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# Evaluation of Moroccan medical students' experience of online learning during the COVID-19 pandemic

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## Abstract:

**BACKGROUND:** Due to the COVID-19 pandemic, online learning has become the main method of instruction. This study aimed to evaluate Moroccan medical students' perceptions of medical online learning experience and to list its probable related advantages and barriers.

**MATERIALS AND METHODS:** A cross-sectional study on 400 medical students randomly selected from the different national medical institutions was conducted. A questionnaire evaluating the online learning experience during the pandemic was distributed via institutional e-mails. Statistical analyses were carried out using Statistical Package for the Social Sciences (SPSS).

**RESULTS:** 51.2% of students were satisfied with the online learning experience and reported several benefits including no need to travel (35.8%), cost savings (20.7%), and flexibility of home studying (32.3%). Technical issues related to the use of platforms or internet connection, limited interaction between students and their instructors, and lack of motivation were the major barriers to online learning. Moreover, results also showed a significant difference when comparing the attendance frequency between presential classes and online learning (i.e., before vs. during the COVID-19 pandemic) ( $P < 0.001$ ).

**CONCLUSIONS:** The experience of medical online learning was reported in our study to be associated to several advantages and disadvantages. Hence, students' perceptions should be considered to evaluate and improve the quality of this instructional method for a successful and more active approaches implementation.

## Keywords:

COVID-19, education, online learning, medical students

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## Introduction

The coronavirus disease 2019 (COVID-19) pandemic is caused by a highly transmissible virus: the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).<sup>[1]</sup> The COVID-19 has rapidly spread worldwide and therefore governments and health authorities have adopted various restrictive measures to minimize the spread of the virus among community members.<sup>[2-4]</sup> These measures included, among others, physical distancing, social isolation, home confinement, and closure of schools and universities.<sup>[3]</sup>

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In response to these measures and to ensure the learning continuity, instructors and teaching staff were required to adapt to the pandemic situation. Consequently, a rapid transition in the education process has occurred and was completely based on online platforms to deliver their courses and all other various teaching and learning activities.<sup>[4]</sup> As per the United Nations Educational, Scientific and Cultural Organization (UNESCO) reports, educational institutions in more than 120 countries have been closed and on-campus classes have been suspended and shifted to online learning in response to health authorities' recommendations.<sup>[4]</sup>

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Although the rapid transition to online courses was necessary to continue the learning process of students worldwide during the COVID-19 pandemic, it has been supposed to be a difficult action and to cause many challenges either in teaching or learning.<sup>[4-6]</sup> Besides, the success of online learning was reported to be related to students' learning attitudes and motivations,<sup>[7,8]</sup> which highlights the importance and the need to evaluate the usability and the adequacy of online learning methods in various educational domains, including medical sciences.<sup>[9-11]</sup>

Moreover, students' evaluation of courses and learning methods may be considered as quality indicators of teaching and learning process and may result in adequate decisions when selecting learning methods for medical students.<sup>[9]</sup>

Our study aimed to explore the Moroccan medical students' experience of online learning during the COVID-19 pandemic, in terms of online learning methods used, their advantages and limitations, and students' suggestions for improving online learning. Our findings may help understanding the needs of medical students to improve their online learning experience and in developing appropriate pedagogical approaches in medical education, especially if the pandemic lasts longer and future physicians are required to learn remotely.

## Materials and Methods

### Study design and settings

This was a cross-sectional study conducted in Morocco and targeted medical students from the different national medical institutions. The included students were randomly selected from preclinical cycle (referring to first and second year students) and clinical cycle (referring to third, fourth, and fifth year students). Data were collected using a questionnaire distributed via institutional e-mails within an overall collection period between April and October 2021.

### Study participants and sampling

A total number of 423 medical students completed the questionnaire. While 23 respondents provided implausible responses to the questions and therefore were excluded from the final dataset, the final sample consisted of 400 medical students.

Participation in this study was anonymous and voluntary. Participants were informed prior to starting to respond that all data were nonidentifiable and will be used for research purposes and that completing the questionnaire and submitting it is equivalent to agreeing to participate. They were also given the possibility to end

their participation and leave the questionnaire at any moment prior to submitting their responses.

### Data collection tools and technique

The different sections of the questionnaire were developed by authors to evaluate the experience of online learning before and during the COVID-19 pandemic, perceived benefits and barriers during the online learning, and students' perceptions, in addition to sociodemographic data.

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) software version 21.0 (SPSS, Chicago, IL, USA). In the descriptive analysis, the results on continuous variables were presented in mean (given with standard deviation) and the results on categorical data were presented in frequency (%). Chi-squared test was used to compare students' frequency of attendance to their courses before and during the COVID-19 pandemic, with a significance level set at 0.05.

### Ethical considerations

This study was approved by the Research Committee of the Faculty of Medicine and Pharmacy of Tangier. Participation to this study was voluntary and consent of participation was given before starting the study.

## Results

The characteristics of the included students are summarized in Table 1. Among the 400 students, 36.3% were males and 63.8% were females. The average age of

**Table 1: Characteristics of the study population (n=400)**

Variables	n (%)
Gender	
Female	249 (63.8)
Male	144 (36.3)
Cycle of study	
Preclinical cycle	284 (71)
Clinical cycle	116 (29)
Geographic areas	
Urban	355 (88.8)
Semi-urban	34 (8.5)
Rural	11 (2.7)
The used technological tools	
Laptop computer	333 (54)
Fixed computer	14 (2.3)
Tablet	26 (4.2)
Smart Phone	244 (39.5)
Internet connection options	
WIFI, Optical fiber (unlimited)	139 (26.7)
Prepaid card (limited)	375 (73.3)
Online learning experience before COVID-19 pandemic	
Yes	143 (35.8)
No	257 (64.3)

the students was  $19.6 \pm 1.6$  years (age range: 17–27 years). The distribution of students regarding their academic level was as follows: 71% of participants were preclinical cycle students and 29% were from clinical cycle. A total of 64.3% of students had no experience of online learning prior to the COVID-19 pandemic. The main reasons why these students did not attend the webinars before the pandemic include the unawareness of the existence of online courses, lack of time, and lack of means to attend online courses, and for the same students, the webinars/online courses were not interesting.

As for the experience of online learning during the pandemic, the main technological means used by students to attend their courses were laptop computer for 54% and smartphones for 39.5%. Moreover, a rate of 44% of students reported that they had a good internet connection. Regarding the time spent on online courses during this period, 62.3% of students were spending 3 hours/day or less, 36% were spending between 4 and 9 hours, and 1.7% spent more than 10 hours/day.

The students reported also the online learning strategies adopted by their medical institution and were based on interactive courses (videoconferences) with a rate of 29.8%, prerecorded courses for 19.2%, limited interaction courses (webinars) for 16.5%, social networks (Facebook, WhatsApp) for 3.6%, and printable courses (WORD, PDF, PPT) for 31% of students.

The benefits of online learning perceived by the included students were as follows: the no need to travel, expressed by 35.7%, cost savings (housing and catering costs), expressed by 20.7%, the flexibility of home studying for 32.6%, and 6.7% of students thought that online learning allows best interaction with various national and international instructors.

However, some disadvantages and barriers were reported and included technical issues related to the use of platforms or internet connection, lack of motivation, absence of interaction between students and their instructors, and lack of concentration due to home environment [Table 2].

We were interested to evaluate student’s perceptions toward the online learning experience during the COVID-19 pandemic using a 5-point Likert scale and responses were in regard to online learning platforms use, organization to attend courses, and the interaction possibility during online learning [Figure 1]. Students were also asked to rate their satisfaction level toward online learning; 32% and 20% were satisfied and very satisfied, respectively [Figure 2].

When asked to provide suggestions on how medical online learning could be improved, the most common

**Table 2: Perception of students towards online learning during the COVID-19 pandemic**

Advantages of online learning	n (%)
Possibility of interacting with various national and international teachers	58 (6.7)
Flexibility of home studying	281 (32.4)
No travel	310 (35.8)
Cost savings	179 (20.7)
No perceived benefits	38 (4.4)
Disadvantages of online learning	
Absence of interaction with instructors and between students	175 (14.5)
Technical problems (related to the use of platforms, internet connection)	221 (18.3)
Difficulty of technological tools use by teachers	126 (10.4)
More time and effort are required (attendance, understanding of courses)	76 (6.3)
Lack of concentration due to home environment	170 (14.1)
Courses overload	159 (13.2)
Lack of motivation	178 (14.8)
Technological tools and internet connection costs	35 (2.9)
No barriers are faced	66 (5.5)

suggestions underlined the necessity to create specific platforms dedicated to medical education and to provide accessibility to the necessary material for online learning.

We also compared the rate of participation of students between the two groups (face-to-face vs. online courses). Results showed that 80.5% of students used to attend their face-to-face courses and 64.8% online courses ( $P < 0.001$ ) [Table 3].

## Discussion

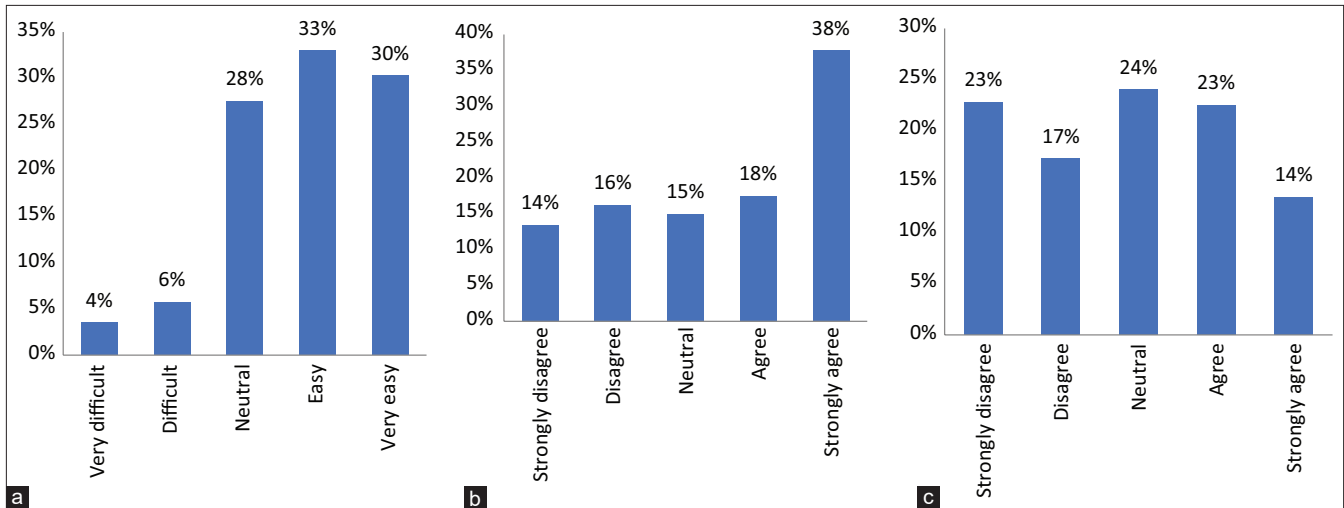
Against the challenges of the COVID-19 pandemic and the risk of developing life-threatening conditions, several actions have been adopted by instructors to guarantee the continuity of medical education process and safety. Online learning has become a mandatory strategy to maintain the continuity of learning during the current pandemic in various educational institutions worldwide, including medical schools.<sup>[12]</sup>

Students have been suddenly shifted from on-campus learning to online classes via digital platforms.<sup>[13]</sup> This rapid transition has presented several difficulties either for instructors, students, or their families.<sup>[4-6]</sup> We conducted this study to report the Moroccan medical students’ online learning experience during the pandemic. It also highlights the advantages and disadvantages barriers to the online learning experience perceived by students during the pandemic. Our findings may help to improve online learning system and the related decisions in medical institutions in the future.

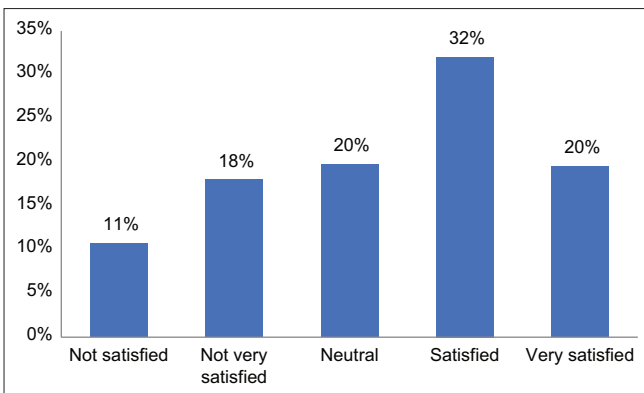
In this study, we evaluated the students’ satisfaction toward their experience of online learning during the

**Table 3: Comparison of attendance frequency between face-to-face and online learning (before vs. during COVID-19 pandemic)**

Attendance frequency	Face-to-face learning (before COVID-19 pandemic) n (%)	Online learning (during COVID-19 pandemic) n (%)	P
I always attend	182 (45.5)	142 (35.5)	<0.001
I attend on average	140 (35)	117 (29.3)	
I rarely attend	48 (12)	67 (16.8)	
I never attend	30 (7.5)	74 (18.5)	



**Figure 1:** Students' perception regarding: (a) online learning platforms use difficulty, (b) organization to attend courses, and (c) interaction possibility during online learning experience



**Figure 2:** Students' satisfaction toward online learning experience

pandemic and 50.6% were satisfied. In addition, they listed several advantages of this experience, including the no need to travel, the flexibility of home studying, and cost savings. Similar studies mentioned other advantages like access to a massive and greater amount of information, the possibility of an individualized approach in learning that allows students to have more control over their educational system along with their ability of asking and answering questions anonymously, which makes the learning environment less intimidating.<sup>[12,14]</sup>

Although the multiple reported advantages, students reported disadvantages related to the experience of online

learning. Technical problems that were suggested to be related to some factors including the use of platforms and internet connection with a rate of 18.1% were the most mentioned. Lack of motivation is also perceived as a disadvantage for 15% of students, probably due to the immediate social isolation imposed by the pandemic.<sup>[15]</sup> The absence of interaction between students and their instructors is also an important challenge against online learning with a rate of 14.5%. Moreover, students reported that the problem of interaction can negatively affect their comprehension, particularly their understanding of the practical approaches during the lectures.<sup>[8,16]</sup> Thus, face-to-face learning allows medical students to communicate and share their thoughts and knowledge through interacting which may be associated to positive effects on their learning process.<sup>[17-19]</sup> Lack of concentration due to family environment is also noted for 14.1% of students, as some students live in small apartments making the online learning activity less efficient.<sup>[20]</sup>

The problems that arose following the implementation of online teaching may negatively affect the frequency of online courses attendance, which may explain the significant difference between the frequency attendance of the two teaching methods reported in our study. Participation rate in online learning during the COVID-19 pandemic is low compared to prepandemic



face-to-face learning. These results may also be explained by decreased motivation and other psychological issues caused by COVID-19–related measures such as social isolation and confinement.<sup>[15]</sup>

### Limitations

Our study has some limitations. The students who were not engaged in online interactions and those without access to the internet were not surveyed. Moreover, our study has evaluated the online learning experience based on students' perceptions; it would be interesting to assess the effectiveness of online learning based on students' performances. Nevertheless, our findings highlight concerns regarding the experience of online learning in medical education in Morocco, which should be considered to effectively implement this method of learning.

### Conclusion

The end of the pandemic is unknown due to the continuous expansion of the SARS-CoV-2 virus. Hence, online learning may continue to be an alternative to face-to-face classes. In our study, students reported that online learning can provide several benefits such as the no need to travel, the flexibility of home studying, and cost savings. However, other factors that may affect the satisfaction of Moroccan medical students toward their experience during the pandemic have also been reported and included technological and home environment issues. Our findings also provided students' requirements regarding online learning including the creation of specific platforms dedicated to medical education and access to the necessary equipment. Such results may help improving online learning approaches in medical education, especially if the pandemic lasts longer and future physicians are required to learn remotely.

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### Conflicts of interest

There are no conflicts of interest.

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