



PERCEPTION ON THE IMPLEMENTATION OF VIRTUAL ENVIRONMENTS AS EMERGING TOOLS TO SUPPORT MEDICAL EDUCATION IN THE TIME OF COVID-19 VIRTUAL ENVIRONMENTS IN MEDICAL EDUCATION

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ABSTRACT

Background: Today, in these times of quarantine and confinement at home due to the constant threat of COVID-19, many students observe a decrease in productivity per hour dedicated to work, and although the same can happen in reverse, since each person has various activities, there may be many reasons why productivity at home is decreasing: the poor quality of the internet, the lack of tools necessary to carry out the work, fear, bad self-regulation role, poor time planning, and distractions. E-learning and virtual environments emerged as a new teaching method to maintain the continuity of medical education. Defining e-learning as the use of computer technology to deliver training, including technology-supported learning, whether online, offline, or both. Before this isolation, distance education and virtual environments did not figure within universities as an educational model. This study aims to explore the role played by virtual environments and online learning in first-year medical students of the Faculty of Medicine and Surgery of the Universidad Regional del Sureste, thus allowing the identification of possible challenges, limitations, satisfaction, and prospects for this approach to learning.

Methods: It is a descriptive-cross-sectional study based on a questionnaire that was designed and delivered to first-year students. For this study, the estimated sample size ($n = 84$) is derived from the "Raosoft" sample size calculator available online.

Results: The results of the study show that 84.7% are regular students and 15.5% irregular, with an average academic performance of 7.95 and a perception of the virtual resources used by students as adequate (64%), a quality of technology perceived as satisfactory (72.6%), in terms of the learning resources used, they were perceived by the students as to their liking (79.7%). In addition to having had a satisfactory accompaniment (58.8%) from the teachers and coordinators.

Conclusion: In general, it can be concluded that the students perceived the virtual education carried out in this school year (2020-2021) as adequate and this had a positive relationship with the academic performance presented.

Keywords: Virtual environments; medical education; educational services; pandemic.

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1. INTRODUCTION

The dynamics of teaching in Mexico was abruptly modified since the face-to-face education model was changed to a virtual interaction model [1]. The implementation of cognitive, metacognitive and resource review strategies are essential for the development of skills that favorably strengthen academic performance [2]. In first-year medical students, it is important to address not only the cognitive components involved in student learning, but also those that are affective in nature, personal characteristics, socio-demographic and motivational profile exert a powerful influence on the decisions thereof, motivational factors like having family doctors, pleased by academia, the inclination towards scientific research and the aspiration to a high economic level facilitate the identification and awakening of interest in the profession, academic performance measured by school achievement can be largely influenced by the motivational factor, as a mechanism to achieve certain objectives [3,4]. The pandemic caused by COVID-19 at the beginning of 2020 forced teachers and students to make use of various virtual learning environments, which are practical, flexible, and accessible tools [5]. The quality of teaching with virtual environments depends a lot on the technological infrastructure acquired, the level of technical knowledge of the users, as well as the possibility of communication among the participants [6]. An important aspect, is the access to technological resources, the demographic conditions where the student is located and the internet coverage for the development of virtual teaching, we are in a country where access to these services is scarce, as mentioned by Martínez (2018), "...more than half of the households in the country do not have internet connection (53%); of 32,925,270 households only 45.6% have a computer and of 122,273,473 inhabitants 73.6% are cell phone users..." [7], this results in a considerable lag in the student population in terms of accessibility of technologies. The availability of infrastructures as well as the implementation of efficient institutional strategies represent in this period a huge challenge for the integration of distance education in medical education. We are facing generations known as: cognitive-behaviorism, constructivism and connectivism. Each of these generations has distinguished the technology used, the learning activities, the granularity of students and content, the assessment modality, the scalability, and the role of the instructor. These generations have been developing according to the technologies available. Each of these generations has been building on the achievements of the previous generation, according to the 2030 Sustainable Development Goals for health,

including health wellness and quality of education, effective and affordable educational strategies must be critically addressed, specifically in low- and middle-income countries, the adoption and acquisition of distance e-learning through virtual environments in different fields of knowledge can add up to achieve these goals [8-13].

2. MATERIALS AND METHODS

The present study is a descriptive-transversal study, in which the working universe consisted of 1st year students of the Faculty of Medicine and Surgery of the Universidad Regional del Sureste, Oaxaca, Mexico, corresponding to the 2020-2021 academic year. This study aims to explore the role played by virtual environments and online learning in first-year medical students of the Faculty of Medicine and Surgery of the Universidad Regional del Sureste, thus allowing the identification of possible challenges, limitations, satisfaction, and prospects for this approach to learning.

2.1 Sample

For this study, the estimated sample size was determined using the "Raosoft" sample size calculator available online, with a margin of error of 5% and a confidence level of 95%.

2.2 Instrument Used

The questionnaire consisted of 23 questions divided into seven blocks. The first one, which included three questions, focused on student satisfaction with the use of virtual learning resources. The second block, made up of three questions, addressed the students' perception of virtual accompaniment (by their teachers or their coordinators). The third block included three questions, focusing on virtual collaboration. The fourth block involved three questions, and with this it was sought to determine the perception of students towards the development of their professional skills. The fifth block included four questions, and with this the quality of the educational institution was determined. For the sixth block, four questions were included, with which it was sought to have an overview of the expectations of the students. For the seventh block, it was made up of three questions, focused on the perception of students towards the development of teaching competencies. To answer these items, a Five-point Likert scale (strongly disagree - strongly disagree agreement). This instrument was distributed through Google Forms through the support of the first-year academic Coordination, supported by simple random sampling for sending it [14].

2.3 Data Analysis

The statistical analysis of the results was performed by descriptive statistics using the SPSS program and the generation of the database was obtained using Excel. The study project, in the form of a protocol, was approved by the Research Committee of the Faculty of Medicine and Surgery of the Universidad Regional del Sureste. The students signed an informed consent and a personal data protection before entering the study, always indicating them a clear freedom to participate or not in the study. The information generated will be kept confidential and anonymous. Disclosure of results will be generalized and will never refer to an individual or group of individuals.

3. RESULTS

The total number of 1st year students who were considered for this study was 106 subjects, of which a sample of 84 students was taken, comprising 57.1% (n=84) female and 42.9% (n=84) male, with an average age of 19.4 ± 2 years, with a minimum of 18 years and a maximum of 25 years (see Table 1), of the total sample 84.7% are regular students and 15.5% irregular, with an average academic performance of 7.95. A total of 95.2% have their own computer and internet, while 4.8% borrow or rent computer and internet equipment (see Table 2). Regarding the location of the students, 57.1% reside in the city and 42.9% in urban or rural areas; based on the regions of origin, 64.3% are from the central valley's region, 11.9% from the coast, 8.3% from the isthmus, 4.8% from the southern highlands, 3.6% from the papaloapam, 3.6% from the northern highlands and 3.6% from the Mixtec region. According to the virtual resources used, 64% of the students consider them adequate with high satisfaction, while only 36% have a perception of dissatisfaction with them, the quality of the technology was perceived as adequate (72.6%). For the learning resources, specifically the virtual classroom (TEAMS) and the educational platform (Moodle 3.10), 79.7% said they were to their liking and 20.3% were dissatisfied with them. Regarding the accompaniment of professors and coordinators with students, the perception of satisfaction is high or adequate, being the orientation of the tutor satisfactory in 58.8%, the time of the activities were perceived as acceptable in 71.7% of the subjects, the consultations made by the students to their tutors or coordinators were satisfied in 68.3% and the total of students refer to an appropriate and efficient orientation in 68.2%. Based on the above, 75.3% of the students commented that they had timely support within the corresponding academic cycle, in addition to having a response to academic and technological problems in a timely manner (72.9%). The

personalized didactic orientation was considered as satisfied in 71.8%, the students' perception that the course does contribute to their competencies was 64.7%, in addition to the fact that 64.7% consider that the course, in spite of the inconveniences or technological deficiencies, did allow the achievement of the objectives set at the beginning. 71.7% of the subjects perceive that the classroom was available without setbacks for the development and delivery of activities to be performed, in addition to feeling comfortable through an environment conducive to their academic training (68.3%).

4. DISCUSSION

The permanent search for professional excellence in the university educational field entails the need to introduce methodological and didactic innovations in teaching that are supported by the use of virtual environments and platforms to favor both teaching tasks and student learning. The pandemic marked the beginning of the obligation of higher education institutions to improve and actively involve teachers and students in virtual environments, despite the abrupt change in the teaching-learning process (face-to-face migration to virtual), students favorably perceive the use of the Teams and Moodle platforms during the 2020-2021 academic year [10,11]. Some studies have presented results with a negative perspective, and a poor result in terms of learning [12-14]. Teaching through digital media has become a difficult task for both students and teachers since it involves many more hours of extracurricular work that can affect their mental health, for this it is necessary to schedule and schedule activities according to their schedule to avoid an overload of tasks for the students, the lack of resources (own computer or internet) in some of them, the affectionation by the geographical location, the increase in academic procrastination or the lack of interest in the subject [15]. On the other hand, the lack of a collaborative culture capable of fostering the collective construction of knowledge poses a great challenge for students. Group work carried out and managed using different types of technological tools (forums, wikis and small discussion groups) requires a series of skills and competencies that not all students possess, which can condition their evaluations and their level of achievement. satisfaction with a virtual teaching focused on proposals focused on the design of collaborative projects and practices, as has been seen from the results obtained. Quiroz (2020), comments on the significance of this global health crisis, highlighting educational inequalities, as well as the disadvantages for students from the most disadvantaged socioeconomic sectors, deepening inequality in education by accessing education with

greater limitations virtual and in some cases, frankly without access to the right to education [15,16]. Higher education institutions require a different organization in terms of operation, infrastructure, working conditions and new roles among their actors: social groups, educational administrators, teachers, and students. Educational institutions after this pandemic must be institutions that support individual, collaborative, and cooperative work, respecting cultural diversity, in enhancing individual and collective qualities through learning environments in communities in person and in a network. with the support of information and communication technologies. The use of ICT in higher education will allow a greater interconnection of training, those who have experienced the benefits of the use of ICT in the classroom perceive them as pleasant, conceive their benefits and consider that their application is compatible with the tasks that their subjects require, being more likely to use innovative teaching modalities. However, it is necessary to point out that university institutions must recognize in educational innovation plans the adaptive work of teachers in this regard, contemplating incentives, providing training and technical resources, as well as something that indicates a high percentage of the participant sample in the study, adding value in the teacher evaluation processes [17]. The introduction and use of ICTs on a regular basis in administrative or teaching-learning processes in higher education are signifying an institutional transformation that today shows us a reality of the university system that is different from that of just a decade ago. Vialart (2020), mentions that virtualization is an opportunity to shorten distances, which enriches the teaching-learning process, allowing the development of study programs, without the need to suspend classes, because the materials and activities remain accessible all time and reveal the attitude of students towards the management of their knowledge, strengthen relationships and instill collaboration among all actors. He emphasizes that it is the teacher's responsibility to train and prepare to develop good course designs in the virtual context, which meets the objectives established in the study programs. In the same way, establish and maintain communication through different channels, to evaluate and guide the student. The success of virtual environments lies in having to select the correct and appropriate, attractive, and easy-to-use media or resources, so that there are no difficulties during the development of educational components, which attracts the attention of students so that, in collaboratively, they are motivated to continue researching and learning [18-25]. The monitoring and role of tutors has been recorded since before the start of the pandemic to avoid school dropouts, which derived from the current circumstances, their role has

increased, this being the perception that students have regarding them as a timely support (75.3%). There are still many things to improve to improve the educational processes for the training of human resources, among which the acquisition and improvement of virtual environments stands out.

Table 1. Sample data obtained

Female (%)	Male (%)	Average age (Years)
57.1	57.1	19.4

Table 2. Distribution of the sample obtained

Students regulars	Students irregulars	Computer and internet own	Computer and internet not own
84.7%	15.5%	95.2%	4.8%

5. CONCLUSION

In conclusion, we can say that the 1st year students of the 2020-2021 school year of the Faculty of Medicine and Surgery of the Universidad Regional del Sureste, perceive as adequate the virtual education carried out in this cycle due to the health problems caused by the pandemic, it is worth mentioning that there is a positive relationship with academic performance, which although it is not the performance they expected to have since the average of the same is 7.95, this may be due to several factors among which stand out: network access, lack of personal computer, lack of knowledge of the platform and the virtual classroom, the change of moving from high school to higher education, the complexity of the terms of the degree, lack of academic self-regulation processes or increase in academic procrastination, despite the above, the learning objectives of the subjects that make up the first year of the degree are considered completed, this educational environment favors the guidance of the tutor and the coordinator to achieve it. However, it is necessary to continue training and updating the teaching staff, in addition to providing the necessary psycho-pedagogical guidance to students who require it to improve the teaching-learning process in the current educational modality.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Pérez-Sayáns M, Chamorro CM, Reboiras D, Gándara P, Gallas M. Perception by teachers of

- the Faculty of Medicine and Dentistry of the USC on virtual and synchronous teaching after the Covid-19 crisis. *Spanish Journal of Medical Education*. 2020;1(2):53-64.
2. Torres Bojacá C. Learning to think and reflect: Proposal of cognitive and metacognitive strategies in reading comprehension. Bogotá: Externado University of Colombia; 2017.
 3. Roberts LE, Green Hammond KA, Gepperd CM, Warner TD. The positive role of professionalism and ethics training in medical education: a comparison of medical student and resident perspectives. *Acad Psychiatry*. 2004; 28:170-82.
 4. Jordan J, Brown JB, Russell G. Choosing family medicine. What influences medical students? *Can Fam Physician*. 2003;49:1065-9.
 5. Fernández RM, Cerqueiras EMB, Anterlò BG, Casal-Otero L. (Covid-19 and non-face-to-face academic activity: Perception of vocational training students from Galicia-Spain. *Lusófona de Educação Magazine*. 2021; 51(51).
 6. Gómez M, Pérez Fonseca JJ, Valdés Tamayo PR. *Virtual Teaching-Learning Environments*; 2007.
 7. Martínez Domínguez M. Access and use of information and communication technologies in Mexico: Determining factors. *PAAKAT: Technology and Society Magazine*. 2018; 8(14):00002.
 8. Bautista García Y, Zúñiga Rodríguez M. Teaching practice mediated by information and communication technologies. Challenges and experiences in basic education. *Conrado*. 2021; 17 (79):81-88.
 9. Corona JFB, Méndez OR. Virtual education and its regulatory framework in Mexico before the health emergency due to covid-19 (virtual education and its regulatory framework in Mexico in the face of the health emergency due to covid-19). *Legal Universes*. 2020;14:36-60.
 10. Vivanco-Saraguro A. Tele-education in times of COVID-19: Inequality gaps. *Sienci America*. 2020;9(2):166-175.
 11. Anderson T, Dron J. Three generations of distance education pedagogy. *Int Rev Res Open Distributed Learning*. 2011;12(3):80-97.
 12. Ghanizadeh A, et al. Use of E-learning in education: attitude of medical students of shiraz, Iran. *Int Med Medical Investigation J*. 2018;3(3):108-11.
 13. Bizberge A, Segura MS. Digital rights during COVID-19 pandemic in Argentina, Brazil and Mexico. *Rev. Comun*. 2020;19(2):61-85.
 14. Del Cid A, Méndez R, Sandoval F. *Research. Fundamentals and Methodologies*. (1 ed.). Mexico: Pearson Education. Dos Santos, M. (2016) Quality and satisfaction: the case of the University of Jaén. *Journal of Higher Education*. 2007;45(178):79-95.
 15. Morales-Torres M, Bárzaga Quesada J, Morales Tamayo Y, Cárdenas Zea MP, Campos Rivero DS. Virtual environments from the ontology of new knowledge of higher education in times of covid-19 pandemic. *RUS*. 2021;13(3):Epub02.
 16. Quiroz C. Pandemia Covid-19 e Inequidad Territorial: El Agravamiento de las Desigualdades Educativas en Chile. *Revista Internacional de Educación para la Justicia Social*. 2020;9(3):17.
 17. Martín J, Torrijos P, Serrate S, García A. Teaching use intention and self-perception of bLearning in higher education. *Revista Educación*. 2021;39:209-35.
 18. Vialart N. Didactic strategies for the virtualization of the teaching-learning process in the times of COVID-19. *Educ Méd Super*. 2020;34(3).
 19. Ibrahim NK, Al Raddadi R, AlDarmasi M, Al Ghamdi A, Gaddoury M, AlBar HM, et al. Medical students' acceptance and perceptions of e-learning during the Covid- 19 closure time in King Abdulaziz University, Jeddah. *Journal of Infection and Public Health*. 2021;14 (1):17-23.
 20. Iqbal T. Medical students' e-learning during Covid-19 lockdown. *Pakistan Journal of Physiology*. 2020;16(1):1-2.
 21. Abbasi S, Ayoob T, Malik A, Memon SI. Perceptions of students regarding E-learning during Covid-19 at a private medical college. *Pakistan Journal of Medical Sciences*. 2020;36(COVID19-S4):S57.
 22. Elzainy A, El Sadik A, Al Abdulmonem W. Experience of e-learning and online assessment during the COVID-19 pandemic at the College of Medicine, Qassim University. *Journal of Taibah University Medical Sciences*. 2020;15(6):456-462.
 23. Demian P, Morrice J. The use of virtual learning environments and their impact on academic performance. *Engineering Education*. 2012;7(1):11-19.
 24. Soni VD. Global Impact of E-learning during COVID 19; 2020.

- Available at SSRN 3630073.
25. Villegas Múnera EM, Aguirre Muñoz CA, Díaz Hernández DP, Galindo Cárdenas LA, Arango Rave ME, Kambourova Kambourova MG, et al. The role of the tutor in the Problem-Based Learning strategy in medical training at the Faculty of Medicine of the University of Antioquia; 2012.