

## ASSESSMENT OF MEDICAL EDUCATION IN THE TIME OF COVID 19: EXPERIENCE OF TANGIER MEDICAL SCHOOL IN MOROCCO

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### ABSTRACT

**Purpose:** To evaluate the effectiveness of our management strategy for different challenges in medical education in the current COVID 19 pandemic, global students' perceived satisfaction and to analyze the different factors that can influence the success of online education or e-learning in general. **Methods:** A survey using a questionnaire sent out by email to all students in our medical school. **Results:** A total of 265 responses were included in the present study. Regarding online learning, we had a satisfaction rate of 66.8%. Statistical analysis proved a positive significant relation between overall students' perceived satisfaction and the student level of study ( $p=0.00$ ), the type, the content and the quality of learning materials ( $p=0.00$ ). In addition, 69.8% of learners strongly wanted a specific e-learning platform from the faculty. This rate seems to be significantly influenced by the fact of having or not having a computer or tablet ( $p= 0.006$ ). Despite the satisfaction of the most of learners, 36.2% believed that face to face learning is better than online learning, while 40.8% of them considered that the 2 types of learning are complementary. 55% of medical learners think that this teaching method could negatively impact their exam scores, indeed, there was a strong relation between students who preferred face-to-face learning and students who believed that online learning will negatively impact their exam scores ( $p= 0.00$ ). Furthermore, Students expressed a huge panic about the impact of COVID-19 on their clerkship curriculum. **Conclusion:** Medical education during COVID-19 pandemic is a real challenge. Its profound impact on learning and the clerkship environment may change the way how future doctors are educated.

**Keywords:** Medical Education; COVID-19; E-learning; clerkship; Morocco; Online learning.

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\*\*\*\*\*Published in November 09, 2020.

doi: 10.46327/msrjg.1.000000000000xxx

doi url: <https://doi.org/10.46327/msrjg.1.000000000000xxx>

### INTRODUCTION:

Since the outbreak of COVID 19 disease, several measures have been applied around the world to protect communities including quarantine and social distancing, that are the most effective preventive approaches pending the development of a vaccine [1]. The priority has been treating patients and saving their lives. Therefore, the impact of the pandemic has been

huge on several sectors, especially on medical education.

Like other countries, Morocco adopted several measures in his war facing COVID 19 [2,3]; indeed, on March 16th, the government officially stopped face-to-face classes. Similarly to what has been done in all educational establishments in Morocco and worldwide, our faculty quickly transitioned to online learning that included chapters in the basic sciences, health system

sciences and practical work. Indeed, we adopted a curriculum that contained recorded lectures, tutorials, PowerPoint presentations with sound and virtual classes. Support was available on the faculty's website or on the e-learning site of our university hospital.

Besides the theoretical education, clinical clerkships have also been postponed or canceled. Medical students are part of the medical team, of course, as learners who require supervision, so in most disasters, they could continue their practical training and even help with care offered to patients [4]. However, with the COVID 19 being "a highly contagious disease" the decision to suspend clinical clerkships seems quite logical because of several factors. Namely, students may transmit the virus unknowingly or contract the disease during training, the lack of adequate personal protective equipment, but the most important reason is that a lot of surgical procedures and routine appointments were postponed. Hence the decrease of the value of practical education [1,5].

Obviously, the impact of COVID 19 pandemic is profound and several measures have been taken at different levels to reduce the magnitude of this impact. Our primary aim throughout this study was to evaluate the effectiveness of our management strategy for different challenges in medical education in the current COVID 19 pandemic and the degree of satisfaction of our students with this online learning experience. Secondly, we wanted to analyze the different factors that can influence the success of online education or e-learning in general.

## MATERIALS & METHODS

### Study Design

We carried out a transversal study, where the survey instrument was sent out by email to all students (n=533) in our medical school in their first to fourth year of medical studies (Please note that our medical school is a young faculty of medicine started in the academic year 2016-2017). The online survey was conducted for one month.

Data collection and statistical analyses:

The questionnaire was written on Google Forms; therefore, the responses were automatically collected on an Excel response sheet. Incomplete or no-consent responses were excluded.

Statistical analyses were performed using SPSS version 21 (epidemiology laboratory of the faculty of medicine of Tangier). The quantitative variables were described in terms of mean with standard deviation and the

qualitative variables in percentage. The univariate analysis was run using Pearson's chi-square test or Fisher's exact test; if the number of people in a subgroup is insufficient; to study different factors that may influence the success or not of online education in our context. p values of < 0.05 were considered statistically significant.

### Ethical Considerations

All students provided consent for use of their data anonymously.

## RESULTS:

### Student Characteristics

Responses from 265 students were included (105 men, 160 women). The mean age was  $19.51 \pm 1.36$ -year-old. Almost half of students (44%) were from Tangier and 56% from outside the city, 5% of whom were foreigners from African countries or the Middle East. Among the students who answered the questionnaire 52.8% were in their first year of medical studies, 17.7%, 13.6% and 15.8% were respectively in their second, third and fourth year.

All the students had a smartphone, 86.4% of them had a computer and 13.6 % had a tablet. Of course, there were some students who had more than one device; most often a computer with a smartphone (in 67.5% of cases); but 12.5 % of the students had only a smartphone.

We asked the students also about their level of the French language; 82.7% considered that they have a good or excellent level in French. Regarding computer and internet skills, 56.3% of students reported that they have good or fairly good computer skills and they didn't find any difficulty in dealing with computers. Although, almost all students had an internet connection, only 21.1% of them had a stable and continuous one.

The evaluation of the student's attitudes toward technology showed that almost half (50.9%) of learners spent in general three to five hours in front of a computer, 27.2% of learners spent less than one hour in front of a computer, while only 4.2 and 3% of students spent respectively seven to nine hours, and more than nine hours in front of a computer. Among this time spent in front of a computer before the era of COVID 19 disease, 40% of learners spent less than one hour in medical learning, 48.3% spent three to five hours for this goal, 7.7% and 4.2% respectively spent five to seven hours and then seven to nine hours studying on the computer. During quarantine just 15.8 % of

students spent less than one hour in medical learning using a computer with the internet. 49.8 %, then 26.4% and 7.9 % of them spent respectively three to five, five to seven and seven to nine hours studying using technological devices. The students were also questioned about the use of social media, among the 97% of students using it, 74.7% reported that they used it in medical learning. 32.5% of learners used social media in this goal rarely, and 38.5 % of them used it quite frequently.

Always with regard to the student attitudes, 43.8 % of learners worked and revised in groups, 37.7 % of them preferred to meet at the faculty library. Others liked to

meet outside the faculty, for instance, at an external library in 8.2 % of cases, at home in 5% of cases, or through virtual groups on social media in 20% of cases. The rest of learners, usually working in groups, didn't prefer to revise in specific places, and used social networks at the same time.

### Type, content and quality of teaching materials

The different tools used in this online teaching, the frequency of their use, and the opinion of the students about their use as a means of distance learning were summarized in **table I**.

Table I: Frequency and quality of online teaching tools according to students' opinions

		Recorded lectures	PowerPoint presentations with sound	Virtual classes	Training modules
Frequency of use	Widely used	24.5 %	20.8 %	31.3 %	39.6 %
	Moderate used	48.7 %	43.8 %	42.3 %	35.8 %
	Rarely used	21.1 %	26.8 %	18.1 %	14.3 %
	Not used	5.7 %	8.7 %	8.3 %	10.3 %
Quality of the tool	Excellent	25.3%	16.2 %	26.0 %	18.5 %
	good	38.5 %	35.1 %	37.7 %	35.1 %
	acceptable	23.4 %	30.6 %	27.2 %	32.5 %
	unsatisfactory	12.8 %	18.1 %	9.1 %	14.0 %

Despite the diversity of teaching tools, the only one that ensured interaction was virtual classes using videoconferencing platforms. 58.1% of students reported that the interaction through the videoconferencing platform was of lower quality than that during face-to-face learning. Although being of lower quality, 25.3% and 20% of students reported respectively that interaction during virtual classes was easy and important, 21.9 % of them announced that it was difficult (**Table II**).

Table II: evaluation of the interactivity on video conferencing platform

	Interactivity on video conferencing platform							
	Easy	Difficult	Important	Without added value	Easy + important	Difficult + important	Easy + without added value	Difficult + without added value
Percentage of students	25.3	21.9	20.0	10.9	14.3	4.5	0.8	2.3

Course materials shared with learners were also diversified. Portable documents format (PDF) had been used in 97 % of cases, PowerPoint and word documents had been used respectively in 58.8 % and 2.8% of cases (table 3). Document sharing had been on the faculty website in 71.7 % of cases, on the teleworking platform and e-learning website of our university hospital in 49 % and 35% of cases. Of the recorded lectures and tutorials, 3.7 % had been shared on YouTube. To access to these course materials 80.4 % of learners used a computer. For 72.1 % of students

the sharing interfaces were intuitive. Even that, 12.8% and 2.3 % of students found the technical accessibility of the courses difficult and very difficult.

All students received courses, content of the teaching materials regrouped also corrected exercises in 38.5 %, quizzes in 20.3 % and practical work in 38.5 % of cases.

According to the student point of view, the content of the course materials attracted enough attention in 70.6 % of cases and attracted perfectly their interest in 16.2 %. Furthermore, 5.7% and 58.5 % of students reported

that the content of the shared learning materials was very easy and easy enough to understand, while 35.8 % of learners judged that its understanding was difficult.

### Impact of COVID-19 on the clerkship learning environment

76 % of students believed that impact of COVID-19 pandemic on their clerkship learning is significant, while 17.8 % others judged that the clerkship learning is moderately affected. Interactive learning such as case discussion and team learning through video conferencing platforms could reduce the negative impact during the pandemic in the opinion of 56.3 % of students. However, most of them (81.5 %) agree that teaching by simulation especially by virtual patient could enhance medical training and learning during these times.

### Student satisfaction assessment

Among all students, 52.8% were satisfied and 14% were very satisfied with their online learning experience. Although 36.2% of students believed that

face-to-face learning is better than online learning, 40.8% considered that the two types of learning are complementary. In addition, 69.8% of learners strongly wanted a specific e-learning platform from the faculty. 22.6% of them agreed with the idea, whereas 7.5% didn't agree with the idea and prefer face-to-face teaching.

Despite the satisfaction of the most of students, 55% of them thought that this teaching method could negatively impact their exam scores and thought that the exam modalities should also be changed (75.5%). Indeed, students who were satisfied with this online learning were the ones who think the impact will be positive on their exam scores ( $p=0.00$ ). On the other hand, there was a strong relation between students who preferred face-to-face learning and students who believed that online learning will negatively impact their exam scores ( $p= 0.00$ ).

Univariate analysis showed that there was a statically significant relationship between the student level of study and their overall satisfaction ( $p= 0.003$ ). In fact, the satisfaction rate was higher among third- and fourth-year students than those of first and second year.

Table III: relation between learner's attitudes and their overall satisfaction.

	Learner attitudes				
	Having a computer	level in French language	Having a stable internet connection	Time spent in front of computer	Use of social media in medical learning
Learner satisfaction (P value)	0.23	0.16	0.24	0.45	0.16

In regard to learner attitudes, statistical results didn't find any significant association between learner satisfaction and learner's attitudes (table 3). However, statistical analysis proved that there was a highly positive relation between global students' perceived satisfaction and the type, the content and the quality of learning materials (Table IV). In addition to the factors that influence overall students' perceived satisfaction to this online learning experience, we had analyzed the

factors that may be involved in preferring to have or not have a faculty specific e-learning platform. Statistical results showed that there was a positive relation between the fact of having a computer or tablet and preferring to have a faculty specific e-learning platform ( $p= 0.006$ ). However, there wasn't any significant relation between this one and student level in French language ( $p=0.11$ ) or their hometown ( $p= 0.54$ ).

Table IV: relation between the content and the quality of learning materials and the overall student satisfaction.

	Type, content and the quality of learning materials		
	The content of the course materials	interactivity	Understanding the content
Learner satisfaction (p value)	0.00	0.00	0.00

## DISCUSSION

The replacement of face to face learning by online equivalent has become an obligation in the time of COVID-19 pandemic. This transition has been made urgently without a prior curriculum. Therefore, we deemed it necessary to evaluate this online learning experience established quickly and without prior preparation. The present evaluation not only allows us to see to what extent our program was adequate, but rather to highlight the great adaptability of medical students. In fact, we had a satisfaction rate of 66.8%, showing that the rapid adaptability of medical students surely has been involved in order to have such results. Ferrel et al report that the use of technology in medical learning, especially during this challenging time, may allow medical students to develop collaborative skills and improve their adaptability [5].

Some authors report an e-learning evaluation system based on a hexagonal approach with six dimensions, namely learner perspective, instructor attitudes, information quality, service quality, system quality, the sixth and the last dimension is social issues [6,7]. Overall our evaluation approach was similar, but more general since we didn't have a well-established e-learning system in advance. In our study we didn't find a significant relation between learner attitudes and their perceived satisfaction which is in contrast with some study results reporting that there is a positive statistically significant relation between the two previous parameters [7,8]. Our findings can be explained by the fact that the most of students have a good computer skill; most of them also believed that document sharing interfaces were intuitive and may be because in the current situation of quarantine, the use of media tools has been increased. In addition, all those studies are relatively ancient and nowadays the younger generations can deal very well with information technology.

Regarding the type, the content and the quality of learning materials, our results confirm those of other studies previously published. Indeed, all of them prove that there is a strong positive association between the content quality of e-learning curriculum and learner satisfaction [6,7,9]. With reference to the student's opinion, a quality content is defined by presentations with rich content, easy to understand and up to date. Together with clear examples, illustrations and additional resources such as quizzes and corrected exercises that attract attention [7].

The other side of medical learning is the clinical clerkship that medical students begin in their third year of medical studies. In the time of COVID-19, clerkship learning has been impacted profoundly and negatively,

as we mentioned previously. Through this survey, our medical students expressed their panic about the impact of the suspension of clinical clerkship on their medical training. Similarly, to the current trend and the increased demand on the organization of webinars, case discussion and team learning through videoconferencing platforms may reduce the negative impact of the cancellation of clerkship during the pandemic, but it can also enhance some clinical skills especially medical reasoning [1,5]. Learning by simulation may represent another opportunity for medical schools to solve this problem of postponed or canceled clerkship. It can also alternate clinical training, despite the lack of fidelity and realism [1,5]. Some authors suggest involving medical trainees as well in the telehealth environment, to continue medical training in this critical situation [1].

In order to learn from the pandemic, we must update our teaching techniques and we must innovate to ensure the continuity of medical education, whatever the circumstances. And since we aren't able to get rid of COVID 19, a second wave of the pandemic is predictable.

Quality medical education must be provided, so that the students can discard the panic and the idea that such a situation could impact their medical training and their career.

In fact, many studies show that e-learning seems to be as effective as traditional learning [6,8]. Therefore, medical students should perceive e-learning as a complement to attending class in-person, not as a replacement for it [10]. They should also perceive all the benefits of using internet technology to enhance medical education. E-learning offers the possibility of flexible working, time management and self-organization. It can also develop individual learning and encourage independent skills [10, 11]. As a result, educators will be involved in medical education as facilitators of learning, not as distributors of content [10].

## CONCLUSION

The current study focuses on the impact of COVID-19 disease on undergraduate medical education. Actually, the pandemic also impacts the residency program even more profoundly. So, other studies are necessary for more precise assessment on all levels of medical education. Currently, communities are confused by how to get rid of the COVID-19 pandemic and how to proceed in the wake of it in different sectors such as economy, health...etc

Obviously, we must be concerned also about how to adapt and enhance our teaching approach. If one thing

is for sure, this pandemic could permanently change the way how future doctors are educated. We'll probably take advantage of the ability of this young generation in medical school in dealing with technology, to integrate this one into health care and sharing Knowledge in an innovative way.

#### DECLARATION OF INTEREST

The authors declare that they have no conflict of interest in relation to this article.

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