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The virtual modality and its impact on the training of medical sciences students

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Abstract

Introduction: The social restrictions that countries imposed to contain COVID-19 generated challenges in all areas of human development, including higher education. University institutions had to adapt abruptly to the new pedagogical demands, resorting obligatorily to the use of the virtual modality in all their academic offerings.

Objective: To evaluate the impact of the virtual modality in the academic and professional training of students of Medical Sciences, in order to identify its advantages, disadvantages and potentialities in the current educational context. Methodology: A systematic review was carried out to analyze virtual health education, using databases such as REDALYC, SCOPUS, DIALNET and SCIELO. Relevant articles were identified and grouped, excluding those that did not focus on virtual education related to health careers. Several search terms were analyzed and multiple articles were obtained in each database.

Results: Although there is uncertainty in the formative quality of students of health careers due to the eminently practical condition of the knowledge imparted, it is evident that telematic education has overcome acceptably the obstacles posed from the dogmatic criterion, so it should be recognized for its support to the continuity of teaching and learning processes.

Conclusions: The university community is obliged to encourage the development of the virtual modality and its application for the benefit of strengthening the professions related to health.

Keywords: Medical education; Online teaching; Virtual modality; Inverted classroom; Educational technologies in health

1. Introduction

When the municipal authorities of the city of Wuhan (China) reported in December 2019 the detection of atypical cases of viral pneumonia caused by a pathogen under study [1], they never imagined that their research would be the beginning of a disease that would shake the health systems of the world. More than four years have passed since the declaration of the COVID-19 pandemic that generated challenges to society in all reasonable areas, and higher education was no exception. The health authorities, as an epidemiological precautionary measure, decreed a final confinement to avoid the increase in infections and the collapse of health systems, establishing the suspension of classes in all public and private establishments [2]. After the extension of the quarantine and the need to maintain the training processes without harming students by exposing them to possible infections, educational institutions were urged to carry out their activities from the virtual mode [3]. This was the beginning of a labyrinth that was built around the teaching-learning binomial under the premise of seeking solutions as obstacles arose. Later, capacity restrictions and social distancing

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measures forced the maintenance of virtuality, which generated continuity in the learning processes based on two fundamental strategies: the adaptation of the curriculum to current conditions and the participation of students through technological platforms [4]. However, this transition from face-to-face to virtuality was significantly complicated for health sciences careers such as Medicine and Nursing, since the development of skills and abilities of the future health professional is conditioned by the student-teacher interaction within the framework of practical learning [5]. The renowned educator Jonathan Zimmerman anticipated the conflict that would exist when using the virtual modality abruptly, pointing out that meticulously planned online learning experiences are different from online courses that are put into practice in crisis or disaster situations [6]. Educational institutions seeking to continue teaching during the COVID-19 pandemic had to consider these differences when analyzing emergency remote education. The countdown had begun and the future of undergraduate and graduate academic programs was conditioned by the possibility of finding alternatives that allow continuing the training of Ecuadorian doctors and nurses, amidst a manifest uncertainty due to the impetuous use of virtual media in a purely operational field. The need then arose to make unavoidable modifications to the syllabi and curricular grids that allowed redefining the scope of digital platforms in theoretical and practical modules, the latter being those of greatest collective interest because it is a forced, but not inadmissible alignment. Understanding the motivations of each individual to overcome the obstacles presented, and the influence of personal, family, social and demographic characteristics are factors that could elucidate a positive or negative result in the virtual modality [7]. The virtual modality provides students with the possibility of accessing a wide range of digital educational resources, such as virtual libraries, laboratories, and patient simulators. This allows them to acquire updated and practical skills, as well as develop clinical abilities. It also provides the opportunity to interact with professors and classmates from different parts of the world, enriching their educational experience. However, it is important to recognize that the virtual modality also presents challenges. Students may face difficulties in staying motivated and organized, as it requires greater self-discipline and personal responsibility. Likewise, the lack of physical interaction can affect their ability to develop communication and teamwork skills . To overcome these challenges, educational institutions must provide adequate support to students, through technological resources, tutoring programs, and online collaboration spaces. Several authors agree that online education is not suitable for all training programs and that its success depends largely on student motivation and commitment. Positive results are more likely to be achieved in those cases where the student's personal circumstances (family, work or physical) limit their face-to-face participation, but there is a strong will to learn. [8].

1.1. General objective

To evaluate the impact of the virtual modality on the academic and professional training of medical sciences students in order to identify its advantages, disadvantages and potential in the current educational context.

1.2. Specific objectives

- To analyze the perceptions of students and teachers regarding the effectiveness of virtual learning compared to face-to-face education, focusing on aspects such as educational quality and the development of practical skills necessary in the health field.
- To investigate the pedagogical methodologies implemented in virtual education to determine their suitability to the specific needs of learning in Medical Sciences, as well as their ability to overcome the challenges posed by remote teaching.
- To examine the psychological and social effects that the transition to virtual education has had on medical sciences students, including aspects such as academic commitment, social interaction, and emotional well-being during the educational process.

2. Methodology

A systematic exploratory search was carried out in the following databases or indexes: REDALYC, SCOPUS, DIALNET and SCIELO. The search terms were: virtual education in health, virtual education in pandemic, flipped classroom in medicine, Education and COVID-19. Virtual education in health REDALYC, 121 articles; SCOPUS, 401 articles; SCIELO, 86 articles (indexed); DIANET 209. Virtual education in pandemic: REDALYC, 34 articles; DIALNET, 102 articles; SCIELO, 63 articles (indexed); Education and COVID-19 REDALYC, 12 articles; DIALNET, 101 articles; SCIELO, 16 articles (indexed); Flipped classroom in medicine: REDALYC, 69 articles; DIALNET, 49 articles; SCIELO, 23 articles (indexed). From the results obtained, they were grouped by inclusion criteria based on current events and topical approach, excluding those that did not focus on virtual education related to health careers.

3. Results

In India, a research related to medical education was conducted by applying a survey to 208 students who enrolled in the medical program. It was determined that 35% had not had previous experiences in online classes, despite this, the acceptance of virtuality was interesting from the students' perspective. 92.3% confirmed that teachers had given them the opportunity to ask questions and resolve concerns, 54.8% indicated that their interaction with the teacher improved in relation to the face-to-face modality, 26.9% believed that virtual classes are as good as physical classes, and 22.1% stated that the online modality was better than attending university [9].

Several authors agree that students perceive the logistical problem as the main obstacle to overcome when receiving online classes. Timely access to an internet service that supports the amount of data on digital platforms and the possibility of obtaining desktop computers or laptops in an economic crisis exacerbated by the pandemic were threats that conditioned students' performance [10]. Regarding the participation of teachers in virtual education, their ability to adapt was put to the test when considering that teaching in health sciences is marked by the care experience of their teachers, with a small group of them having dedicated themselves completely to university instruction. The generic and specific competencies of health sciences teachers focus on their knowledge and not on the development of pedagogical skills in higher education [11]. The paradigm of traditional medical doctrine against capacity-based education was most evident during online classes, pointing to a transformation from an education focused on teaching to an education built on learning and teaching classes where priority is no longer given to what the teacher believes is important to teach, but to what must be essential for students to learn [12].

The academic approach had to be directed towards the planning of activities within the framework of innovative proposals, which had to solve the impersonality of remote teaching under the premise of evaluating the student in a flexible way [13]. However, the use of technological tools presented some resistance in teachers who did not have the opportunity to use them previously. In a study carried out on 44,000 secondary and higher education teachers in Mexico, it was established that only 65.9% had had previous experiences with the distance learning modality, and 36.3% accepted that they were not prepared to face the challenges of virtual education. Among the most notable complications were the difficulties derived from the evaluation of student activities (47.7%), the clarification of the contents taught with the telematic restriction (34.1%), and the modification of the syllabuses from the face-to-face to the remote modality (11.4%).

Regarding the time spent preparing classes, 88.6% indicated that teaching work increased considerably, without any additional salary recognition [14]. The most frequent complication that teachers noted during digital sessions was the evaluation of the level of knowledge that students acquired with the new pedagogical strategy. Grading individual participation and performance resulted in a divergence between the observed objectivity and the implied subjectivity [15]. Other circumstances analyzed from the professors' perspective were the excuses given for failure to attend classes, tests or submit work attributed to the failure of the internet connection or electricity, which in most higher education institutions was required to be validated as a pertinent justification [16]. It was also concluded that in certain scenarios there was a weakened participation of students who entered the session at the time of remaining connected, but did not turn on their video cameras for virtual classes and did not actively participate in the meeting, which they justified in the misinterpreted right to privacy, a fact that is not legitimately violated by the will of the parties to comply with a contract or training agreement. Despite the above, most universities requested to avoid its mandatory nature in order to avoid legal conflicts [17].

In a meta-analysis of 28 eligible comparative studies related to student experiences within the flipped classroom, it was established that the evidence suggested that the Flipped Methodology approach Classroom education in health professions generated a statistically significant improvement in student performance compared to the exclusive face-to-face modality. The opportunities that telematic education can offer to the teaching-learning process are incalculable, and could only be limited by the lack of interest or little commitment of teachers or students in the implementation of digital tools at the service of pedagogy [18].

Through a systematic review of several research papers related to the experiences that arose in virtuality during COVID-19, it was possible to establish the main advantages and limitations evidenced by teachers and students of health careers.

Table 1 Advantages and limitations of virtual education during the COVID-19 pandemic stated by the Teacher

Advantages	Limitations
Increased use of teaching resources such as videos, digital presentations and software related to the course.	Limited mastery of technological platforms and tools, with the corresponding need for ongoing training.
Ease of evaluation and grading processes through the use of digital tools that immediately tabulate online tests.	And platform management activities , without the respective salary recognition.
Accessibility to teaching materials and organization of information academic.	Difficulties for active participation and collaboration of the student.
The feasibility of receiving and evaluating jobs or tasks with pre-established times in the system.	Improvised modifications to syllabuses to adapt them to the virtual modality
Greater control when executing group work, sending participants to private rooms.	Concern about the increase in unethical behavior (copying and plagiarism) during online assessments by students.

Source: Cited references [19-23]

Table 2 Advantages and limitations of virtual education during the COVID-19 pandemic stated by the Student

Advantages	Limitations
Feasibility when accessing information about the course, teaching materials, presentations, grades, etc.	Technical difficulties of certain platforms or unfriendly or incomprehensible tools.
Easier to submit assignments, essays, research, etc.	Financial problems in acquiring your own equipment such as computers or tablets
The execution of tests or assessments was significantly more user-friendly using academic platforms, which presented extensive resources to generate not only multiple-choice questions.	Not having an adequate internet connection for the information generated on the platforms.
Time optimization when accessing classes from anywhere.	Restrictions on proper relationships with teachers or colleagues in the virtual classroom.
Opportunity to access recorded classes to avoid falling behind on the content or to review generated information again.	Failures to consolidate knowledge of skills or abilities (practical component).

Source: Cited references [19-23]

4. Discussion

In the collective imagination, the erroneous concept has been established that students of health-related careers who were forced to train virtually due to the COVID-19 pandemic dragged information gaps that were reflected in their professional level. Some even suggested that classes or training programs in Medicine and other similar careers should have been suspended until the confinements were resolved [24]. Arguments that lacked any logic when interpreting that education could not succumb to the adversity of a disease whose behavior was uncertain. Humanity tirelessly sought to cope with this scenario at the cost of sacrificing personal interaction in the name of one's own and others' well-being, which is why we should not condemn the will to learn, but criticize the intention not to do so [25]. The practical component was modified to be supported under the telematic guidance of the teacher who assimilated the potential of technological tools that, although they limited the learning of technical skills surrounded by a microphone and a screen, were not revered as an impenetrable barrier to empathy and human interaction (teacher-student relationship), but rather constituted an opportunity to find new teaching routes to avoid being shipwrecked in the sea of pedagogical failure. The practices began to encourage observation, self-regulation and asynchronous participation as strategies for the acquisition of knowledge. The student had to become the center of his or her own training under the development of attitudes of personal improvement and resilience in the face of a pandemic that shook everyone's reality [26]. It cannot be denied that the practical component needs to stimulate the student's technical skills for its consolidation, which during the pandemic was solved in an acceptable way with the guidance of the teacher and the

direct and autonomous participation of the student, although the use of medical or hospital-level simulation scenarios will always be necessary; However, this should not relegate the virtual modality merely to the theoretical field, since in the process of training students during the restrictions of their participation in universities and healthcare units, virtuality proved to be capable of solving its limitations based on the operator's guidelines and the will of the participant. Such dynamics ends up being the fundamental basis of Telemedicine, where it is possible to operate on a patient thousands of kilometers away, under the constant supervision of the expert surgeon who is in the comfort of his home. [27].

The importance of virtual communication should be highlighted from its transcendental role so that man could explore the confines of the universe or simply so that a radiologist like Dr. Albert Jutras in 1955 could avoid high doses of radiation by remaining behind a lead partition while giving instructions to his patients through a simple monitor [28]. That is, the possibilities that could be generated by the implementation of virtual education without the hasty impositions of a health emergency can become unlimited. It was precisely the hasty and disorderly migration of syllabi conceived for face-to-face classes, which led to the deficient and unfriendly use of digital platforms that were underestimated by high pedagogical expectations, without having a process or prior planning [29,31]. The current of thought moved with the impetus of the river that they tried to stop its course , but it looked for the smallest crack to continue advancing. And although the crack it found was the virtual modality, its application should not be discriminated as an enemy of medical learning, on the contrary, in this new reality where time and distance prevent us from relating accurately, technological tools have become the bridge that keeps us connected and are projected as strategic allies that will enhance our academic capacities, so virtual teaching, far from being abandoned, should be perfected to find a balance between the information that necessarily requires a face-to-face format, and others that could benefit from virtuality. In this regard, the development of the inverted classroom or Flipped Classroom should be encouraged, which is how the mixed or semi-presential learning modality is known where the strategies of face-to-face and virtual classes converge to improve the transfer of knowledge from the development of cognitive processes stimulated by the contrast between the everyday and the established to achieve the student's interest.

5. Conclusion

The methodology of virtual learning assessment is a little-explored territory that had to be reached abruptly due to the pandemic. This panorama demanded new mechanisms that reinforce the dynamism and flexibility of the academic process. The aim was to encourage autonomous learning, especially when addressing practical topics that had to be under the supervision of the teacher remotely and the active participation of the student in their own home. In this context, it could be interpreted that the success or failure of the virtual modality would not be conditioned by the system itself, but by the teacher's willingness to teach and the student's willingness to learn. The virtual class model assumed during the pandemic was a challenge for all those involved because they faced a task that required technical and theoretical knowledge. In addition, it had to be executed with creativity and innovation, requiring, on the fly, to solve the problems that arose with the same difficulty as changing a tire with the vehicle in motion. At the same time, they were urged to maintain an emotional balance within an emergency situation that involved, among other things, confinement measures and fear of contagion. Both teachers and students demonstrated sacrifice and dedication with the sole objective of sustaining the training processes and achieving the long-awaited dream of becoming professionals.

Certainly, medicine is based on the development of skills and abilities, so some specific topics or content must be taught from a face-to-face perspective, but not every idea must be executed by hand nor must every concept be embodied in a witnessed action, and if there is one thing we can be sure of, it is that in a reality where distance and time end up being hostile concepts for the optimization of resources, the future of health careers and health professionals will depend on the seriousness with which they approach virtual education and telemedicine, allowing the correct use of technology and digital tools for their training and continuous training, because a doctor who looks at the world with the eyes of Jules Verne will be able to understand that the enemy to be defeated is not pain or illness, but simply our lack of imagination. The positive impact that the virtual modality has had on the training of students of Medical Sciences is evident, thanks to the human capacity related to learning, teaching and cognitive processes that involve technology and new media, as well as the possibility of interaction, collaboration and collective participation. However, there are also observations about negative aspects in the implementation of this modality, such as the difficulty of measuring active participation and access to technical resources under equitable conditions. The greatest challenges, particularly in health science education, arise from the need to ensure that there is training that maintains the essence of medicine centered on science and the patient. This does not necessarily mean essentiality, but rather relevance and rationality. Thus, the conclusions of this study confirm the complexity and richness of this educational modality, which did not exist before; they show the enormous potential of its applications, but also its own aspirations and challenges. In this regard, it could be concluded that the key to success in the design and operation of the virtual modality in health careers will be

the will that both teachers and students have in the integration between technology, educational model, learning strategies and active participation.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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