers driven by the need for a flexible and accessible educational platform. Chamilo has established itself as a popular LMS solution that has been used in a considerable number of institutions around the world.

Some of the main advantages of the platform are:

- Content management. It provides tools for the organisation and delivery of content in a structured way.

- Communication and collaboration: It offers online communication and collaboration functions through tools such as discussion forums, chats, wikis, sending private messages, among others.

- Assessment and progress monitoring: Allows the creation and administration of online assessments, such as quizzes and exams. Teachers have the possibility to track the progress and academic performance of each student, generate reports, provide personalised feedback and create an individual profile.

- Customisation and adaptability: Chamilo provides options to customise the appearance and configuration of the learning environment according to the needs of each educational institution, the scalable modular architecture provides flexibility to adapt to different contexts and emerging needs.

Therefore, Chamilo is a tool that stands out for its intuitive and user-friendly interface, which simplifies its use for both educators and students. Moreover, one of the tools that arouse the interest of educators is the possibility of creating and managing robust online assessments that are integrated with comprehensive monitoring reports that complement the advice and feedback both face-to-face and online.

It is important to take into consideration that although Chamilo is a solid platform for the implementation of virtual classrooms, it is necessary to have an adequate planning and instructional design methodology to guarantee an effective learning experience, as well as an emerging training plan and a technical support structure to provide the necessary technical support to carry out the activities.

It can be summarised that the central objectives of this article are, firstly, to promote the use of the Chamilo platform for the implementation, configuration and administration of emergent virtual classrooms, and secondly, the didactic strategy that comes from the urgency of changing and adapting contents initially thought of as support material in face-to-face courses to virtual environments based on adaptability according to the technological, academic and reinforcement conditions that each student and academic requires throughout the fulfilment of activities within a teaching period.

Theoretical framework and background

The growth of distance education in the years following COVID-19 significantly accelerated the adoption of online education worldwide, as educational institutions had to adapt quickly to the restrictions imposed by the health crisis (Posso Pacheco, 2022). After the initial impact of the pandemic, online education continued to expand and establish itself as a viable alternative to face-to-face education because it has democratised access to education, with more and more people able to access academic programmes and courses from different parts of the world without having to physically move (Redacción, 2020). It offers greater flexibility for students to organise their study time and fit around work, family or other personal commitments.

Online education has opened up opportunities for a wide range of subjects and disciplines, allowing students to find programmes and courses that suit their interests and needs, educational technology has had a major influence in providing more engaging and effective learning experiences, and as online education becomes more common, it has increased acceptance and recognition by employers and universities, which has strengthened the credibility of online degrees and certificates.(Johnson et al., 2016)(Magdaleno González, 2021).

Learning management systems (LMS) after the events experienced by COVID-19 underwent an evolution and new adaptation in the educational landscape (Cruz Picón & HERNÁNDEZ CORREA, 2022). The pandemic drastically accelerated the adoption of online education, which generated an increased demand and use of LMS platforms worldwide, systems such as Chamilo, became essential tools to facilitate the transition to online education and ensure educational continuity during periods of confinement and social distancing. In addition, LMSs demonstrated their ability to provide flexibility in accessing educational content, facilitate interaction between students and teachers, and offer a variety of enriching digital resources. LMSs were also instrumental in collecting data and tracking student progress, allowing educational institutions to make informed decisions and adjust their pedagogical strategies. Overall, the changes driven by COVID-19 have strengthened the position of LMS systems as key pillars in online education and reinforced their role in creating learning experiences that are more efficient, inclusive and adapted to the changing needs of contemporary education. (Posso Pacheco, 2022).

In academic terms, a virtual classroom is an online educational environment that simulates and replicates the characteristics and dynamics of a traditional classroom, allowing interaction between students and teachers through digital media and communication technologies (Ruipérez & García, 2020). These are virtual spaces in which teaching and learning activities take place, where teachers can teach classes, share educational content, assign tasks and assess students' progress remotely (Santana Oleas et al., 2023).

Students, in turn, can participate in discussions, engage in collaborative activities, access digital educational resources and receive personalised feedback from academics, tutors or learning managers. Virtual classrooms foster flexibility, accessibility and personalisation of learning, and have gained relevance especially in crisis or emergency situations, such as the COVID-19 pandemic, where they have become an essential tool to ensure educational continuity in remote environments. Emerging virtual classrooms are characterised by their ability to adapt to different pedagogical approaches and teaching styles. This implies the flexibility to implement various learning strategies, such as active learning, project-based learning or collaborative learning in a virtual environment (Cavanaugh, 2005).

Emerging virtual classrooms have a number of attributes that differentiate them from traditional ones, for example, the agility of implementation during a crisis, as educational institutions need to adapt quickly to the online modality to ensure the continuity of education. Another feature is adaptability to different contexts: Emerging virtual classrooms can be adapted to different educational scenarios and teaching levels. They can be implemented in higher education institutions, primary and secondary schools, vocational training programmes and more (Area Moreira et al., 2010). The COVID-19 pandemic has demonstrated the importance of ensuring continuity of education in crisis situations. Emerging virtual classrooms have become an essential tool to maintain the link between students and teachers, ensuring that the teaching and learning process does not stop.

Chamilo is an open source learning management platform (LMS), an open source virtual campus that is distributed under GNU/GPLv3 license, and that any person, institution or company can freely use for the delivery of training actions through the internet. (Bohemia Interactive Australia Pty Ltd, 2015)

Chamilo had gained popularity in the educational community, primary schools, secondary schools, universities and training centres adopted its use due to its flexibility and ability to adapt to different educational contexts, it offers a complete set of features and functionalities to manage online courses and facilitate learning in virtual environments, it drives collaboration through interaction tools such as forums, chats and private messages in addition to offering a community of support and support that for a system administrator is usually attractive.

Methodology

The type of research chosen for the development of this research is the case study, a qualitative methodology used to investigate a complex phenomenon in a specific context. In this approach, an in-depth and detailed analysis of a particular case, which can be an individual, a group, an organisation or a situation, is carried out. The aim of the case study is to understand the case in its context and to obtain a complete picture of the underlying causal relationships and processes (Hernández-Sampieri et al., 1991). For this work, data were collected from various sources such as interviews, observations, documents and records in order to capture multiple perspectives and dimensions of the phenomenon under study, the data were processed qualitatively and at this stage patterns, trends, and relationships between variables were sought in order to gain an in-depth understanding of the case. (Phelan, 2011).

Among the research stages that were carried out were firstly the definition of the context, which consisted of analysing the educational institution, the characteristics of the curriculum and why Chamilo was chosen as the LMS system. The institute of cultural integration was the setting for this case study, it started after a request from the program director, who after the guidelines that the federal government (Sánchez-Talanquer et al., 2021) imposed for face-to-face classes arose the need to establish a virtual environment for students to continue their learning process started since month of November 2019, after some virtual meetings an emerging plan for the implementation of emerging virtual classrooms was developed in which the following activities were included:

–　Search for a hosting platform.

–　Domain registration (electronic url).

–　LMS installation process.

–　Configuration of security parameters, functionality and user management.

–　Emergent instructional design strategy for the design of distance learning courses.

–　Teacher training.

–　Publication of virtual classrooms.

–　Implementation of support and helpdesk programme for students and teachers.

–　Satisfaction data collection through surveys and interviews.

In the master's degree in Innovation and Creativity in Education at the IIC (Institute for Cultural Integration), the aim is to train future teachers who will influence the learning process of future generations, in addition to providing all the didactic, methodological and research tools to promote training in the country. The case study will also serve as a documentary background for a didactic strategy for subsequent analysis and reflection.

In the second step, a review of the literature available at the time of implementing the solution was carried out, trends and emerging methodologies for course design were analysed and the trends at that time were evaluated as described in section two.

Choice of LMS system for the implementation of emerging virtual classrooms

When an organisation or institution is evaluating the selection of a learning management system (LMS) for its distance education project, it is essential to consider several key aspects. Among the most important considerations are the clear definition of the project objectives, the technical requirements for successful implementation, the usability of the system for teachers and students, the essential functionalities required, the customisability to adapt to the specific needs of the project, and the security of data and privacy of users (Osma et al., 2016).

In addition, attention should be paid to the level of technical support and maintenance provided by the LMS provider, as well as the associated costs, including licensing, custom development, maintenance and training. The ability to integrate with other tools and systems used by the institution is also a crucial factor. User experience and feedback from teachers and students must be taken into account to ensure a satisfactory experience (Parihar et al., 2021) (Osma et al., 2016).

Conducting pilot tests and evaluations before the final implementation allows to verify how the LMS adapts to the specific context of the project. In addition, it is important to consider the scalability of the system to accommodate future growth of the project. The reputation and experience of the LMS provider, as well as compliance with applicable regulatory requirements, are factors that should also be evaluated. Finally, having an active user community and a broad resource base can be beneficial for continuous learning and technical support. (Ruipérez & García, 2020).

LMS Platform	Advantages	Disadvantages	Functionality	Usuarios activos
Moodle	Large community of users and developers	Initial learning curve for administrators	Course and educational content management	Over 250 million (from 2021)
	Customisable and flexible	Requires adequate technical and server resources	Assessments and student progress monitoring	
	Large number of plugins and extensions	User interface can be complex	Online communication and collaboration	
	Support for different types of content	Upgrades may require time and effort	Grading and feedback tools	
Chamilo	Focus on ease of use and user experience	High resource consumption in some cases	Integration with other tools and technologies	More than 1 million (from 2021)
	Active community and continuous support	Less popular compared to Moodle	Easy administration of courses and users	
	Intuitive and user-friendly interface	Fewer plugins and extensions available	Creation of educational content and assessments	
	Integración con herramientas multimedia	Smaller user community	Online communication and collaboration	
	Actualizaciones frecuentes y mejoras	Fewer customisation options	Tracking student progress and performance	
Claroline	Gran cantidad de recursos de capacitación	Less modifiable and customisable	Reporting and data analysis for decision making	Data not available, less than one million users.
	Enfoque en la simplicidad y facilidad de uso	Fewer advanced features compared to others	Course and educational content management	

	Interfaz intuitiva y amigable	Smaller user community	Creation of educational materials and activities	
	Soporte para varios idiomas	Fewer customisation options	Tracking student progress and performance	
	Facilidad para administrar y gestionar cursos	Requires basic technical knowledge	Online communication and collaboration	

Table 1 Comparative table of the main free and open source LMS systems on the market

Implementation of virtual classrooms

The Chamilo installation process consisted of installing the system on a hosting platform that was contracted externally, where it was verified that the characteristics of the server met the minimum requirements such as the PHP version, the database engine (MySQL) and other necessary components. Subsequently, a series of steps was started, whose guide was followed from the official Chamilo manual (Bohemia Interactive Australia Pty Ltd, 2015), basically the procedure was:

- The domain registration process was carried out with all the necessary documentation to be able to use the address https://iictultepec.edu.mx. The process involved presenting a series of documents that accredited the institution and its educational organisation.

- The latest stable version of Chamilo was downloaded from the official website (https://chamilo.org) or from the source code repository. In the case of the contracted hosting, the installation package was unzipped and the installation wizard was executed by means of an internal tool called softaculus.

- The name and location to create the database was determined.

- The installation process began and lasted approximately 7 minutes.

- Accessed the website through the browser and followed the installation instructions that appeared on the screen.

- From the beginning of the installation, the user name and administrator password for the platform were established.

- Once the installation was completed, the Chamilo administration panel was accessed and the general settings, such as language, time zone, site name, among others, were configured.

- The courses and virtual classrooms corresponding to the subjects or programmes that will be offered in your institution or study centre were created.

- The structure of each course was defined, content was added, activities were created and permissions for teachers and students were established.

- Roles and permissions were then defined for the different users, such as administrators, teachers and students, to ensure proper access to the platform's functionalities.

- The appearance and design of the website was customised using the configuration options and templates available in Chamilo, the logo of the institution was established along with some elements of personalisation to boost the identity of the institute.

- Extensive testing of the platform to ensure that everything is working properly and adjustments to any necessary configuration to further optimise its functioning.

Training and adoption programme

Once the virtual classrooms were established and published, they were shown to the authorities and administrators of the programme, user accounts were created so that it is possible to monitor progress, accumulated connection time, manage users and courses, organise categories, competencies and badges that serve to provide a much better user experience. Once it was approved by the administrators it was imminent to move on to the training programme which consisted of two main activities, two 6-hour videoconference sessions and the second was to organise teachers at specific times to review their classroom configurations at a time of their choice, a spreadsheet was shared in which each teacher scheduled an appointment within the timetable established for this purpose.

The objective of the training was that the teachers could upload complementary didactic material, elaborate tasks, grade them and manage the evaluation, as well as other functionalities such as discussion forums, private messages, chats and elaboration of activities, one of the main goals was that each teacher could personalise their virtual classroom, for the revision of this, personalised consultancies were established where each advisor could solve the doubts that arose during the process.

Through this process, a brief interview was carried out where, at the end, the teachers expressed their comments on the virtual classrooms, the most relevant of which were the following:

- The platform seems to me to be very organised, from the outset, everything seems clear to me".

- The icons are intuitive and easy to identify.

- I have the impression that after some time connected it becomes slow".

- "It does not have the possibility to assign a grade to assignments unless the student has sent it in the corresponding section, it does not allow flexibility in the time of delivery of activities for each case".

- The evaluations section seemed to me to be one of the best things it has".

- "A bit confusing in the discussion forum settings".

- "The tasks do not allow for a freer adaptation and their revision is complicated".

The platform offers tools for monitoring and tracking users, it has a general section where you can see statistics of students, teachers, courses, among others, from a data and database point of view, as well as details of each of the accounts that make up the students, there were several sessions for platform administrators to generate their reports.

Results and evaluation

In general, a very brief Likert-type survey was developed so that each user within each virtual classroom could give an assessment of the user experience when using the platform, the instrument that appears in the surveys of the same options of Chamilo, appeared as follows: Participants could select their level of agreement or disagreement with each statement using a 5-point scale (1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree nor Disagree, 4 = Agree, 5 = Strongly Agree).

The Chamilo platform is easy to navigate and use.

- Resources and course materials are clearly organised and accessible on the platform.

- Uploading and downloading files to and from the platform is fast and efficient.

- Activities and assignments can be easily created and graded in Chamilo.

- The student progress tracking system is effective and provides useful information.

- The platform allows smooth interaction between teachers and students.

- The online forums and communication tools are useful to foster collaboration and discussion.

- The platform has a variety of assessment tools (quizzes, exams, etc.) that are effective in measuring student learning.

- The technical support provided for the use of the platform is timely and efficient.

- Overall, I am satisfied with the functioning of the Chamilo platform for the development of my academic activities.

The above gave an average as can be seen in figure 2.

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Figure 1 Overall results of the Linkert evaluation survey

Although the implementation was successful, there were some items with the development of activities and tasks that were confusing, the section of evaluations and forums were the best evaluated, while the overall performance of the platform was slow and unresponsive in some parts. The implementation had to be readjusted after the start of the classes when nobody could access the platform, so adjustments had to be made to the sessions and training courses.

In general, it can be determined that the element of time and the emergency for placing the spaces was covered, the students were able to continue their learning process and from this point onwards they would work in a different way for the production of the academic contents of each course.

Figure 2 Example of a pop-up virtual classroom of the subject Didactic use of the Internet accessible from the e-mail address http://iictultepec.edu.mx

Conclusions and future work

By way of conclusion, it is determined that this type of project could be considered as a combination of a process and a method. Although it is based on the implementation of specific software such as the Chamilo tool that uses information technology, the initiative itself involves a series of steps and actions that go beyond the mere acquisition or implementation of a product or software.

The project involves the contracting of hosting services, the installation and configuration of the Chamilo platform, the creation of virtual classrooms, training for administrators and teachers, and the promotion and dissemination among students with the respective technical support. All these components make up an integral process to implement and adapt the platform to the needs and requirements of the Institute for Cultural Integration and the master's degree in Image and Creativity in Education.

GALEANA-VICTORIA, Luis Gustavo, SANCHEZ-GARCÍA, Judith Ruby and FLORES-AZCANIO, Nancy Patricia. Implementation of emerging virtual classrooms: case study, master in innovation and creativity in education. Journal of Technology and Education. 2023

In order to make this project a success, several strategies were involved, emerging instructional design methods as analysed in the following research as specific steps were followed using strategies to guarantee an effective, fast and successful course design of the virtual classrooms. In addition to the above, aspects such as training, creation of individual classrooms, monitoring and evaluation, promotion and facilitation of integration among learners were involved.

Although the project involves the adoption of a specific software, as a research group we conclude that it involves more than merely technical elements that are based on an integrative vision involving innovation, problem-solving capacity and planning oriented towards emerging didactics, which will continue to be explored in future research.

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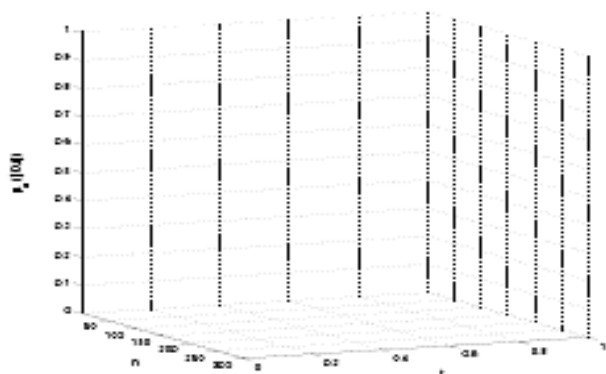
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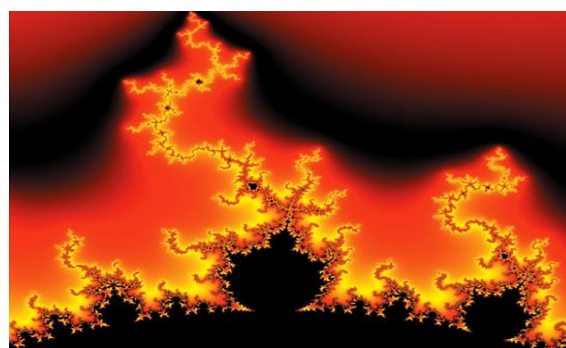
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