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Artículos científicos

Atribuciones a la educación mediada por tecnología en universidades públicas mexicanas durante la pandemia

Ascriptions to Technology-enhanced Education in Mexican Public Universities During the Pandemics

Attributions to technology-mediated education in Mexican public universities during the pandemic

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Resumen

Durante la pandemia del covid-19, el trabajo en línea generó inconformidades e inquietudes en los distintos actores del sector educativo, lo que ocasionó que la Educación a Distancia (EaD) fuera considerada difícil y poco efectiva. Por eso, el objetivo de este estudio fenomenológico hermenéutico fue explorar las experiencias de alumnos de algunas universidades públicas en México. En concreto, se trató de dar respuesta a preguntas que se han generado respecto a esta transformación educativa para las distintas instancias sociales, la efectividad de las implementaciones pedagógicas llevadas a cabo y las consecuencias de las brechas existentes. Para ello, se efectuó la entrevista a una muestra de 5 alumnos de algunas universidades públicas en México. Las evidencias cualitativas recolectadas se analizaron utilizando la agrupación de la información por temas y códigos axiales con la ayuda del *software* Nvivo. Entre los hallazgos de la investigación se detectaron aspectos que complicaron la forma de trabajo relacionados con el uso de dispositivos electrónicos, conexión a internet, capacitación docente y recursos institucionales. Finalmente, se realizaron varias propuestas para mejorar la educación en la reinserción a la nueva normalidad postcovid-19. Desde la perspectiva de los alumnos universitarios, una opción considerada es la modalidad de aula invertida o *blended learning*. Para ello, las

instituciones educativas deberán enfocarse en capacitar a sus docentes en uso de tecnología y mejorar su infraestructura tecnológica.

Palabras clave: Tecnología educativa, educación a distancia, brecha digital.

Abstract

During the CoVID-19 pandemics, working online generated mostly negative opinions and concerns in different educational participants. Negative attributions were given to Distance Education (DE), considering it difficult and time-consuming. The objective of this phenomenological study was to explore students' experiences from some Mexican public universities. This study aimed at answering questions raised concerning this educational transformation for different participants, the effectiveness of the instructional implementations, and the consequences of the existent digital divide. A sample of 5 students from public Mexican universities was interviewed. The qualitative evidences were collected and analyzed using theming the data categorically and axial codes with Nvivo software. The findings are related to aspects that affected this situation as the use of electronic gadgets, internet connectivity, teachers' training, and institutional resources.

Finally, suggestions are made to improve education for the new normal lifestyle post CoVID-19. From higher education students' perspectives, *blended learning* and *flipped classroom* were suggested as options to continue education. Higher Education institutions will need to encourage the development of these skills to improve their efficiency in education and graduates' insertion into the job market.

Keywords: Instructional technology, distance education, digital divide.

Resumo

Durante a pandemia de covid-19, o trabalho online gerou divergências e inquietações nos diversos atores do setor educacional, o que fez com que a educação a distância (EaD) fosse considerada difícil e ineficaz. Portanto, o objetivo deste estudo fenomenológico hermenêutico foi explorar as experiências de estudantes de algumas universidades públicas do México. Especificamente, procurou-se responder às questões que foram geradas sobre essa transformação educacional para as diferentes instâncias sociais, a eficácia das implementações pedagógicas realizadas e as consequências das lacunas existentes. Para isso, foi realizada uma entrevista com uma amostra de 5 alunos de algumas universidades

públicas do México. As evidências qualitativas coletadas foram analisadas por meio do agrupamento de informações por temas e códigos axiais com o auxílio do software Nvivo. Entre os achados da pesquisa, foram detectados aspectos que dificultam a forma de trabalhar relacionados ao uso de dispositivos eletrônicos, conexão com a Internet, formação de professores e recursos institucionais. Por fim, foram feitas várias propostas para melhorar a educação na reintegração na nova normalidade pós-covid-19. Na perspectiva dos universitários, uma opção considerada é a sala de aula invertida ou modalidade de ensino híbrido. Para isso, as instituições de ensino devem focar na capacitação de seus professores no uso da tecnologia e na melhoria de sua infraestrutura tecnológica.

Palavras chave: Tecnologia educacional, educação a distância, exclusão digital.

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Introduction

Faced with the health emergency generated by the covid-19 pandemic, authorities of all countries recommended distance education (EaD) as an alternative to continue with teaching activities. Thus, it was assumed that schools and universities would be able to offer online courses and that students would adapt to this mode of learning from home. However, in many studies it has been reported that these actors were not really prepared for online education (Grätz and Lipps 2020, as cited in Emblemståg, 2021). This happened because the technical teams of the institutions could not offer support to all the teachers in such a short time (García Dobarganes, n. d.), which forced teachers to improvise teaching strategies, such as the delivery of tasks by mail and the use of learning groups in WhatsApp to teach classes. All this caused an experience with many negative attributions (García, 2017), and with an overload of work and stress (Hodges et al., March 27, 2020; Zaragoza-Vega and Gutiérrez-Pérez, 2019).

For the students, some limitations were the lack of suitable devices and a stable Internet connection. Likewise, it was common that they did not have self-regulation skills to work online, so it was difficult for them to adapt to this form of teaching, which had an impact on their motivation.

In the case of Higher Education institutions, especially those attached to the traditional model, they had to suspend activities, since they lacked trained personnel, technological infrastructure, and pre-existing courses for the use of ICT. On the contrary, the institutions that already had virtual programs or used the *blended learning* model, were

able to adapt better, since they had a technological and personal infrastructure for this purpose.

Regarding this new way of working, considering the efforts of teachers to take advantage of the available resources, Pedró (2020) indicates that this way of working during the pandemic can be called *coronateaching*. However, technological resources have been used as if they were still working in the classroom. Therefore, this hermeneutic phenomenological study aims to know how this educational transformation has been for students, as well as the effectiveness of pedagogical implementations and the consequences of possible existing gaps.

Method

Based on the situation presented, the following research questions arose, based on the perception of students from public universities in Mexico:

1. How have you perceived the effectiveness of this new modality in your learning process?
2. What conditions are related to a good result in the learning process in this new modality?
3. What changes must be made to improve the learning process in this new modality?

To answer these questions, the hermeneutic phenomenological qualitative design of exploratory scope was chosen. According to Creswell and Poth (2018), this aims to describe the essence of a phenomenon experienced by the participants. However, it should be noted that due to the isolation decreed by covid-19, the piloting of the instrument and the approach to the participants was a challenge.

Even so, this research project was presented in the call for the Inter-institutional Program for the Strengthening of Research and the Pacific Postgraduate Program 2021 — known as the Dolphin Program— of the Autonomous University of Nayarit, Mexico. Four students who participated in the virtual stay of the XXVI Summer of Scientific and Technological Research of the Pacific responded to this call. These students—from the Benito Juárez Autonomous University of Oaxaca, the Autonomous University of Guerrero, and the Meritorious Autonomous University of Puebla—received training in scientific research and participated in the piloting stages of the interview and the collection of qualitative evidence. Since the students were in contact with college students, it was

decided to use a non-probabilistic convenience sample made up of 5 students from different areas of knowledge from the universities of origin. In this regard, Creswell and Poth (2018) mention that the sample in a hermeneutic phenomenological study comprises individuals who experienced the same phenomenon, and can have a size of 4 to 15 participants. In this case, due to the restrictions that existed at that time, it was decided to use this type of sample.

To design of the interview, the main investigator considered the variables found in the literature review related to technology-mediated learning. Specifically, the variables were the instructional design of the classes, teacher training, teacher-student interaction, institutional conditions, student characteristics, socioeconomic conditions, and disposition or attitude towards this modality. These served as the basis for the construction of the descriptive codes used in the analysis of the qualitative evidence, which was completed with a free version of the Nvivo program.

Within the activities of the scientific summer, the students received prior training on the process of developing qualitative instruments, the collection of qualitative data and their analysis. The interview was piloted with the students participating in the virtual research stay to make the pertinent modifications. The final interview (see annex) consists of 26 questions focused on what was experienced before and during the contingency. Likewise, questions were added about what education should be like after the pandemic.

The interviews were conducted using technologies for video sessions, which were recorded and transcribed to be analyzed as follows: first, the information was grouped by topic, which is appropriate for phenomenological studies when it comes to exploring beliefs, constructs, and emotional experiences (Saldana, 2021). Once the information was grouped, axial codes were used to combine the information and identify possible relationships or interactions between the information (Cohen *et al.*, 2018).

Results

Benito Juárez Autonomous University of Oaxaca

Students from different semesters of nursing and obstetrics degrees participated from this university; educational sciences; Psychology of the education; administration and accounting. The adaptation to virtuality was perceived in different ways. Mostly like a

strange and difficult process that they weren't used to. Of the students interviewed, only one found it easier to work from home.

Regarding technology skills, they considered that they were good for those who already had some previous experience, which simplified their adaptation. In this regard, it was detected that both students and teachers had connection problems and did not know how to solve them.

Likewise, they detected inconveniences that teachers had in the use of technological resources. Even so, the students considered that the communication with the teachers was good and they responded to their concerns. Only one of them perceived that doubts were only resolved through the computer.

The emotions experienced were apathy towards the classes taught in this way and sadness for not being able to put into practice what was learned in class. This comment occurred mainly in students who, due to the nature of their studies, needed to have face-to-face activities. The contents of the course were transmitted to them mainly with guides and advice, but they considered that they had not been significant.

Regarding the knowledge obtained, there are several discrepancies. While some consider that their learning increased, for others it decreased due to the lack of practice. It was observed that a student thought that his learning had been incomplete, since he considered that the teacher should be the guide and the one who would corroborate if what he had learned was correct. Derived from the forms of work in class, the evaluations focused on the theoretical part of the activities.

Regarding the use of the library, the institution does not have a digital one, so they have not had this resource to consult materials. In fact, they have only worked with manuals from other institutions. Furthermore, only one student mentioned that he had used academic journal articles.

The students agreed that they would not like to continue taking virtual classes due to the difficulties they experienced and the need to socialize with teachers and peers. Regarding the return to face-to-face classes, most of them thought that it would be pertinent to work in a mixed way.

On the other hand, it stands out that this way of working had a negative effect on motivation. While it was nice at first to work from home, the hassles getting online and social distancing dampened interest in studying. Therefore, one of the suggestions was to increase student participation in the video sessions.

Autonomous University of Guerrero

Students with degrees in education sciences, economics, food sciences and nutrition participated in this university. For them, the adaptation to virtuality was complicated because they had never had any online courses and they did not know how to use the computer very well. They expressed having received no training or only brief instructions, so they had to learn on their own.

On the other hand, the teachers were supportive, since they were aware that not everyone had internet or electricity at home. The communication was given by WhatsApp, video calls or email, in addition to some Google applications. Something they observed was the lack of fixed hours to work, since some messages or tasks were received late at night.

Regarding the knowledge obtained through this modality, some consider that they have not learned anything, while others believe that they did because they had more time to consult online. They also noted that they spent a lot of time doing homework and attending online conferences. The feelings expressed were stress and frustration at feeling alone, without support or motivation. However, despite those initial feelings, they had more time to organize. They also mentioned the economic savings that this modality represented in terms of transportation and food expenses.

Regarding the return to face-to-face, they are mainly motivated by coexistence and teamwork. One suggestion they made was greater teacher training to work online and encourage participation and dynamism in class, as well as the use of technological tools to increase cognition.

Meritorious Autonomous University of Puebla

The sample from this university was made up of students from various semesters of bachelor's degrees in tourism, business administration, history, social anthropology, and educational processes. They were selected because they were considered to be familiar with social problems.

The adaptation to virtuality was considered stressful and confusing due to the lack of knowledge about the use of digital tools, as well as the pace of work and the saturation of tasks. The adaptation, therefore, was more favorable for those who already had some experience in the modality. The main means of communication was email, social networks and applications such as Zoom or Meet, which caused discomfort, since they had to use a camera. This exposure was perceived by some as an invasion of their personal space. The

weather conditions and the lack of adequate connection were the reasons for students to constantly go in and out of the meetings, and to avoid participation.

They expressed that they had not received formal training, although the institution's library had previously offered courses on the use of digital platforms. In addition to the aforementioned connection problems, the equipment to connect was mostly shared with other family members. Although at first this form of work was considered a form to rest and to save in terms of transfers, this caused an imbalance of activities, stress, anxiety, and differences with family members. Some students suffered the loss of family members, unemployment of one of the parents, or even emotional or health problems. All this was a reason to put a pause in his academic activities. Likewise, all these situations made it difficult to have an adequate environment, or emotional state to concentrate. Consequently, with this modality they did not see a significant increase in their knowledge.

Regarding the forms of evaluation, the activities were reduced to reading, attending video sessions and completing rubrics. With this occupying most of the time, the processes of reflection, discussion and development of critical thinking were left aside. In addition, rest time was affected.

Regarding the online classes, they were limited to presentations in which there was no greater interaction. One advantage they found was the opportunity to take courses or do virtual stays (academic or research) in other countries or states, thereby improving their curricular training. Although they did not feel motivated to continue working in this way, they considered that returning to face-to-face could pose a risk, so they expressed openness to the mixed option.

Discussion

This research project sought to determine the effectiveness of online education during the pandemic. Derived from the information obtained, it can be noted that the success or failure of this modality was conditioned by the resources that the students had, the way their teachers worked and the personal situations they were experiencing at the time. In general, the participants recommended the design of more dynamic activities that encourage practice and critical and reflective learning.

In this sense, Moreira et al. (2017) point out that many institutions have tried to diversify their modalities, although without modifying their educational practices. It must be clear, therefore, that working online is not about simply transposing face-to-face

practices to virtual environments. This practice implies making changes based on research that integrates the emerging models that characterize Distance Education (DE). Likewise, the attitude of the teacher and the institution with respect to this way of delivery conditions the strategy with which this form of teaching will be addressed.

On the other hand, some institutions expressed mistrust requesting evidence of work, which increased the workload and stress for teachers. This request was perhaps due to the idea that working from home is not effective, as well as the attachment to traditional ways.

In the midst of this situation, the role of school libraries was also modified, since they could not offer physical materials to students nor could they visit them. For this reason, it was necessary to provide reliable and quality digital materials so that students could access them from their cell phones, since it is the most widely used device. In the words of Pierce (May 14, 2020), the library has ceased to be a building to become a virtual space for the search for information and ideas. However, the evidence showed that some institutions lacked the support of this kind of infrastructure.

Kumar and Dawson (2018) argue that when teachers without prior training or experience in remote work participate in this type of programs, they generally receive negative evaluations from students. For this reason, these authors suggest that teachers without experience in this modality receive training that helps them develop several skills. These skills are critical thinking development, the writing of instructional speeches, and the design of activities to develop the academic and professional objectives of the course.

Likewise, it should be noted that in DE it is important that the student has interest and motivation to succeed in this form of instruction. In addition, the attitude or concept that the teacher has will influence the way in which it works and the way in which the student will perceive it. Both students and teachers experienced difficulties adapting to working from home because this modality demands a greater commitment. Cabero and Barroso (2015) mention that online students must have the following characteristics: a) self-learning capacity, b) self-discipline, c) autonomy, d) self-regulation of time, e) preference for individual work, f) good written expression, g) ability and experience in the use of ICT, h) the need for specific training, and i) an active role in their learning.

In recent years, there has been a movement called slow, which emphasizes that daily activities must be carried out slowly and focused, which —according to Honoré (2004/2019)— increases reflection and concentration. In this sense, Berg and Seeber (2013)

agree that having time for reflection and analysis is a fundamental element for learning. However, the social and emotional situation experienced during the contingency did not allow both students and teachers to have the time and emotional stability for teaching and learning.

For distance learning to be successful, it is essential to develop self-regulation strategies to take responsibility for improving academic performance. Self-regulation is the ability to recognize emotions, thoughts, and behaviors in order to control them and achieve a goal (Kayaalp et al., 2022). This can be fostered by motivating students to reflect on their learning process and the reasons for learning, as well as by teaching them the strategic actions necessary to achieve the desired objective. In short, self-regulation allows the recognition and control of emotions to focus and control behavior. (Mazlumoglu & Samanci, 2021).

However, to achieve self-regulated learning, four stages must be considered: task definition, goal setting, commitment to learning, and adaptation of strategies (Berridi & Martínez, 2017). As satisfaction with academic achievement increases, motivation increases. Students who have not developed self-regulation strategies have less success in the distance context, so they will tend to drop out. In addition to this, the distance student must have greater cognitive capacity, specific knowledge, learning strategies, better management of affective factors, goal setting, and greater motivation to learn.

In addition to the above, it should be taken into account that personality can affect preferences in terms of forms of instruction (Bhagat et al., 2019), since it has been found that introverted people prefer asynchronous education. In addition, it has been observed that students of a certain sociodemographic, cognitive and emotional level, and who have certain technological skills are more successful in distance contexts.

Although the quality of distance education has been questioned, it should be noted that this depends on the characteristics of the instructional design implemented, and the specific teacher training for this context is essential. In other words, the pedagogical design is a determinant of the number of students who complete a course.

In the virtual context, of course, the student's attitude must be active to become a lifelong learner (Firat, 2016). However, the student of traditional programs is accustomed to the presence and guidance of the teacher, which is why he becomes dependent on him and on his classmates. On the other hand, in DE it is important that the student is autonomous and has the capacity for critical reflection, decision-making, and

independence. In addition, he must develop time management skills and concentration in his studies (Kara et al., 2019).

The uncertainty of the context in the pandemic was another factor that affected the understanding of the study materials and the desire to carry out the tasks. In addition, they experienced negative feelings having changed the ways of communication with classmates and teachers. Indeed, the educational transformation during the pandemic has been profound, which is why training in educational technology has been given greater importance. However, the more traditional institutions have been affected by the lack of technological infrastructure and trained personnel. Globally, the gaps have been more evident and in the near future the educational and economic difference will also be more evident. This situation has resulted in a school year with deficiencies in the quality of education provided and limited access to it.

Teachers, for their part, have had negative experiences with the online work that occurred in this emergency situation. They experienced fatigue with meetings on Zoom or Google Meet, complications to digitize their materials, dissatisfaction with the online forms of communication with students, and the need for interaction in the classroom (Lang, May 18, 2020). With the aim of offering support to teachers, the Universitat Oberta de Catalunya implemented the “Emergency remote teaching” program to help them adapt to remote teaching. With this initiative, they identified two needs of teachers: first, there is a lot of information about online teaching, so it is difficult to select the most relevant. The second need detected was that most of the webinars for online teaching training are in English, a language that few Spanish-speaking teachers are fluent in (Xarles & Martínez, 2020). As a result, the existing inequalities in terms of access to education and technology increased, which has generated gaps that can hardly be shortened.

Similarly, many students expressed the desire to be in the classroom. Most of the complaints were related to the lack of habit to this way of working. In general, students who choose the face-to-face modality do so because they want to live this experience and because it adapts to their personality and educational needs. Therefore, even if the conditions to eliminate the gap and disparity are improved, these students will not be satisfied with online teaching, since it demands a greater mental effort and offers few opportunities to socialize.

In the case of teachers, they had to adapt in a hurry, since they were not familiar with digital tools and tried to replicate the work activities of the face-to-face modality. For

Simonson (2019), "the instructional design process is essential to provide efficient instruction in distance education" (p. 1). However, during the contingency the practice was used without knowing the theoretical foundation. In other words, the technological medium was only a transmission vehicle for the same contents that were used in face-to-face teaching.

The results of the quality of education in this context would have been different if it had been possible to have a prior action plan that contemplated the use of mobile applications (Pedró, 2020). In addition, two things were not noticed either: first, not all students and teachers (especially from marginalized areas and with fewer resources) had these technologies; and then, both teachers and students who did have access to mobile phones most of the time underutilized them.

Now, the new post-pandemic economy will demand that more people work from home and that more commerce be carried out electronically. This reality will require trained personnel to meet the needs of new job positions (Oppenheimer, June 28, 2020), which must have greater self-efficacy and intrinsic motivation, characteristics that allow the development of the ability to learn to learn (González-Benito et al., 2021).

Finally, one of the recommendations of the students as an alternative to face-to-face classes was *blended learning* or *flipped classroom*. According to Emblemavåg (2021), students who attend hybrid courses have greater learning, satisfaction, and cognitive presence. This is a flexible and dynamic model, whose effectiveness and success depends on the management capacity of the student (Bartolomé-Pina et al., 2018), who requires autonomy to carry out the practices and searches of the course. In addition, these models allow you to study at your own pace, choose the type of learning material, communicate online with the teacher and classmates, and at the same time attend classes (Eggers *et al.*, 2021).

Conclusions

The pandemic situation generated changes and dissatisfaction that were also perceived in the DE, which was described as difficult, confusing and time-consuming. However, it is important to clarify that what was done during the first months of the contingency was actually an emergent and improvised use of technology in an extraordinary situation, which caused many students and teachers to form a negative

perception of this modality. In short, both students and teachers lacked experience in this way of working, so they had to find strategies to adapt.

However, to be successful in the context of DE, the student not only needs technological skills, but also assertive and collaborative communication, openness to collaboration and motivation to learn, characteristics that will allow him to manage his time dedicated to studying. Among the technological skills, in addition to knowing how to manage the educational platform, they must know the sites to find materials, communicate, and download resources. Assertive communication refers to reading and understanding messages. It is also recommended to develop motivation to learn, cognitive, metacognitive, and resource regulation strategies. In short, it can be affirmed that the effectiveness in the way of working during the pandemic was directly conditioned by the level of development of self-regulation skills and personal characteristics of the student.

Future lines of research

Derived from the conclusions of this research, future lines of research are opened to deepen the subject:

1. Teacher training needs in instructional design with technology.
2. Need to change organizational structures in educational institutions for DE.
3. Increase of online library resources.
4. Strategies for the development of soft skills, autonomy, and emotional intelligence in students.
5. Adaptation to the use of *blended learning* models.

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Annex

Introduction/presentation

I am _____, student of _____ university and I am participating in the Inter-Institutional Program for the Strengthening of Research and the Pacific Postgraduate Program 2021 —known as the Dolphin Program. I am participating in a research project on students' perception towards the use of technology during the pandemic.

Your participation is voluntary and the information will be anonymous and confidential. Answering the interview will take 15 minutes maximum. The information provided is confidential and will not affect your privacy or academic performance.

Before:

1. Before the contingency, did you have any experience as an online student?
2. How was your experience and how long did it last?
3. How did you consider your ability to work with technology before working online?

During:

4. Did your institution provide any training to use technology during the contingency?
5. How did you perceive activities, resources and assessment during the contingency?
6. How supportive were your teachers?
7. How do you consider the use that the teachers gave to the technological resources?
8. Do you consider that the teachers' activities have enhanced teamwork and communication?
9. How would you describe the communication with your teachers?

10. How would you describe the communication with your peers?
11. Does your institution have technological resources as platforms or on online library resources?
12. How have these resources been used?
13. How did you adapt to this modality in the beginning?
14. How do you feel more comfortable working? On your own or working in teams?
15. Do you have an appropriate space for working?
16. Do you have the technological devices to do your activities? Which one?
17. Do you hve internet connection? From home, cellphone?
18. Do you consider that you use more or less time to study in this modality?
19. Do you consider that your learning has increased or decreased in this modality?
20. How do you consider your abilities to work in this modality?
21. How motivated do you feel to work in this modality?
22. How have you reorganized your lifestyle to work in this modality?
23. How would you describe your emotional experience working in this modality?
24. How supportive have your parents been?

After:

25. Would you like to continue working in this modality? Why?
26. What would you suggest to improve your experience working in this modality?

Demographic data:

University:

Faculty:

Bachelor Degree:

Semester: