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ORIGINAL ARTICLE

Opportunities for the development of medical education with the use of technologies. Lessons from the pandemic

Oportunidades para el desarrollo de educación médica con uso de tecnologías. Enseñanzas de la pandemia

Oportunidades para o desenvolvimento da educação médica com o uso de tecnologias. Lições da pandemia

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ABSTRACT. The objective was to describe the conditions in which the classes were held once the confinement for non-essential activities was declared. A descriptive, cross-sectional methodology was used with a hermeneutic approach. A questionnaire was applied to a sample of 357 members of the Health Sciences student body of the Universidad Juárez Autónoma de Tabasco, Mexico, in May 2020. Semi-structured interviews were also conducted. In the results, it was identified that the student body had an Internet connection (87.1%), smartphones (82.5%), and a laptop (75.8%). The student body's activities were elaborating slides for presentations in class (78.8%) and reading in their textbooks (67.5%). The activities of the teaching staff were to comment at the end of the presentations (58.9%), and they requested the search for information for the elaboration of texts (61.8%). The student body mentioned that their stress levels increased (52.7%), and the tasks became more challenging to do (45.2%). The migration to virtual environments was not accompanied by changes in the structure of school activities, so it is most likely that when returning to face-to-face learning, the traditional class will be maintained.

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PALABRAS CLAVE

aula virtual, confinamiento, desarrollo de proyectos, gestión de recursos, sistema de gestión de aprendizaje.

RESUMEN. El objetivo fue describir las condiciones en que se desarrollaron las clases una vez que se declaró el confinamiento para actividades no esenciales. Se utilizó una metodología descriptiva, transversal, con enfoque hermenéutico. Se aplicó un cuestionario a una muestra de 357 integrantes del estudiantado de Ciencias de la Salud de la Universidad Juárez Autónoma de Tabasco, México en mayo de 2020. También se realizaron entrevistas semiestructuradas. En los resultados se identificó que el estudiantado contaba con conexión a internet (87.1%), teléfonos inteligentes (82.5%), computadora portátil (75.8%). Las actividades del estudiantado fueron la elaboración de diapositivas para exposiciones en clase (78.8%), lecturas en sus libros de texto (67.5%). Las actividades del profesorado fueron comentar al final de las exposiciones (58.9%), solicitaron la búsqueda de información para la elaboración de textos (61.8%). El estudiantado mencionó que aumentaron sus niveles de estrés (52.7%) y las tareas se hicieron más difíciles de hacer (45.2%). La migración a ambientes virtuales no se acompañó de modificaciones en la estructura de las actividades escolares, por lo que lo más probable es que al regresar a lo presencial se mantenga la clase tradicional.

PALAVRAS-CHAVE

aula virtual, confinamiento, desenvolvimento de projetos, gestão de recursos, sistema de gestão de aprendizagem.

RESUMO. O objetivo é descrever as condições em que se desenvolver as classes uma vez que se declare o confinamento para atividades não essenciais. Se utiliza uma metodologia descritiva, transversal, com enfoque hermenêutico. Se aplica um questionário a uma mestra de 357 integrantes da estudantada de Ciências da Salude da Universidade Juárez Autónoma de Tabasco, México em maio de 2020. Também se realiza entrevistas semiestruturadas. Os resultados identificaram que o estudante contava com conexão à internet (87,1%), telefones inteligentes (82,5%), computador portátil (75,8%). As atividades do estudo foram realizadas com a elaboração de diapositivos para exposições em classe (78,8%), palestras em seus livros de texto (67,5%). As actividades del profesorado fueron comentar al final de las exposiciones (58,9%), solicitar a búsqueda de información para la elaboración de textos (61,8%). O estudiantado mencionou que o aumento dos níveis de estrés (52,7%) e as tarefas são mais difíceis de fazer (45,2%). A migração a ambientes virtuais não se acompanhada de modificações na estrutura de atividades escolares, por lo que lo mais provável es que al regressar a o presencial se mantenha la classe tradicional.

1. INTRODUCTION

In 2020, an unusual event occurred that was why many human activities were disrupted to minimize the impact that the covid-19 pandemic would have on the world, given its high transmissibility. From the beginning, it was assumed that it would significantly affect the populations of countries with more significant economic imbalances, such as Mexico. There is a high rate of non-communicable diseases (ENT) associated with nutrition (Instituto Nacional de Salud Pública INSP, 2020), an impoverished public health system, and the reason the country is in a global crisis of poverty and poverty extreme that lasts for 40 years (Consejo Nacional de Evaluación de la Política de Desarrollo Social CONEVAL, 2020).

Few are the opportunities, and the permissible is designed with a series of arguments and prohibitions that, to maintain a minimum social distance and primary hygiene conditions in the face of emergencies, the result of the imposition of neoliberalism in a society that in addition suffers the effects of colonialist and patriarchal ideologyl (De Souza, 2020).

Few are the opportunities, and the permissible is designed with a series of arguments and prohibitions that, to maintain a minimum social distance and primary hygiene conditions in the face of emergencies, the result of the imposition of neoliberalism in a society that in addition suffers the effects of colonialist and patriarchal ideology (Irby et al., 2010). The model comprises two disjointed blocks: the basic, where morphological asignaturas and some sciences are taught. It starts from the premise that it is necessary to learn them to understand the clinic block. For example, "to fully learn nutrition," it is essential first to study "biochemistry, molecular biology, and

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physiology" (Franco and del Carmen, 2001). But this social representation is not sustained. Usually, in traditional schools, the questions of higher education teachers are typically about the speed of forgetting the contents of the first courses (Rodríguez, 2014; Torres et al, 2011).

In the school cycle from February 2020 to August 2020, students and teachers attended the traditional classroom to develop the courses programmed in 20 weeks. The assignment programs were organized into units and themes, and the student was asked to carry out learning activities centered on expositions, debates, and essays. The evaluation was through the written exam. These activities are "traditional rituals of the ankylosed school," which must have been overcome in the context of the XXI century (Díaz, 2020).

In March of this same year, the Autonomous Juárez University of Tabasco responded to the indications of the government of the State of Tabasco to suspend the classroom classes from the 17th. A statement was issued through notices on the website of the University, radio, television, and WhatsApp group that the administration organized to inform about the suspension of administrative and academic activities in person and on the 23rd start of confinement. The Unidad de Ciencias de la Salud de la Universidad had a virtual classroom (AV) implemented in the Chamilo learning management system (LMS), which had not enrolled many teachers, and it was decided that the courses would continue there. In the training hub for the student, there was also a tutorial designed by the institution and published on the website.

To address the University's problem, collaboration links were formed with Microsoft Mexico, and the LMS Microsoft Teams (MT) was implemented, such as "AV UJAT," which was canceled in Chamilo para Ciencias de la Salud. Furthermore, to train the teacher, the course "Collaboration, evaluation, and inverted learning classes through the MT platform" was invited in six modules: 1. Creation and management of class groups or independent work teams, 2. Result of activities and management of resources, 3. Creation of multimedia resources, 4. Evaluation and acquisition of information, 5. Remote communication, distribution of multimedia content, 6. Automatic administration of tasks and development of projects.

At the beginning of the pandemic, the universities decided to migrate the development of online classes. Many had technological platforms, but the transit of courses with the support of new technologies was very little. Thus, face-to-face classes were transferred based on conferences to video conferences (Giraldo et al., 2021; Vázquez et al., 2021). The traditional curricular structure based on the blocks, the basic sciences, and the clinics hinders the puesta in march of using the technologies in the classroom. Using software where experimental situations are simulated has the limitation that the student has computing equipment or smartphones with internet connection as a whole (Flores, 2021). Techniques such as the inverted classroom are not used because the routine of expositions in class is maintained (Muñoz & Maldonado, 2021).

In this context, the main objective of this investigation is to describe the conditions in which the classes were developed once the confinement for non-essential activities and particular purposes was declared 1) the resources with which the student was counted, 2) the type of activity carried out on platforms, 3) taking advantage of areas of opportunity perceived by the student regarding migration from face-to-face to virtual.

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2. METHOD AND MATERIALS

Studio type. It is a descriptive and cross-sectional cohort investigation. The study universe was a student body of 5082 members enrolled in the UJAT Health Sciences Campus in May 2020. A simple random sample was held, which consisted of creating a data table in Microsoft Excel with the study population, Each participant was assigned a value to randomly select the observation units to reach the representative sample (Hernández et al., 2014). If I use a confidence level of 95% and an error margin of 5%. A sample of 357 members was obtained.

Processing and data analysis was carried out using version 21.0 of the IBM Statistics Package for the Social Sciences (Chicago, IL, USA). The reliability was evaluated through the calculation of Kuder-Richardson 20, tables of frequencies were obtained for the set of variables.

Data collection instruments. A questionnaire of 20 reagents was prepared. This was validated through the evaluation of other teachers, piloted with 30 students. The final version was of three questions. A reliability of 0.77 was obtained using the Kuder-Richardson 20. Once the definitive version of the questionnaire was configured in the Google "Forms" application, students were invited who, in May 2020, were enrolled in the classes of the teaching staff members to answer the questions. The student who attended the request was from the second to the fifth semester.

If they had semi-structured interviews with guided questions for which a group of students was invited, they agreed to participate. The answers were reviewed, and the questions of the first instrument were considered. They only attended if they were written down with a code from A1 to A8 so that their data remained anonymous. They only attended if they were written down with a code from A1 to A8 so that their data remained anonymous.

Ethical considerations. To guarantee confidentiality, each questionnaire was anonymized. The study complied with the Declaration of Helsinki of the World Medical Association. It adhered to the provisions of the regulation of the General Law of Health in Materia de Investigación para la Salud de México. Once the investigation was classified as "no risk", each participant was asked for their written consent. Each one was informed about the objectives of this study and the possibility of not responding to the questionnaire.

3. RESULTS

Resources con que contaba el estudiantado

When starting the confinement, the central part of the student body had computer equipment, smartphones, and internet access in its homes. However, only four out of five had a portable computer to access classes and carry out tasks, and even 82.5% had a smartphone. Since the types were promoted in a way that the student was synchronously on the platform, the smartphone was not used that could have facilitated the work online, as well as the searches on the network. This access was incomplete as, before the confinement, 10% of the students had access to the Internet in their homes, and it was usually available on the campus free of charge. However, they could only connect in half-hour sessions, and once cerrado el campus and in sus casa, this resource is now available (Table 1).

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In this aspect, one participant expressed:

"On the part of the teachers, not all of them presented support, for the majority, in a principle they understood the difficulties that existed, but they became intolerant of lost telephone numbers, blackouts of electricity, internet, among others, which I affect to those students who sometimes could not count on such services. In my case, I was connected by cell phone, computer, and internet, but I had many resources (A9)."

Type of principal activity on the platform. When transiting classes online on the platform in small rooms (breakout rooms) in the hub, the ways of carrying out the courses are modified. The students replied that they maintained many universities' expository classes and daily practice (Amezcua et al., 2021). The exhibitions were primarily based on the wide range of usual themes and where, in groups of five or six, they corresponded to the class.

For the same reason, the students had the search for information to make the necessary slides for their exhibition as their primary activity. In the end, the professor members added some missing details. They did not receive advice to prepare their slides, and they copied and got the information without corroborating that this was a good place. Similarly, the qualifications were assigned mainly through the application of exams if the presentations of themes were part of the partial qualifications (Table 1).

About the development of academic activities dijeron:

Some professors showed their support with the academic course, my experience with them was good in their majority, some gave their classes, even though how we worked was through expositions (A1) and some professors chose that the course or they used clinical cases to make more dynamics. Still, they only lasted a little time (A2). There is not much difference regarding how the face-to-face classes were imparted to the virtual ones and that, in both cases, slides were presented. I consider that it was better in virtual and that we didn't have to rent a video projector, bring our laptop a la escuela, or lack internet in the classroom. Also, if I missed some assignments practices and I had to wait a year more to be able to register for the scientific summer (A10).

Table 1

Resources and actions

Question	Most Frequent Answers	f(%)
1. How did they find out that the courses would be online in their entirety	On the advice of your teachers	284 (76.3)
	By communications from the administration	219 (58.9)
	By comments from your compañeros	135 (36.3)
2. Resources with which the student counts	Internet connection	324 (87.1)
	smart phone	307 (82.5)
	laptop computer	282 (75.8)
3. Information management in classes	Teacher video conferences	248 (59.9)

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	Student exhibitions	223 (61.2)
	Discussion of topics	188 (50.5)
4. Tasks to do at home	Make slides to expose	293 (78.8)
	Readings in text books	251 (67.5)
5. Where they mainly found their information searches	Copy of your text books	294 (79)
	Buscaron en Google Scholar	239 (64.2)
	Search on Google	141 (37.9)
6. Activities of the teacher in the development of classes	They commented at the end of the presentations of the students	219 (58.9)
	Requested information search for writing texts	230 (61.8)
	They made an initial presentation of the theme	178 (47.8)
	They commented at the end of the presentations of the students	
7. Requirements that the professor established for the articles that were revised in classes	Nobody	242 (65.1)
	Search in the Cochrane library	17 (4.6)
8. Ways to evaluate the activities by the teacher	Presentation of themes with slides	307 (82.5)
	Through online exams	275 (73.9)
	Elaboration of writings that their professors call "essayos"	196 (52.7)

Source: own elaboration with data and results obtained

Perceptions of the student. When transitioning from face-to-face to virtual, the alumnado felt an increase in their stress levels. They resulted in high levels of stress for the mitad of the student. A perception was confused by the indications online because suitable channels were not considered forums for help or questions from the student. Later, the student adapted to the presentations and tasks online, the beginning of which was more complex (Table 2).

> My school life before the confinement was more organized and productive; I got up early to bathe and prepare some breakfast to take to classes; in my free time, I could go to the library to complete tasks, or I could get into practice in the simulation laboratory. But unfortunately, the pandemic in my surroundings occurred around a week before the Holy Week holidays. I had said that we would return after these, but it all widened; we studied without classes until, little by little, we were implementing the virtual classes (A3).

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Before the pandemic, my school life was surrounded by a certain amount of stress, but with a wide variety of ways to channel that stress, especially in the company of my friends. However, when the pandemic arrived in our state, businesses started to close more quickly, when there were no people in the streets, and there was more time free A4).

I believe that one of the main challenges is that the form of presentation of information and exhibitions is sometimes complicated, and over all the pandemic affected with my income and that I feel that my productivity as an alumna has decreased" (A5).

Before the confinement, my school life was better personally; I prefer the social interaction that the middle school could offer. When the pandemic started, everyone was surprised. Nadie was prepared for a situation like that in the beginning. It did not seem to have any noticeable social changes A8).

Table 2. Perceptions of online courses

Question	Most Frequent Answers	f(%)
9. Ideas about the courses	Result in high levels of stress	196 (52.7)
	The classes were hicieron very confused, there were no spaces to ask questions	160 (43)
	For the confinement the tasks were more difficult	168 (45.2)
10. Aspects of the pandemic reviewed in the classes	The conditions of the health system	242 (65.1)
	The infection prevention processes	179 (48.1)
	The consequences of the pandemic in society	120 (32.3)
11. Individual study opportunities about the pandemic	Review scientific information and data independently	187 (50.3)
	Study the social determinants of health	206 (55.4)
	The pathogenesis of the viruses	134 (36)
12. Individual characteristics of students considered to be at risk for their health	overweight	126 (33.9)
	hypertension	49 (13.2)
	Diabetes	44 (11.8)
13. Qualification of students for their online courses	Of regular quality	182 (48.9)
	good in general	86 (23.1)
	bad	34 (9.1)
	mallets	48 (12.9)

Source: own elaboration with data and results obtained

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4. DISCUSSION

During the pandemic, I clarified that all undergraduate courses could be transferred to a virtual form. Canonical courses such as anatomy in the requirement of cadaver dissections dictate a tradition extending to the XVII century. There are software programs in support of the student where it is possible to study morphology in virtual environments in three dimensions, such as the Visible Body, Body Map, VH Dissector platforms, and others that allow the visualization of the details of specific patients, before surgery. In addition, there are platforms for the visualization of histological sections and simulation of pharmacology experiments in animals, which reduce costs through microscopes and microtomes, among others. This puts into perspective the possibility that inter-university academic activities of all kinds can be carried out.

Similarly, the congresses could plan and carry out the cable online, which allowed many participants to take their ponencias outside their cities without the obstacle of the lack of resources to travel. In this way, the assistance of students at universities could be motivated to courses that were not available on their campuses with the inclusion of these in the curriculum.

There was a need to reduce the number of credit hours from the maximum to the minimum so that the student could access better practices of location, discrimination, and application of the information in specific situations planned for their management in the classroom (Díaz, 2019) for the application of knowledge available on the web to problem situations similar to those of real life, both ambiguous (Mendoza et al., 2012) and situated (Muñoz, 2012).

Given the complexity of the health field, school work is necessary based on the resolution of clinically structured questions (Muñoz et al., 2020) , identification of problems by searching for information sources, and different disciplines (Muñoz & Maldonado, 2011).

To achieve the usability of the technologies by the professor, there would also be a lack of management of the tools available in the LMS, such as Sway, Flipgried, Kahoot, and Soundcloud, among the many with free access. However, these desirable scenarios are not presented.

Problems related to accessibility. Due to the covid-19 pandemic in 2020, it is necessary to transfer all activities, teaching and administrative, to an online system. If the administration would tend to maintain its functions, it would also have to have plans to depart from the traditional. It is not the case that there was no lapse in defining necessary modifications, probably because these modifications were not considered necessary (Díaz, 2020).

If the students attended their classes, there were difficulties in accessing them, both because of problems with electricity cuts and the same platform, the availability of high-quality internet service because in the places where they live it is less likely than in the urban area. Tabasco has on average, between urban and rural areas, a percentage of users of 69.1% of the population (Instituto Nacional de Estadística y Geografía INEGI, 2021).

This was also present at the main Universidad de México, La Autonoma Nacional (UNAM), where it was identified that 67% of students had problems entering the platforms (Román, 2020). This difficulty was caused because the lack of mobile devices and smartphones lacked access to the Internet network due to a lack of resources to acquire data. The administration did not consider changes to reduce data consumption, with fewer hours in front of the screen. This is because of the curation of resources and the creation of éstos por el profesorado.

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The persistence of the class model is based on the chair. Once the pandemic was declared, many activities considered non-essential were stopped, including school assistance at all educational levels. In the populations with the minimum infrastructure to support it, education in virtual spaces was migrated, where the explanatory classes in charge of the professor or the student were continued, as well as the traditional scheme for exams and tasks online (Amescua, 2021).

Thus, the face-to-face course series is "a blatant and evident copy of contents" in the activities and projects assigned to the student (Vargas et al., 2020). It can be attributed to the fact that the teacher has pedagogical failures, the improvisation in the design of didactic strategies, and the student who does not find the need to transform information into knowledge (Díaz, 2019).

Classes are not broken down to move through teacher training processes to serve students in fully online or hybrid activities. Whence there is time for reading information and synchronic activities to solve problems. This requires modifying the criteria for daily care and the listed country, one of the vices of traditional education (Díaz, 2019).

Lack of transition to teaching innovations. Unfortunately, migration in many institutions was only the process of taking classes as they were in virtual spaces. The teachers did not accompany the students in their school work online; they could not have the necessary skills or the interest in training them (Román, 2020).

Many teachers communicate with each other to try to bring the most similar classes possible in the study plan. However, I have had cases where the experience was simply wrong. For example, the teachers did not present themselves, we did not have classes for the majority of the time, or they left us to give the class for our mismos without anyone providing the complement of its part (A2).

These "education vices" (Díaz, 2020) raise challenges for the administration of educational dependency in order to develop hybrid didactic strategies for an effective transition from complete face-to-face to hybrid education (Chehaibar, 2020).

5. CONCLUSIONS

The pandemic made clear the possibility of moving to virtual spaces in the processes of advanced medical education, including those names that, such as anatomy, histology, or cellular and molecular biology, have been maintained in many institutions of understanding with a pedagogical tradition of acronyms. The sudden migration of large groups produces accessibility disorders, and not all communities have connectivity. Despite creating a course to train teaching skills for online activities, the classes remained in the traditional format. For the administration of the University, it would not be enough to implement the teacher training courses, but how to modify the school activities, for example, work in the format of the turned classroom, since when returning to predominantly face-to-face classes, it would be necessary to have moved to other ways of teaching the technological resources were invisible.

The generated results of this study can serve as a basis for future investigations that allow for highlighting and evaluating the differences between the educational model mediated by the information and communication

technologies, the traditional teaching model, and the emerging innovative strategies designed in the teaching process and the learning process that It significantly favors the generic competences in the student body.

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