

## Impact of technology for educational development at the higher education level at the Universidad Veracruzana in times of SARS-CoV2 in Poza Rica Veracruz, Mexico

## Impacto de la tecnología para el desarrollo educativo a nivel de educación superior en la Universidad Veracruzana en tiempos de SARS-CoV2 en Poza Rica Veracruz, México

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### Abstract

Evaluating the use of ICT at the higher education level is essential for every educational institution, because it allows knowing the degree of user satisfaction and the required needs, to later carry out a planning with strategies and actions that support their improvement. This research work is an analysis study carried out on the digital strategies used by the Faculty of Mechanical and Electrical Engineering of the “Universidad Veracruzana” in Poza Rica Veracruz, Mexico, during the COVID-19 contingency. Through an opinion survey applied to a sample of 300 students. Which allows us to identify the strengths and weaknesses of using a 100% virtual teaching in turn to know the difficulties that students presented, the attention they received, and how confinement affects school performance.

### Resumen

Evaluar el uso de las TIC a nivel de educación superior es fundamental para toda institución educativa, debido a que permite conocer el grado de satisfacción de los usuarios y las necesidades requeridas, para posteriormente realizar una planificación con estrategias y acciones que apoyen su mejora. El presente trabajo de investigación es un estudio de análisis realizado sobre las estrategias digitales utilizadas por la Facultad de Ingeniería Mecánica y Eléctrica de la “Universidad Veracruzana” en Poza Rica Veracruz, México, durante la contingencia por covid-19. Mediante una encuesta de opinión aplicada a una muestra de 300 estudiantes. La cuál nos permite identificar las fortalezas y debilidades de utilizar una enseñanza 100% virtual a su vez conocer las dificultades que presentaron los estudiantes, la atención que recibieron, y como afecta el confinamiento el rendimiento escolar.

### Virtual education, SARS-CoV2, ICT

### Educación virtual, SARS-CoV2, TIC

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## Introduction

Faced with a situation like the one we live in today, where a global pandemic has forced us to modify not only the way we live together as human beings, but also the way we teach, the challenge of modifying face-to-face classes to adapt them to a digital format was not easy. Although online classes are not new, it is an issue of great impact in our country because not all regions have internet and not even with adequate electrical infrastructure, another issue to consider are the electronic devices needed to develop the projects. Within the Universidad Veracruzana, Faculty of Electrical and Mechanical Engineering in Poza Rica Veracruz, Mexico. There is a community of students from different places, where these problems occur. Beyond considering that no one was prepared for this new reality.

## Target

Determine the needs of the students and create improvement strategies to maintain the quality standards of the Universidad Veracruzana.

## Why is it important to know the perspective of the student community regarding the virtual modality?

Given the need to cancel face-to-face classes due to the current contingency. The Universidad Veracruzana in an attempt to continue maintaining the quality standards resorting to different digital tools including EMINUS, to continue providing attention to 87,388 students [1] enrolled in formal education within the university community. It is worth mentioning that the proposal presents some difficulties and above all the impartiality with which the model can be developed. Some factors to consider are the availability of electronic equipment, to the student's emotional state in the face of confinement and possible health problems.

To determine this situation, the Faculty of Mechanical and Electrical Engineering of the Poza Rica-Tuxpan Region, through surveys of a sample of 300 students from the four educational programmes offered in the period February-July 2021, which are: Mechanical Engineering, Electrical Engineering, Electrical Mechanical Engineering and Industrial Engineering.

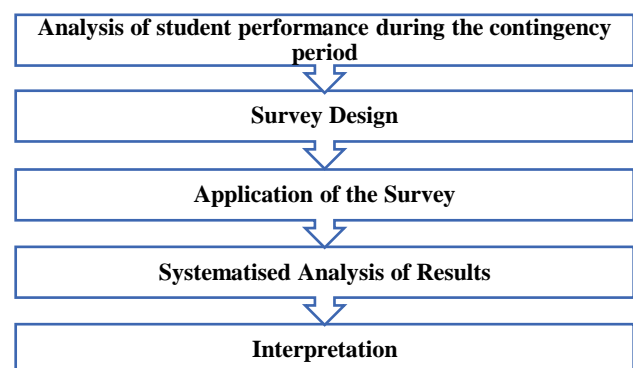
It is essential to stop and analyse the impact, repercussion and return of each of the actions that have been carried out to face the challenge of modifying the face-to-face teaching method to a digital format. There is no point in launching actions without knowing if they are effective or, on the contrary, if they have not had the expected impact.

Hence the need for a research process.

## Methodology

Through a quantitative and qualitative analysis that arises from the analysis of each response related to the students who were part of this work, it is of utmost importance to carry out a clear and concise work on our strengths and weaknesses in this area. It is necessary to apply a research method that collects all the data in order to get an idea of our current situation.

Each stage in the development of our process is explained below.



**Figure 1** Phases of research development

*Source: Own elaboration*

## Analysis of student performance during the contingency period

This consists of carrying out a visual inspection and detecting the number of students who have had difficulties in accrediting a subject.

## Design of the survey

The questions are formulated according to the observations, regarding the possible problems that the students had when sending the evidence of their respective educational experiences.

Opinion survey on the impact of technology for educational development at the undergraduate level at the Universidad Veracruzana in times of SARS-CoV2.	
1.	Do you have an internet connection with an acceptable bandwidth to access the virtual classes taught by the professors of the Faculty of Mechanical and Electrical Engineering, Poza Rica-Tuxpan Region?
2.	What electronic device do you usually use? When doing homework, submitting evidence and connecting properly in the virtual classes of the Educational Experiences you are taking during the contingency.
3.	How often did you send activities or participate in virtual forums and meetings within the activities proposed by the professors of the Universidad Veracruzana?
4.	What were the difficulties you encountered and why did you not participate in the proposed activities of the Educational Experiences you carry out online?
5.	Do you consider that you have the ability to use digital tools, conduct research work, carry out quality activities and use digital platforms to access virtual meetings?
6.	How do you consider the learning gained from the Educational Experiences you are taking during the virtual classes due to Covid-19?
7.	The Universidad Veracruzana has the EMINUS platform to promote education systems. Do you consider that the platform meets all the requirements for online education?
8.	During the contingency, do you incur additional costs for e-learning?
9.	Has the quarantine confinement established by the health authorities affected health?
10.	How do you consider the use of digital platforms (Skype, Zoom, Line, WhatsApp, Telegram, among others) has supported teaching processes?
11.	How would you rate the performance of the School of Mechanical and Electrical Engineering in virtual teaching during the contingency period?

**Table 1** Survey questions

Source: Own elaboration

**Application of the survey**

This work has a sample of 300 students, formed by students of the educational programmes of mechanical engineering, electrical engineering, mechanical and electrical engineering and industrial engineering, which were carried out virtually through the Google Forms application.

This survey seeks to generate the necessary information to be able to correctly develop the fourth step.



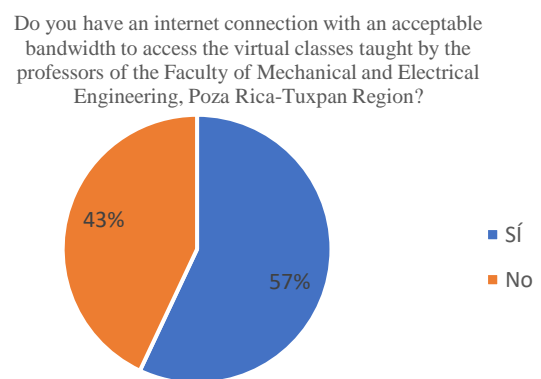
**Figure 2** Screenshot of the survey conducted on the Google Forms platform.

Source: Own elaboration

**Systematised analysis of results**

Data was collected from the students who participated as a sample from the different Educational Programmes. The data were obtained quantitatively, the results obtained in each of the questions are shown below.

Despite the fact that nowadays most of the country has telecommunications infrastructure, it is a reality that it is not always in ideal conditions, an example of this is represented in Graphic 1, where it can be seen that 43% presented connection problems when trying to connect to take a virtual class.

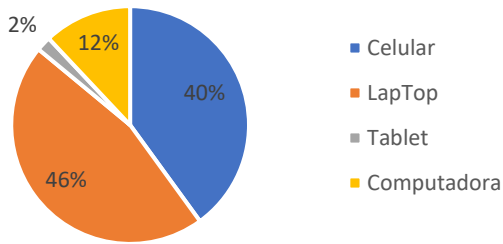


**Graphic 1** Question Results 1

Source: Own elaboration

The devices that students tend to use for their practicality are those shown in Graph 2, where the mobile phone and laptop show a high demand for its practicality, portability and economy, because some students do not have enough money to purchase a fixed equipment as shown in Graph 3, which also shows the rest of the possible difficulties that students presented during the contingency period, such as: poor internet signal reception, the acquisition of software that serve as support tools that can be used when developing the respective projects for each educational experience.

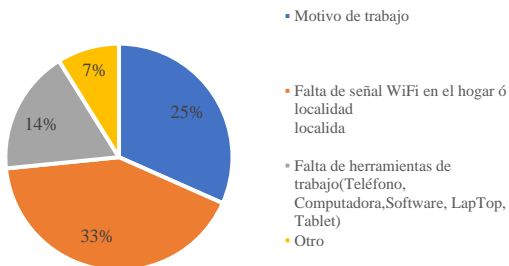
What electronic device do you usually use? When doing homework, submitting evidence and connecting properly in the virtual classes of the Educational Experiences you are taking during the contingency.



Graphic 2 Question Results 2

Source: Own elaboration

What were the difficulties you encountered and why did you not participate in the proposed activities of the Educational Experiences you carry out online?

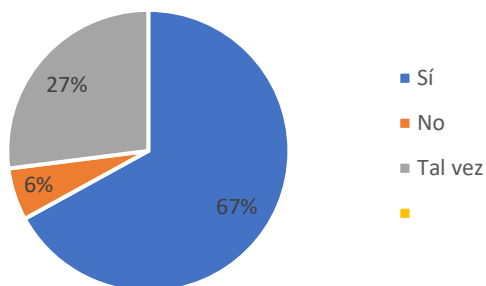


Graphic 3 Question Results 4

Source: Own elaboration

Currently, during their academic training, students have been developing and perfecting technological skills, which is why taking classes in this modality is not complicated for them, as shown in Graph 4; however, it should be noted that there is still a lack of culture at the time of intervening in a virtual class, considering delivery and participation times within the same.

Do you consider that you have the ability to use digital tools, conduct research work, carry out quality activities and use digital platforms to access virtual meetings?

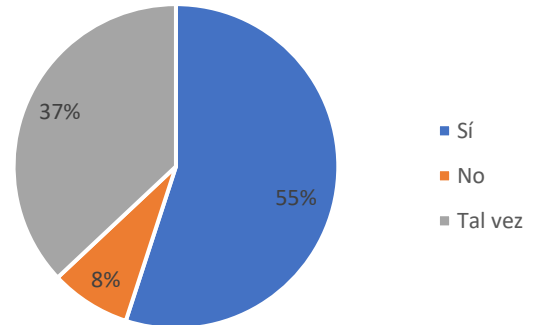


Graphic 4 Question Results 5

Source: Own elaboration

Within the Universidad Veracruzana, the EMINUS platform is available. On the other hand, 71.70% consider that the use of messaging tools such as WhatsApp, Line, Skype, Zoom, Teams, etc., support the teaching processes, as shown in Graph 6. support the teaching processes as shown in Graph 6.

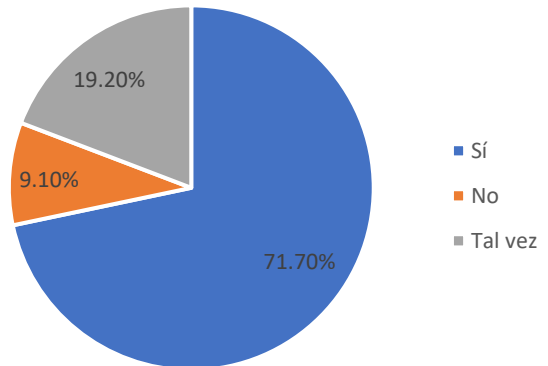
The Universidad Veracruzana has the EMINUS platform to promote education systems. Do you consider that the platform meets all the requirements for online education?



Graphic 5 Question Results 7

Source: Own elaboration

How do you consider the use of digital platforms (Skype, Zoom, Line, WhatsApp, Telegram, among others) has supported teaching processes?

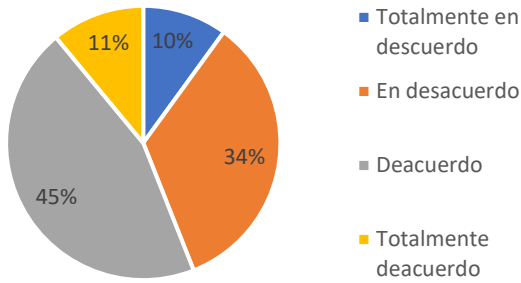


Graphic 6 Question Results 10

Source: Own elaboration

During the contingency, not only has it affected health, but also the psychological aspect by drastically changing the lifestyle not only of students and teachers but also of the population in general, as shown in Graph 7. It can be seen that 45% of the students have presented problems of anxiety, irritability and insomnia. Another aspect to consider is that confinement has increased household expenses by 42% when doing e-learning, as shown in Graph 8.

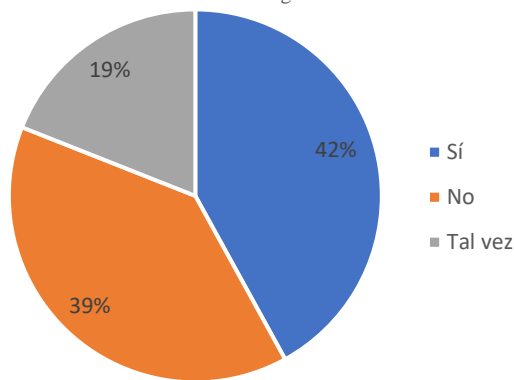
Has the quarantine confinement established by the health authorities affected health?



Graphic 7 Question Results 9

Source: Own elaboration

During the contingency, do you incur additional costs for e-learning?

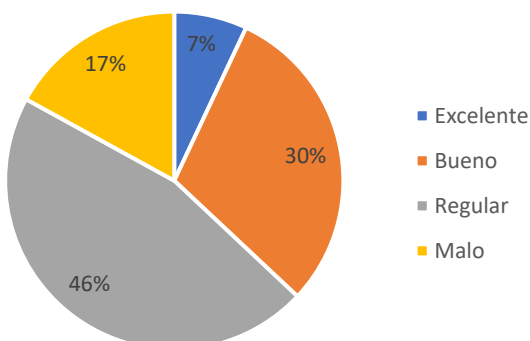


Graphic 8 Question Results 8

Source: Own elaboration

Derived from all the factors mentioned above, the question shown in Graph 9 was formulated, which reflects that students consider learning to be regular with 46% during the virtual modality. It is worth mentioning that according to the census, the submission of activities and student participation was 56% for students with regular participation, for students who submitted all activities it was 8% and with 36% for students who hardly ever submitted activities. As can be seen in Graph 10.

How do you consider the learning gained from the Educational Experiences you are taking during the virtual classes due to Covid-19?

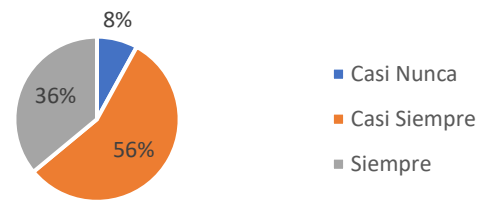


Graphic 9 Question Results 6

Source: Own elaboration

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How often did you send activities or participate in virtual forums and meetings within the activities proposed by the professors of the Universidad Veracruzana?

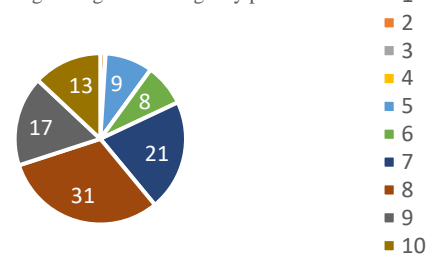


Graph 10. Question Results 3

Source: Own elaboration

According to the performance of the teachers, when teaching their classes in the virtual modality, the students of the Faculty of Mechanical and Electrical Engineering, position it with 31%, placing it with a score of 8, giving a result in a "Good" level as shown in Graph. 11, however, it is worth mentioning that there are still aspects to work on in order to achieve excellence.

How would you rate the performance of the Faculty of Mechanical and Electrical Engineering in virtual teaching during the contingency period?



Graphic 11 Question Results 11

Source: Own elaboration

Results

As can be seen in the analysis of the graphs, the Universidad Veracruzana has shown a Regular performance, however this category is not only the result of the performance of the teacher in a virtual classroom, several factors also influence the student, it is important to mention that not all communities have the infrastructure, not all students have access to technological devices to carry out their activities, Another important point is the commitment and responsibility on the part of the student to attend virtual meetings and comply with project deadlines, as well as the responsible use of electronic devices, because sometimes they are used as a distraction instead of as a support tool to access the information that is essential for their training.

## Conclusions

Although, as a teacher, it is important to have a mastery of ICT, and that given an epidemiological situation, which forced us into a confinement where most teachers were not prepared to face such challenges, and that today will be a new reality, where: conventional classes became obsolete, the duality of face-to-face classes and the virtual will be essential for the development of new skills and competencies, being aware of this, the Universidad Veracruzana developed a virtual training through the Academic Training Program (PROFA) [5]. In which, courses are offered by the University itself, which allows updating teachers covering areas such as: Design, Technology, Management and Awareness that contribute to the development of five competences: Communication, Self-learning, Planning, Research and Evaluation. On the other hand, it is also important to carry out training courses for students on how to use institutional platforms such as: EMINUS and the complementary ones Teams, Zoom... etc., with the aim of taking advantage of the tools and reinforcing the learning obtained.

On the other hand, it is worth mentioning that the application of these strategies does not guarantee that the objective of excellent teaching is achieved one hundred percent, because there are factors that exceed us as a public institution, although within the facilities of the Faculty of Mechanical and Electrical Engineering there is a computer lab and a wireless Wi-Fi network, however, many students do not have the resources to have a laptop or internet at home or in their community, just as they need to leave their home to work.

Our country, in spite of its richness in terms of culture, agriculture, livestock, etc., still has the problem of not having an electrical infrastructure and services that reach all communities, in addition to the fact that job opportunities are reduced.

On the other hand, it is important to raise awareness among students to create a culture of how to behave in virtual meetings, to learn to organise themselves and meet deadlines and probably avoid problems of insomnia, anxiety and stress when sending evidence.

The present work showed a reality that our teaching system cannot be 100% virtual, because not everyone has the digital tools, even with the money to pay the increased cost of services produced by being in online classes, however, a possible solution could be to implement a blended learning to ensure proper student-teacher interaction.

## References

- [1]Universidad Veracruzana (2017). Programa de Trabajo Estratégico (2017-2021). Recuperado de [www.uv.mx/informacion-estadistica/uv-en-numeros/](http://www.uv.mx/informacion-estadistica/uv-en-numeros/)
- García-Peñalvo, F. J., Corell, A., Abella-García, V., & Grande, M. (2020). La evaluación online en la educación superior en tiempos de la COVID-19. *Education in the Knowledge Society*, 21, 12. doi:10.14201/eks.23013.
- Lloyd, M. (2020).Desigualdades educativas y la brecha digital en tiempos de COVID-19.En H. Casanova Cardiel (Coord.), *Educación y pandemia: una visión académica* (pp. 115-121). Ciudad de México:Universidad Nacional Autónoma de México, Instituto de Investigaciones sobre la Universidad y la Educación.
- Fardoun, H., González-González, C. S., Collazos, C. A., & Yousef, M. (2020). Estudio exploratorio en Iberoamérica sobre procesos de enseñanza-aprendizaje y propuesta de evaluación en tiempos de pandemia. *Education in the Knowledge Society*, ISSN 2444-8729
- [5]Universidad Veracruzana (2020).Departamento de Formación Académica. Recuperado de <https://www.uv.mx/formacionacademica/oferta-veracruz/>
- Rivera, J. A. L., & Verdugo, A. A. G. (2021). Saberes digitales y educación superior. Retos curriculares para la inclusión de las TIC en procesos de enseñanza-aprendizaje. *Virtualidad, Educación y Ciencia*, 12(22), 9-21.

Espinosa, E. M. (2021). Calidad e innovación en la educación superior. Tres décadas de investigación en el Centro para la Calidad e Innovación de la Educación Superior de la Universidad de Guadalajara. *Higher Education and Society*, 33(1), 324-360.