

*Artículos científicos*

**Plataformas digitales en la modalidad híbrida a nivel superior**

***Digital platforms in the hybrid mode at a higher level***

***Plataformas digitais no modo híbrido em um nível superior***

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## Resumen

El Centro Universitario (CU) Ecatepec, de la Universidad Autónoma del Estado de México (UAEMéx), es una institución con 27 años de servicio en la cual se imparten las carreras de ingeniería en Computación, licenciatura en Informática Administrativa, licenciatura en Psicología, licenciatura en Contabilidad y licenciatura en Administración. Utiliza herramientas digitales como Moodle, Seduca y Microsoft Teams para apoyar el proceso de enseñanza-aprendizaje. Cuenta con tres tipos de modalidades de enseñanza: escolarizada, mixta y en línea. En el marco de la suspensión de las clases presenciales, la necesidad de mantener la continuidad de los aprendizajes ha impuesto desafíos que los países han abordado mediante diferentes alternativas y soluciones en relación con los calendarios escolares y las formas de trabajo, por medios no presenciales y con diversas formas de adaptación.

Por tanto, el objetivo de este documento es visibilizar la diversidad de consecuencias que estas medidas tendrán sobre la institución educativa a corto y mediano plazo, así como plantear recomendaciones para sobrellevar el impacto de la mejor manera posible, proyectando oportunidades para el aprendizaje y la innovación en la educación posterior a la pandemia con la comunidad universitaria del CU Ecatepec.

**Palabras clave:** plataformas digitales, modalidad híbrida, estudiantes.

## Abstract

The University Center (CU) Ecatepec, of the Autonomous University of the State of Mexico (UAEMéx), is an institution with 27 years of service and has the degrees of Computer Engineering, bachelor's degree in administrative informatics, Bachelor's Degree in Psychology, Bachelor's Degree in Accounting and bachelor's degree in Administration. Use digital tools such as Moodle, Seduca and Microsoft Teams to support the teaching-learning process. It has three types of teaching modalities: schooled, mixed, and online. The suspension of face-to-face classes, the need to continue learning has imposed challenges that countries have addressed through different alternatives and solutions in relation to school calendars and forms of work, by non-face-to-face means and with various forms of adaptation.

Therefore, the objective of this document is to make visible the diversity of consequences that these measures will have on the educational institution in the short and medium term, as well as to propose recommendations to cope with the impact in the best possible way,



projecting opportunities for learning and innovation. in post-pandemic education with the CU Ecatepec university community.

**Keywords:** digital platforms, hybrid modality, students.

## Resumo

O Centro Universitário (CU) Ecatepec, da Universidade Autônoma do Estado do México (UAEMéx), é uma instituição com 27 anos de atuação onde são ministrados engenharia da computação, bacharelado em Informática Administrativa, bacharelado em Psicologia, bacharelado. em Ciências Contábeis e graduada em Administração. Utilizar ferramentas digitais como Moodle, Seduca e Microsoft Teams para apoiar o processo de ensino-aprendizagem. Possui três modalidades de ensino: presencial, misto e online. No quadro da suspensão das aulas presenciais, a necessidade de manter a continuidade da aprendizagem impôs desafios que os países têm enfrentado através de diferentes alternativas e soluções em relação aos calendários escolares e formas de trabalho, através do ensino não presencial. - meios faciais e com diversas formas de adaptação.

Portanto, o objetivo deste documento é tornar visível a diversidade de consequências que estas medidas terão na instituição de ensino no curto e médio prazo, bem como propor recomendações para fazer face ao impacto da melhor forma possível, projetando oportunidades para aprendizagem e inovação na educação pós-pandemia com a comunidade universitária CU Ecatepec.

**Palavras-chave:** plataformas digitais, modalidade híbrida, estudantes.

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## Introduction

The covid-19 pandemic caused digital tools to become more important for education, as they allowed communication and interaction between students and teachers to be maintained. In the case of the Ecatepec University Center (CU), belonging to the Autonomous University of the State of Mexico ( UAEMéx ), it uses platforms such as Moodle, Seduca and Microsoft Teams to support the teaching-learning process.

Therefore, this article seeks to make visible the use of technology as an essential resource to teach the financial mathematics learning unit corresponding to the degree in Administration and Accounting, in blended or virtual mode. Specifically, it has been decided to use the



Seduca platform UAEMéx , from the Autonomous University of the State of Mexico. This initiative seeks to optimize the teaching and learning process in the university community of this institution in the face of the challenge posed by the confinement due to covid-19. In addition, the aim is to determine if the students have the necessary resources to adapt to this new modality.

With the purpose of obtaining an exact and defined calculation of the students studying the degree in Administration and Accounting at the CU UAEM Ecatepec, a representative investigation was carried out. This gave rise to the use of the Seduca digital platform UAEMéx , educational services portal of the institution. To do this, a quantitative approach was used, which is based on the collection, processing and inspection of information.

Now, it is essential to highlight the disruptive impact that the covid-19 pandemic has had on all aspects of life. In other words, it is crucial to analyze how it has affected Mexico's educational system, which has traditionally focused on in-person teaching. Therefore, it is imperative to explore alternatives that allow the transition to a blended or virtual educational system, which implies taking advantage of the possibilities offered by educational platforms and technological tools to transform teaching processes. However, it should be emphasized that the relevance of the face-to-face interaction that physical coincidence implies should not be neglected ( Acharki , 2021).

As stated by Granados (2015), the incorporation of information and communication technologies in the teaching and learning process requires that teachers not only be familiar with the appropriate tools, but also train and update their strategies. pedagogical by integrating these technologies in the classroom.

The use of technology as a support or complement in teaching was considered an aspirational trend in most higher education institutions. However, due to the pandemic, its implementation became a pressing challenge, as each institution tried to respond in the best way with the available resources. In this situation, previous experience in the use of warehouse management systems and *software served as a reference for some institutions, while for others it represented new opportunities* (López, 2022).

However, in a globalized world, the viability of implementing technological changes in education depends on the capacity of each nation to carry out these transformations. It is crucial, therefore, that an educational platform is established that promotes learning in various fields and sectors, and educational institutions, especially universities, must lead in the adoption of these applications, given that they have the responsibility of training



professionals. of the future (Fajardo and Cervantes , 2020).

Likewise, it is relevant to keep in mind that these technological changes not only affect students, but also involve teachers and the administration of educational institutions. In addition to seeking the feasibility of implementing these technologies, it is essential to focus on innovations in teaching environments, particularly those that are developed virtually or hybridly. Therefore, it is imperative to guarantee that all the necessary tools are properly used in the Financial Mathematics study unit of the Accounting and Management degree at the Ecatepec University Center of the UAEM. This involves evaluating whether students have the required infrastructure, such as computers and the Internet, to enable this teaching approach (Fajardo and Cervantes , 2020).

### **Environments virtual**

The use of ICT in the educational field, supported by an appropriate pedagogical model, requires the creation of conditions and facilities that allow students to work at their own pace, interact with teachers and classmates and, at the same time, acquire knowledge, develop skills and gain experience. In distance education, a learning environment designed to meet the needs of face-to-face interaction and facilitate access to teaching resources is used (Hiraldo, 2013).

ICT can be used in the educational field to support and improve the tasks of the teacher, who acts as a guide in this process. This is achieved through activities that engage students, including multimedia presentation elements, access to current content, searching appropriate databases, and continuous evaluation. Virtual learning environments (VLE) are based on the principle of collaborative learning and are supported by the use of multimedia tools, which creates an interactive environment for the construction of knowledge. These are designed to facilitate the academic management of classes by teachers and help students in the development of their courses through the Internet (Hiraldo, 2013).

The UAEMéx system offers its students the opportunity to take learning units (UA) in a blended and virtual manner to adapt to the contexts and rapid changes experienced in a globalized world, where constant interconnection through the Internet is modifying teaching content and learning methods. The goal is for students to not only acquire knowledge, but also apply it to become better professionals. The Autonomous University of the State of Mexico has three modalities:

1. Schooled modality: The students and the subject teacher have interaction in the



classroom in person, complying with class hours so that students can credit your credits. They count with three evaluations: Ordinary, title and recurse.

2. Mixed mode: Students take class in person and online, complying with their hours class for achieve accredit their credits. They count with three evaluations: ordinary, title and recurse.

3. Online mode: In this, students cover their class schedules virtually, using the platforms already mentioned, to accredit the corresponding credits of each degree (UAEMEX, 2021).

Regarding the fundamental changes driven by virtual education, the following can be mentioned: a student-centered pedagogical model, which redefines the role of both the student and the teacher. The latter is no longer the only transmitter of information, but rather becomes a guide that guides students in the construction of knowledge. This is achieved through teacher input, interaction with other students, and working with various sources of information in various formats.

Likewise, individual and collaborative learning of students is encouraged, since teaching is individualized through the integration of ICT, and virtual spaces are created where students can interact with each other and communicate with teachers using both synchronous and asynchronous tools. This allows for more detailed and personalized guidance from teachers (Lima and Fernández , 2017).

## Methodology

The research carried out was quantitative, since an instrument (questionnaire) was applied to collect data and analyze it. Furthermore, it was documentary type, since that HE they consulted books, journals, memories, articles, between others. Likewise, it is transactional because the data was collected in a single period, and it is descriptive because an attempt was made to examine, locate and specify particular circumstances.

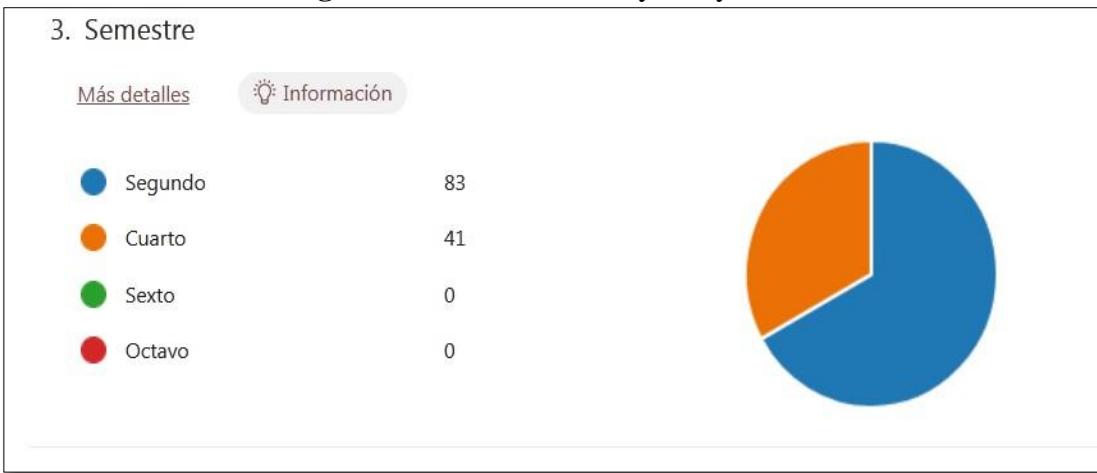
Specifically, 124 second-year students were taken into account and fourth semester, who already took the UA Mathematics Financial of the degrees in Accounting and Administration. The platform used was Microsoft Teams , which is used for virtual classes, video meetings that can be stored, collection of documents and activities.



## Results

Below is the interpretation of the survey carried out along with the analysis of each question asked to the students of the Financial Mathematics learning unit. In Figure 1 it can be seen that the students surveyed were in second and fourth semester.

**Figure 1.** Semester that they study the students



Fountain: Elaboration own

In Figure 2 it can be seen that, of the 124 students surveyed, 119 have completed the Financial Mathematics learning unit. This is a significant opportunity, as there are tools that allow them to understand and apply concepts of simple and compound interest, as well as amortization and other fundamental elements that a financial manager needs to carry out financial analysis. Likewise, only five students have not taken this subject; However, in the future, it is essential that they do so, as these issues represent a significant component of modern business operations.

**Figure 2.** Students that they have completed the U.A.

5. ¿Has cursado Unidades de Aprendizaje virtuales o con mediación tecnológica?

[Más detalles](#)

- Sí
- No

119

5



Fountain: Elaboration own

In Figure 3 it can be seen that 64 of the students surveyed (52%) consider that they have had a positive experience in virtual environments. On the other hand, 37 students (30%) rate their experience as average. Only 2 students (2%) think that their experience has been bad. It is important to note that the pace of technological change is extremely rapid, often making it difficult for teachers and students to keep up with these innovations.

**Figure 3.** Experience of the students surveyed in environments virtual

6. ¿Cuál es tu experiencia en los entornos virtuales?

[Más detalles](#)

Información

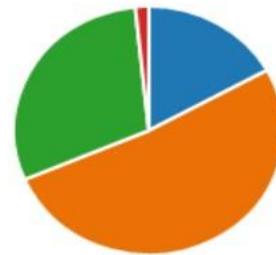
- Excelente
- Buena
- Regular
- Mala

21

64

37

2



Source : Elaboration own

Figure 4 shows that 80% of the students surveyed (99 students) consider that it would not be appropriate to teach the Financial Mathematics learning unit virtually, while 20% (25 students) think that it would be appropriate. These students argue that this opinion is based on the complexity of the topics, the difficulty of the exercises and the need for time to address calculations related to the value, interest rate or profitability of various financial instruments, such as deposits, bonds , loans, paper discounts, stock valuation and insurance calculations,



among others.

**Figure 4.** Prompt to impart the U.A. in modality virtual

7. ¿Considerarías oportuno que la Unidad de Aprendizaje Matemáticas Financieras fuera impartida en modalidad virtual?

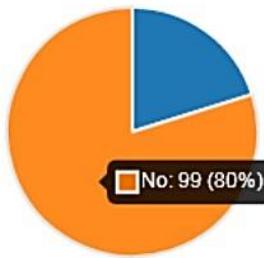
[Más detalles](#)

Información

- Sí
- No

25

99



Fountain: Elaboration own

Figure 5 shows that 53% of the students surveyed (66 students) do not consider it appropriate to teach the Financial Mathematics learning unit with technological mediation through the Seduca platform . In contrast, 47% (58 students) think that it would be appropriate. These students argue that their opinion is based on challenges such as the difficulty of resolving doubts in person, confusion in the instructions, the complexity of the exercises, the understanding of the topics and the availability of time to carry out the activities.

**Figure 5.** Prompt to impart the U.A. with mediation technological

9. ¿Considerarías oportuno que la Unidad de Aprendizaje Matemáticas Financieras fuera impartida con mediación tecnológica?

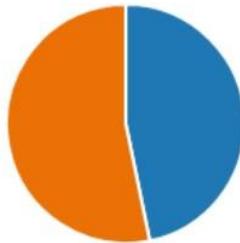
[Más detalles](#)

Información

- Sí
- No

58

66



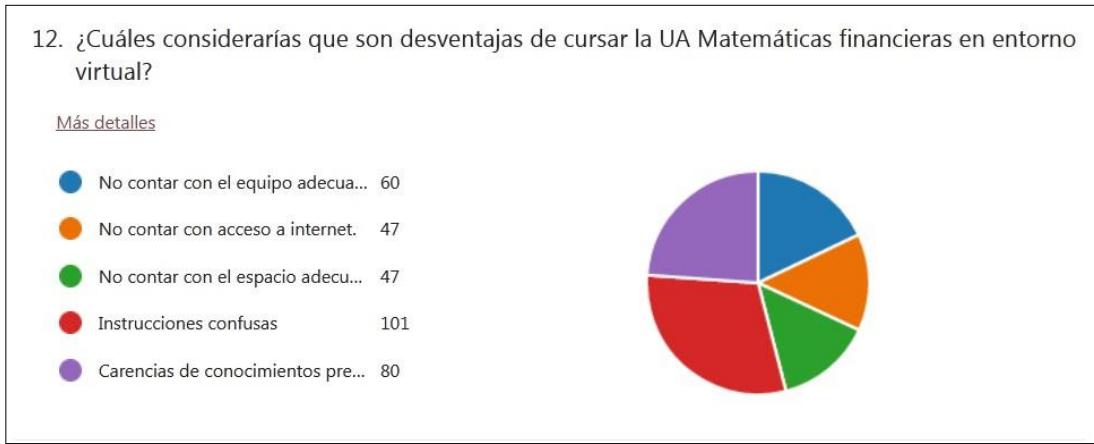
Source: Elaboration own

Figure 6 shows that 53% of the students surveyed do not consider it appropriate to teach the UA Financial Mathematics with technological mediation through the Seduca platform . This



is because the educational program aims to analyze and interpret financial and administrative information, detect economic and material problems in organizations and make responsible and ethical decisions. Financial mathematics, in his opinion, is practical for carrying out these analyses. On the other hand, 47% of students think that it would be appropriate.

**Figure 6.** Disadvantages of to impart the U.A. in a around virtual



Source: Elaboration own

Now, regarding the limitations of this research, first of all, it should be noted that greater participation of sixth and eighth grade students was required, since they have been in their study plan for longer and could provide additional relevant data. . Another limitation was related to the initial lack of definition about whether the questionnaire would be administered in written form or through digital means. Finally, the digital modality was chosen to facilitate data collection. However, there were difficulties related to the time given to students to complete the questionnaire, as not everyone was able to remember or find the right time. Additionally, a significant limitation was the lack of access to computers or *laptops* by a considerable number of students, which sometimes resulted in problems when trying to open applications or pages on their mobile devices.

The results obtained have been presented to the coordinators of each degree with the purpose of proposing possible modifications to the study plan, whenever feasible.

The implementation of a strategy for the continuity of university teaching in a virtual environment implies, however, changes in teaching practices to make the most of the possibilities offered by this new educational model (Acharki, 2021 ) . This involves facilitating modifications, developing new processes and embracing innovative theories.

It is crucial to provide the necessary social and professional skills to students, as challenges



such as lack of infrastructure, low quality of connection, difficulty of implementation and technical problems in public educational institutions can affect not only their education, but also their life in general (Sierra *et al.*, 2017). This is achieved by promoting the use of technological tools in classroom projects, creating high-quality instructional resources and providing training to teachers in the use of platforms, instruments, databases, among others. In this process, teachers and students actively interact, and teachers assume a guiding role to promote positive, complete, respectful, direct and fair communication. Simply put, ICT can play a vital role in facilitating education for all.

## Discussion

The covid-19 pandemic has had an uneven impact on access to education. Now, it is essential to have technological devices such as televisions, computers, tablets and mobile phones, and services such as internet, electricity and water, as well as adequate spaces and orientation. However, unfortunately, a less privileged segment of society often lacks these.

The use of technology—particularly the Internet—has become essential for students, teachers, and their families alike. This technology has allowed us to stay connected through our electronic devices. However, we face challenges from acquiring these to adapting to digital platforms and applications to carry out meetings, video calls, exams, exhibitions, teamwork and practices.

## Conclusions

The purpose of this study was to evaluate the effectiveness of the Seduca platform UAEMéx as a digital tool for blended and virtual learning in the Financial Mathematics learning unit of the degree in Administration and Accounting, taught at the UAEM Ecatepec University Center, belonging to the Autonomous University of the State of Mexico. To do this, a questionnaire was administered to 124 students, and the key results were the following: 90% have access to the internet and electronic devices, which facilitates the use of the platform, 80% use the platform at least once per week, which indicates an adequate frequency for learning, 70% are satisfied with the platform, which denotes a positive assessment of this tool and 60% have experienced improvements in their grades in Financial Mathematics, which reflects a positive impact on their academic performance.

Therefore, it is concluded that the Seduca platform UAEMéx is effective in supporting blended and virtual learning, as long as access to the necessary technological resources is



guaranteed and appropriate training is provided to both teachers and students.

However, it is important to highlight that more than half of the students surveyed do not consider it appropriate to teach this subject digitally due to the complexity of the topics, the doubts that arise and the time required to resolve the problems raised. This suggests the need to improve communication, guidance and feedback between teachers and students, in addition to adapting the contents and activities to the characteristics and needs of each group. Limitations of this study include the small sample size, which prevents the results from being generalized; the lack of a control group, which makes it difficult to compare the effect of the platform with other modalities; and the absence of prior measurements, which makes it impossible to evaluate student progress from the beginning of the course. It is therefore recommended to carry out future studies with larger samples, control groups and pre- and post-measurements to obtain more solid and reliable results.

Ultimately, this study contributes to knowledge about the use of digital tools in higher education, especially in the context of the covid-19 pandemic, and provides valuable information to improve the quality of the teaching and learning process in the university unit. Learning Financial Mathematics of the degree in Administration and Accounting.

### **Future lines of research**

The results obtained, together with the analysis based on the application of the instrument, suggest several future areas of research related to academic training, focusing on total virtuality, where all learning units are taught online. This strategy is proposed as a way to expand access to higher education at the UAEM Ecatepec University Center, since the demand for students exceeds admission capacity by more than 50%.

Furthermore, there is a need to update the curriculum in accordance with the needs and requirements of organizations in a globalized world. Currently, Plan F18 is being implemented, which follows a hybrid educational model focused on the development of students' abilities, knowledge and skills. The use of business simulators has also been incorporated and teachers have been trained in the use of technology, including an institutional educational platform ( Seduca ), as well as teaching tools to improve teaching. The updating of the study plan is based on the monitoring of graduates, which seeks to develop the professional skills required in the labor market. This includes communicating with alumni employers to obtain feedback. In addition, students' opinions are valued and it is verified that the teaching objectives are met.



Finally, the importance of including technological activities that help develop necessary skills in the workplace is highlighted. Subsequently, a comparison between face-to-face and virtual teaching is sought in order to achieve continuous improvements in the educational process.

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