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Online teaching assessment during COVID period among FMPM students

THESIS

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BY

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TO OBTAIN THE DEGREE OF DOCTOR OF MEDICINE

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{رَبِّ أَوْزِعْنِي أَنْ أَشْكُرَ نِعْمَتَكَ
الَّتِي أَنْعَمْتَ عَلَيَّ وَعَلَى وَالِدَيَّ
وَأَنْ أَعْمَلَ صَالِحًا تَرْضَاهُ وَأَصْلِحْ
لِي فِي ذُرِّيَّتِي إِنِّي تُبْتُ إِلَيْكَ
وَإِنِّي مِنَ الْمُسْلِمِينَ}

سورة الأحقاف

بِسْمِ ٱللَّهِ ٱلرَّحْمَٰنِ ٱلرَّحِيمِ

قَالُوا۟ سُبْحَٰنَكَ لَا عِلْمَ لَنَآ إِلَّا مَا عَلَّمْتَنَآ ۖ إِنَّكَ أَنتَ ٱلْعَلِيمُ ٱلْحَكِيمُ ﴿٣٢﴾

صَدَقَ ٱللَّهُ ٱلْعَظِيمُ

Hippocratic Oath

I swear to fulfill, to the best of my ability and judgment, this covenant :
I will respect the hard-won scientific gains of those physicians in whose steps I walk, and gladly share such knowledge as is mine with those who are to follow.
I will apply, for the benefit of the sick, all measures [that] are required, avoiding those twin traps of overtreatment and therapeutic nihilism.
I will remember that there is art to medicine as well as science, and that warmth, sympathy, and understanding may outweigh the surgeon's knife or the chemist's drug.
I will not be ashamed to say "I know not," nor will I fail to call in my colleagues when the skills of another are needed for a patient's recovery.
I will respect the privacy of my patients, for their problems are not disclosed to me that the world may know. Most especially must I tread with care in matters of life and death. If it is given me to save a life, all thanks. But it may also be within my power to take a life ; this awesome responsibility must be faced with great humbleness and awareness of my own frailty. Above all, I must not play at God.
I will remember that I do not treat a fever chart, a cancerous growth, but a sick human being, whose illness may affect the person's family and economic stability. My responsibility includes these related problems, if I am to care adequately for the sick.
I will prevent disease whenever I can, for prevention is preferable to cure.
I will remember that I remain a member of society, with special obligations to all my fellow human beings, those sound of mind and body as well as the infirm.

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LISTE ARRETEE LE 04/10/2023

DEDICATIONS

Je me dois d'avouer pleinement ma reconnaissance à toutes les personnes qui m'ont soutenue durant mon parcours, qui ont su me hisser vers le haut pour atteindre mon objectif.

C'est avec amour, respect et gratitude que

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PROFESSEUR AHMED RHASSANE EL ADIB,

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Je vous remercie vivement professeur pour avoir chaleureusement accepté de nous honorer par votre présence parmi le jury. J'ai toujours admiré votre simplicité, et la facilité de votre abord. Je suis toujours impressionné par vos qualités humaines et professionnelles, qui me font aimer d'avantage ce métier noble.
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<u>A NOTRE MAITRE ET JUGE DE THESE,</u>
<u>PROFESSEUR GHIZLANE DRAISS,</u>

Je vous remercie vivement de la spontanéité avec laquelle vous avez accepté de juger ce travail. Je tiens également à vous remercier pour votre disponibilité, votre modestie et votre gentillesse, qui sont de grands atouts à côté de votre rigueur scientifique.
Veuillez accepter, cher Maître, mon sincère respect.

<u>A NOTRE MAITRE ET JUGE DE THESE,</u>
<u>PROFESSEUR MOHAMED AMINE LAKMICHI,</u>

C'est pour moi un grand plaisir et honneur de voir un homme au grand cœur comme vous siéger parmi les membres de jury de notre thèse. Je vous remercie pour vos encouragements et votre modestie ainsi que pour votre bonté.
Veuillez recevoir l'expression de ma gratitude, mon admiration et ma considération les plus distinguées.

ABREVIATIONS

LISTE DES ABRÉVIATIONS

WHO : World Health Organization

FMPM : Faculty of Medicine and Pharmacy of Marrakesh

ICT : Information and communication technologies

GENIE : Généralisation des technologies d'information et de communication dans l'enseignement

MVC : Moroccan Virtual Campus

VR : Virtual Reality

MD : Doctor of Medicine

FIGURES

OUTLINE

INTRODUCTION

Online learning, a specific form of distance or remote learning, is the process of learning with some or all instructional materials delivered over the Internet, with the teacher facilitating the process by structuring and sequencing the online activities (Cook & Steinert, 2013). This work model has known growing interest over the past decade with the fast development of technological tools, which made the switch from traditional face-to-face interactions a logical option in various fields. For instance, the remote method has enabled multiple institutions to cut costs, allowing for fewer working hours per week in favor of a healthier mental state and better time management. Online learning's current form follows a series of historical events that go as far back as the 19th century(1), making it grow slowly but surely in popularity among experts, as well as individuals.

The WHO declared COVID-19 a Public Health Emergency of International Concern on 30 January 2020 and characterized the outbreak as a pandemic on 11 March 2020(2), presenting an unprecedented challenge to the global education system. Educational institutions were compelled to rapidly transition from face-to-face teaching to online methods to ensure the safety of their students and educators, therefore allowing schools and universities to keep giving out classes while respecting the pandemic's restrictions, seen as the only real way of facing the rapid spread of the virus.

The Faculty of Medicine and Pharmacy of Marrakesh, as a part of a large network of medical faculties in the Kingdom of Morocco, and following the instructions of the Ministry of Education, has been able to implement this mode of instruction to face this global health crisis, as it became an essential tool for medical schools to adapt and continue educating students during lockdowns. Thus switching to a fully online professor-student interaction, consisting of setting up a students' platform allowing them to access filmed lectures, live interactive classes, and quizzes.

The traditional approach to medical education being deeply rooted in face-to-face interactions, clinical experiences, and laboratory work brought forth a multitude of challenges

and opportunities since this transition, making the debate about its efficiency rise among educational entities.

Experts have shown concerns about the feasibility of implementing online teaching in medical schools. Mainly, how quickly could the transition take place in the context of a global crisis, as well as the degree of adaptation of both students and educators to this new method, in the light of technophobia and limited resources, in a way that wouldn't hinder the development of the students' curriculum, In addition, the problem of replacing simulation classes that represent an important part of medical professionals' training. Lastly, time management, financial status, the lack of in-person interaction, and mental health were all key elements that had to be taken into account.

However, this educational approach came with several advantages. The urgent switch enabled a set of education professionals as well as students to gain a large knowledge about the new technological tools put in place for educational purposes in a short time. It has also enabled a new horizon of options for the future resulting in more flexibility and a faster response to future challenges. Furthermore, it allowed a certain level of financial stability to people already affected by the repercussions of the pandemic.

The heterogeneity of opinions about online learning as a new way of training medical professionals leaves room for a large specter of studies that are still needed to objectively assess, and then accept, deny, or find a common ground for the implementation of this method, that could potentially pave the way for the future generations to access the health system world as responsible caregivers.

The objectives of this thesis are :

To provide a description and an analysis of the multifaceted impact of online learning in the FMPM, shedding light on the opportunities and challenges that this digital transformation presents.

- ✓ To assess the difficulties encountered by the FMPM students with online teaching during the Covid period.
- ✓ To point out the advantages presented by this method.
- ✓ To assess students' experience with this method.
- ✓ To evaluate students' satisfaction with online teaching.
- ✓ To determine the possible future implementation of online teaching in the FMPM.

METHODS

1. NATURE OF THE STUDY:

This was a cross-sectional study, with a descriptive and analytical aim.

2. TARGET POPULATION AND SAMPLING METHOD:

The population concerned by this study were the medical students of the Faculty of Medicine and Pharmacy of Marrakesh from 1st to 5th year during the Covid period, and the sampling method used was non-probability sampling.

2.1 Inclusion Criteria :

All current medical students and graduates from the FMPM who benefited from online teaching from the 1st to the 5th year during the COVID period.

2.2 Exclusion Criteria

All medical students from the FMPM who haven't studied online during the Covid period.

3. ETHICAL CONSIDERATIONS :

For each student, we explained the study and its objectives, reminding them that the survey is voluntary, and anonymous, with the right to refuse to participate in the study.

All answers were confidential, and students' anonymity was respected, with conformation to ethical considerations.

4. THE STUDY PERIOD :

The collection of replies took place from the 20th of July 2023 to the 1st of October 2023, after the form was published on all Whatsapp and Facebook groups of classes from 2nd year up to graduates from the 2021-2022 year.

5. THE DEVELOPMENT OF THE QUESTIONNAIRE :

The collection of data was made through an anonymous questionnaire, designed and written to be clear and understandable in English. It consisted of 38 questions focused on 8 major sections, with a majority of questions being single or multiple choice, conversely only 2 were short open questions.

2.1 General information: 4 questions

This section contains questions about age, gender, year of studies, and year studied online.

2.2 Previous experience and Proficiency with technological tools: 4 questions

This section evaluates the student's experience and proficiency with online learning before the COVID-19 pandemic and determines which platforms are the most popular among students.

2.3 Technological equipment: 4 questions

This section had 4 questions informing about :

- The type of internet connection used to access online classes.
- The quality of the internet service.
- The type of device used to attend classes.
- If the device is equipped with a camera and mic.

2.4 Assessment of students' experience of online learning during the Covid period: 10 questions

This section was dedicated to evaluating the diverse aspects of online teaching as experienced by students. Mainly, the accessibility, quality of lectures, interaction, engagement, and efficiency of this method.

2.5 Simulation through online teaching : 3 questions

The objective of this section was to have an idea of the impact of this transition on simulation classes in the FMPM.

2.6 Advantages and disadvantages of online teaching: 6 questions

- Benefits of online teaching to medical students in the FMPM.
- Difficulties encountered through this method by students.

2.7 Overall satisfaction using this mode of instruction : 3 questions

- Level of proficiency regarding technological tools after this experience.
- Rating satisfaction towards the experience of online learning.
- The success of online learning compared to the face-to-face method.

2.8 Overall view of future implementation of this learning method: 4 questions

- Comparison between the traditional and the online method according to students.
- The preferred method by students between traditional, online, and hybrid learning.
- Suggestions for effective ways to implement online teaching in the FMPM.

- Perception of the impact of online teaching in the future of medical studies in the FMPM.

6. DATA ENTRY AND ANALYSIS :

We carried out the statistical analysis of the data using Google Sheets. Entry of texts and tables was made using Google Docs and graphs through Google Forms and Google Sheets. The results were expressed in percentages and in numbers.


RESULTS

A. General information :

1. The gender :

Our sample consisted of 106 women and 55 men, representing a sex ratio of 0,52%.

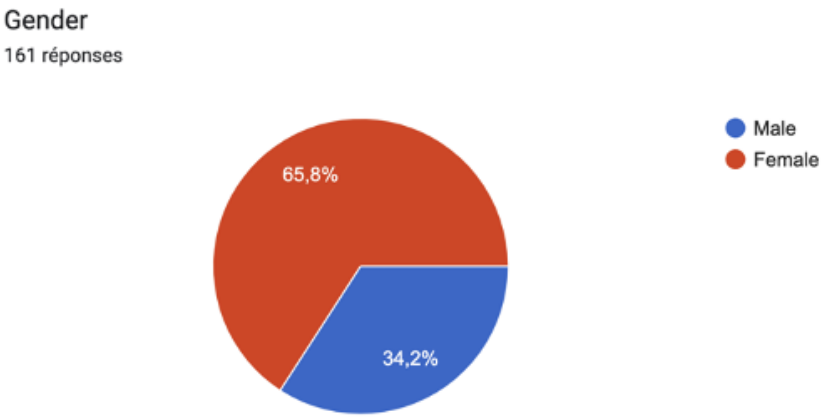

Figure 1: Distribution of students according to their gender.

2. The age :

The age group from 23-25 years was the most represented in our sample, i.e. 86 students.

The age group from 18-20 years was the least represented with 10 students (6.2 %).

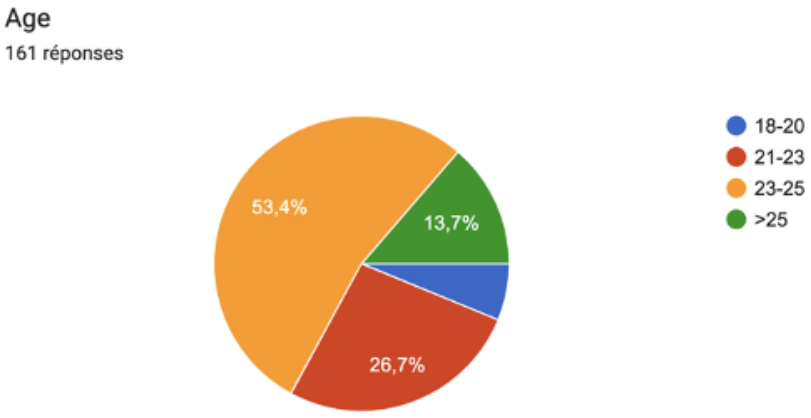

Figure 2: Distribution of students according to their age.

3. Course year :

The seventh years / 2nd-year interns were the most represented (N=76), followed by sixth years / 1st-year interns (N = 16,8%), meanwhile, 2nd years only represented 1,2% (N=2).

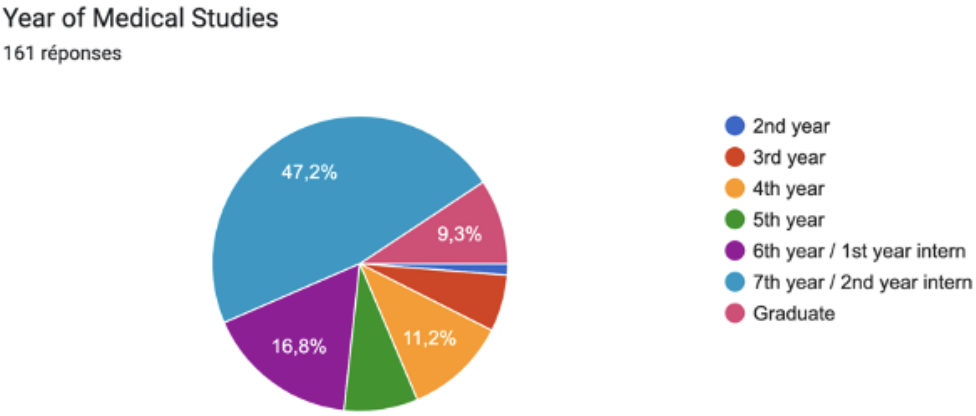

Figure 3: Distribution of students according to the course year.

4. Course year studied online :

From our sample, most students (N=51) have carried out their fourth year online, followed by first year with 32 students, while second year was the least represented with 24 students.

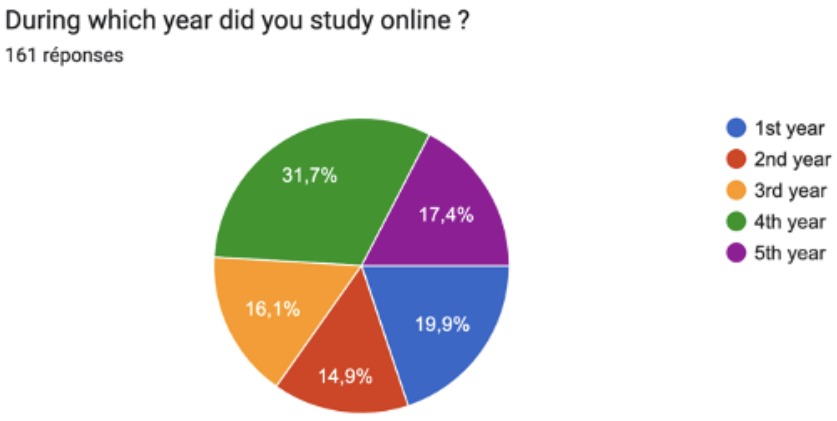

Figure 4: Distribution of students according to the course year studied online.

B. Previous experience and Proficiency with technological tools :

1. Students' prior exposure to online learning before the Covid-19 pandemic:

Only 19,9% of students rated their previous experience with online learning higher than average, with 16,8% (N=27) rating it as high and 3,1% (N=5) rating it as very high.

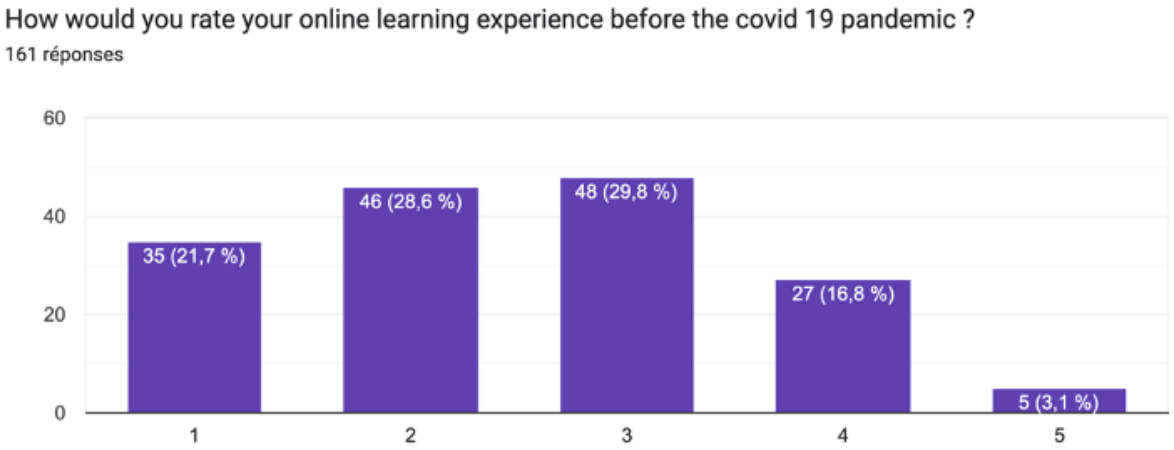

Figure 5: Students' experience with online learning before the Covid-19 pandemic.

2. Students' proficiency with technological tools prior to the onset of the Covid-19 pandemic :

32,3% of students rated their competency with technological tools as neutral. 28,6% of them considered it to be low, and 12,4% judged it as very low.

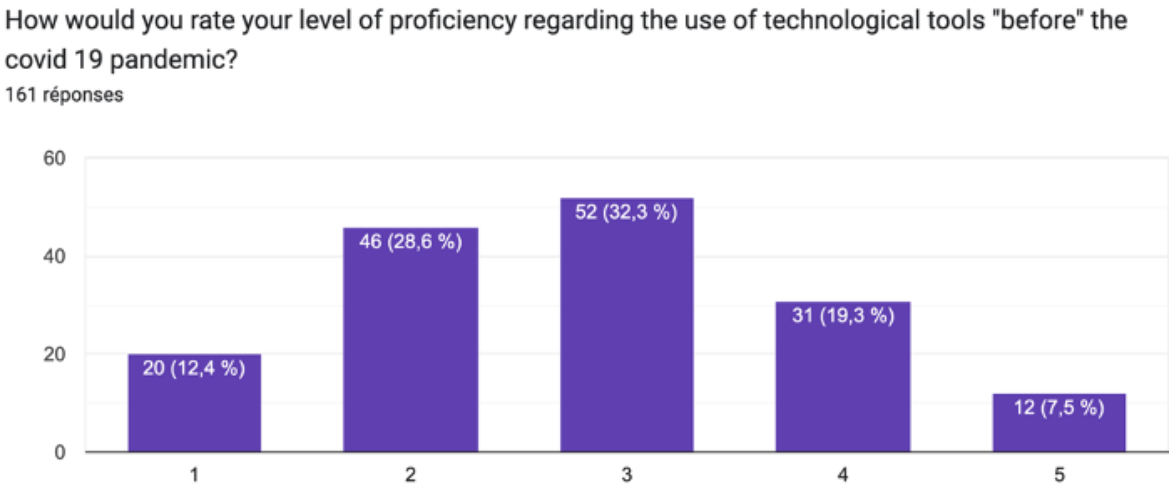

Figure 6: Students' level of proficiency in the use of technological tools prior to the Covid-19 pandemic.

3. Online platforms :

Out of the participants, 55 stated that they had been using online platforms as part of their medical training prior to the COVID-19 pandemic, 47 students declared that they resorted to online platforms only during the pandemic, and 59 reported still using them.

In addition, YouTube was the most used platform with 63 students declaring it to be their go-to online platform, followed by the Theia platform being chosen by 48 students and the FMPM website by 28. Other faculties' websites were chosen by 12 students.

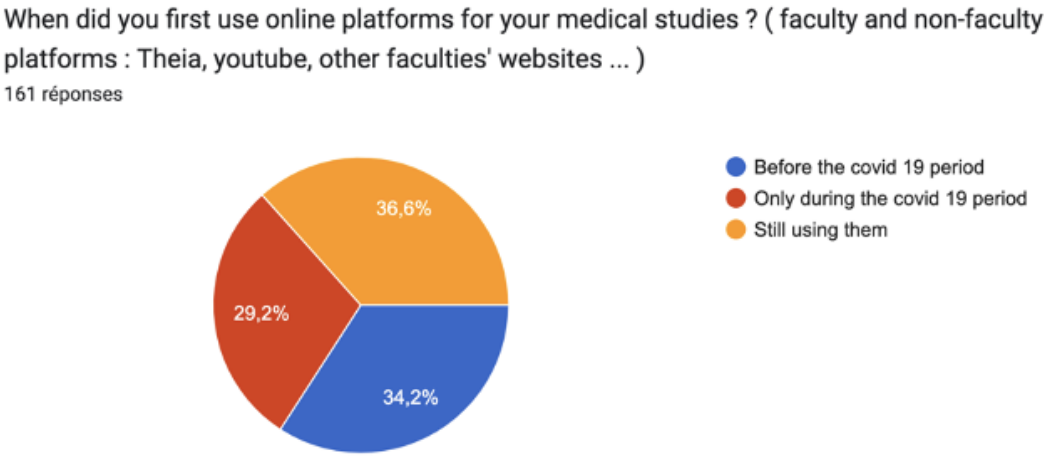

Figure 7: Time of initial use of online platforms for medical studies.

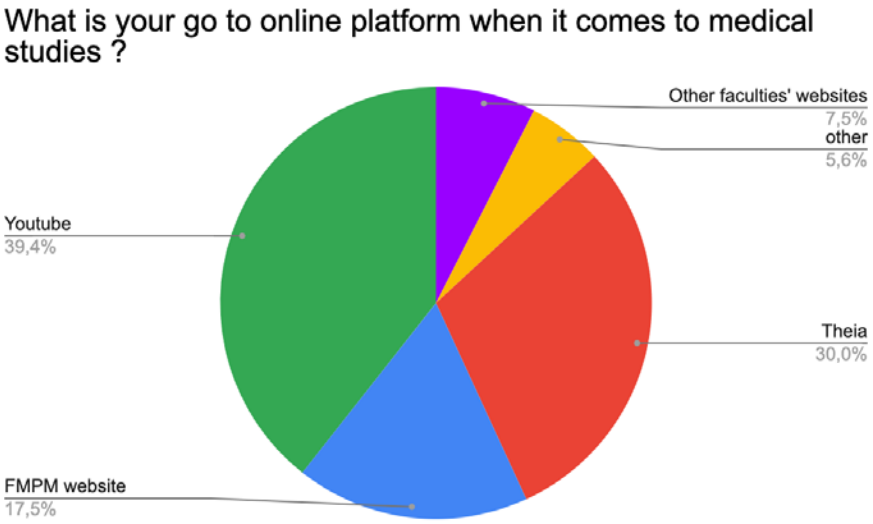

Figure 8: Preferred online platform of medical students.

C. Technological equipment

1. Students' technical conditions :

Out of the 161 students interviewed, a majority claim to have access to technological equipment allowing them access to online classes, with 91% stating having used a personal computer, 41% a phone, and 8% a tablet.

145 students reported that the device was equipped with a built-in mic and camera, and only 10% claimed the opposite.

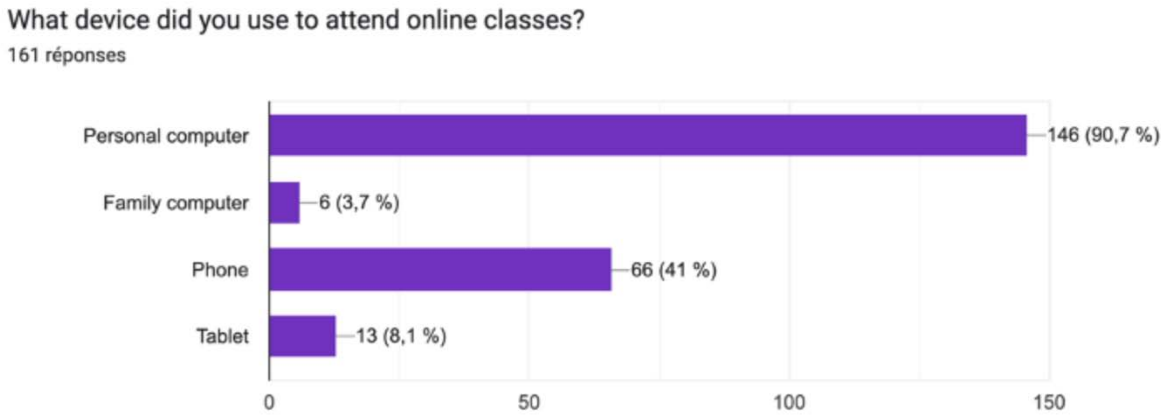

Figure 9: Device used for accessing online classes.

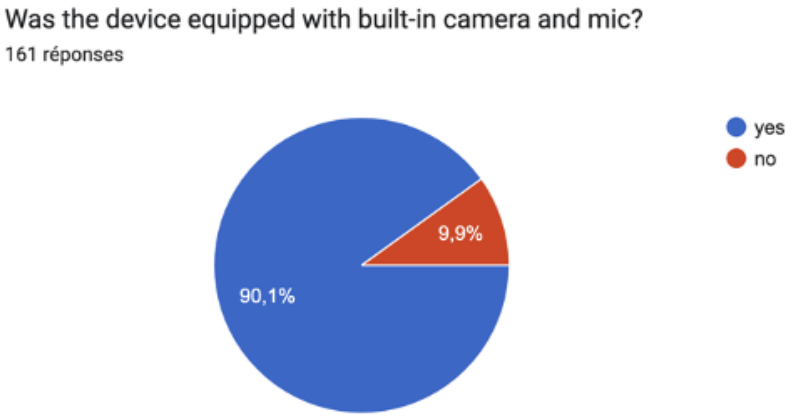

Figure 10: Presence of Built-in Camera and Microphone on the Device

2. Internet connection :

a- Type of internet connection used :

More than half of students (N=83) had access to Wi-Fi through ADSL connection and 58 to Fiber-optic internet. 18 of them used 4G to connect to the internet and 2 stated they used other types of internet connections.

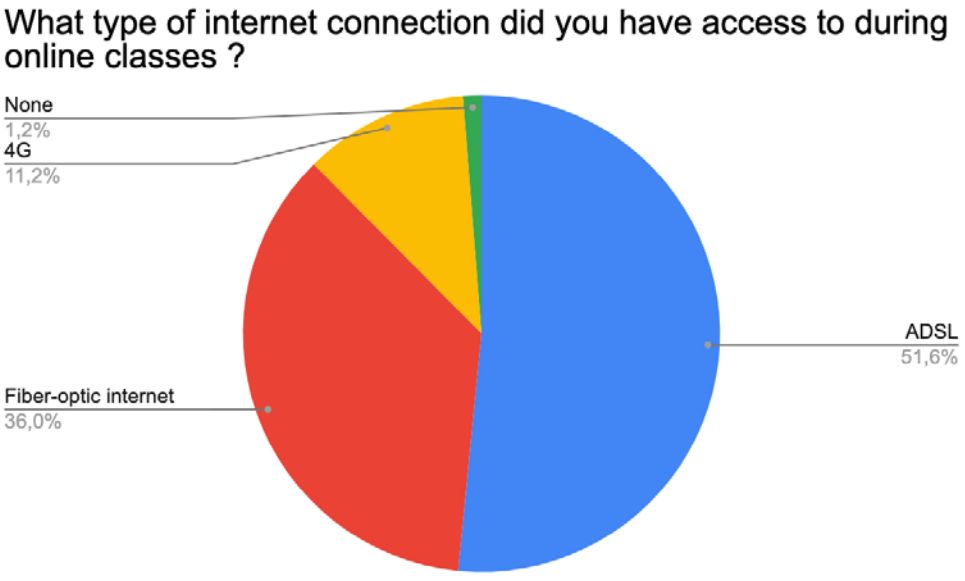

Figure 11: Different internet connection types used to access online classes.

b- Quality of the internet service :

The quality of the internet service used was described as good by 32% of the students, and very good by 13%. 36% were neutral about the quality of their Internet connection, and 19% considered it of low or very low quality.

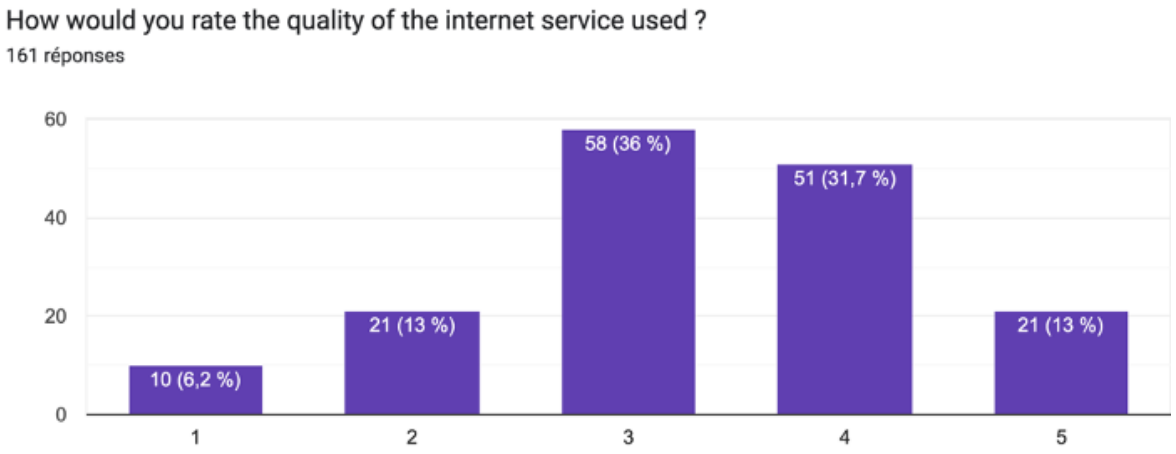

Figure 12: Quality of internet connection.

(1 = very bad - 5 = very good)

D. Assessment of students' experience of online learning during the Covid period :

1. Level of difficulty for navigating through Online Platforms employed by the FMPM :

According to the participants, the use of the online platforms provided by the FMPM during the Covid-19 period was generally easy with 38% of votes, or very easy with 19% of votes. 33% stated that they were neutral and only 1% reported that the platforms were very difficult to use.

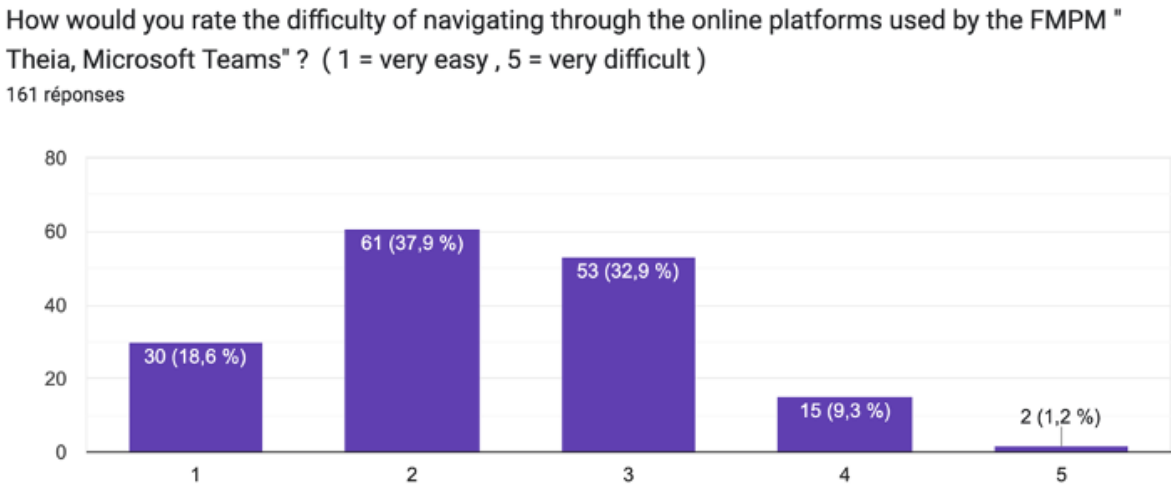

Figure 13: Difficulty Rating of FMPM's Online Platforms: Theia and Microsoft Teams.

2. Quality of online lectures :

Students were inquired about the quality of online materials they received. The results have shown that 47% of students were neutral, while 36% of them judged them as good to very good. The quality of lectures was judged as low to very low by 17% of all participants.

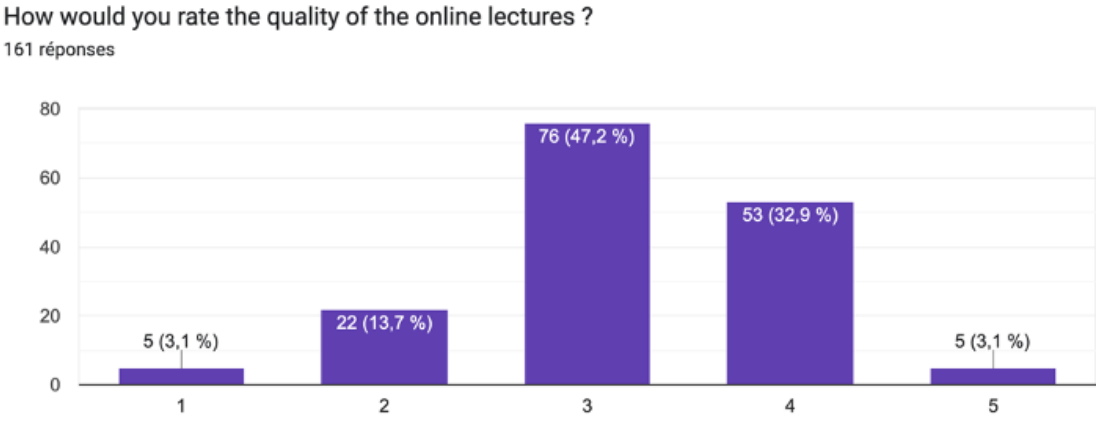

Figure 14: Students' judgment of online lectures' quality.

3. Student-professor interaction through online teaching compared to the traditional method :

According to the results, 11% of the participants judged that the interaction was very easy to accomplish, and 30% declared that it was easy. On the opposite side, 10% stated that it was very difficult to interact with professors and 18% considered it difficult.

Finally, 32% of students felt neutral about it.

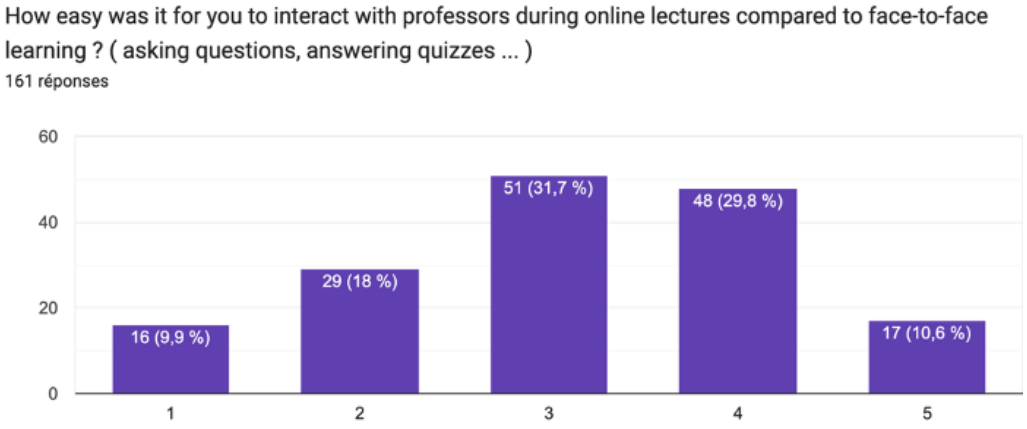

Figure 15: Comparison of Student-Professor Interaction Ease: Online vs. Face-to-Face Learning.

4. Time schedule :

Regarding the time schedule designed for online lectures, 41% of students felt neutral toward it. 27% of students felt satisfied with the design and 3% were very satisfied with it.

The time schedule was judged as bad by 21% of students and very bad by 8% of them.

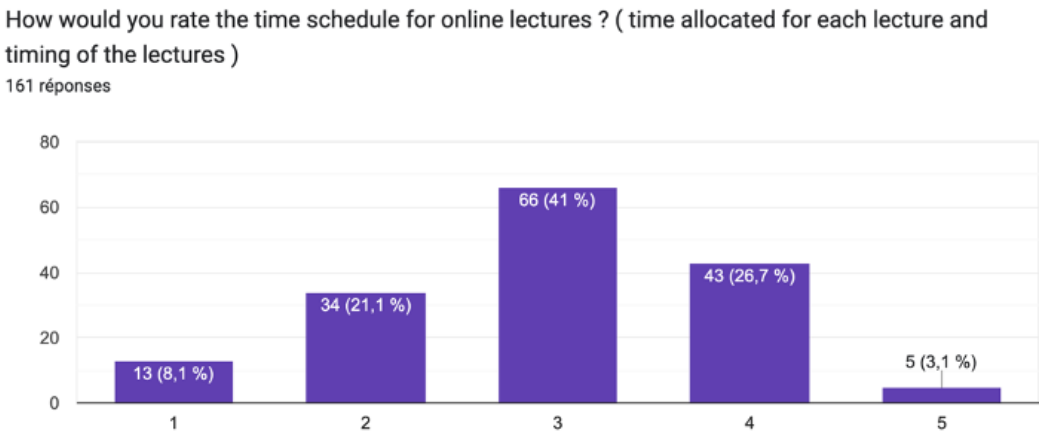

Figure 16: Rating of Allocated Time Schedule for Online Lectures.

5. Time management :

Time management efficiency was judged as very good by 14% of students and very good by 27%.

6% stated that their time management efficiency was very bad and 8% of them reported it to be bad.

In addition, 35% of all participants judged it as neutral.

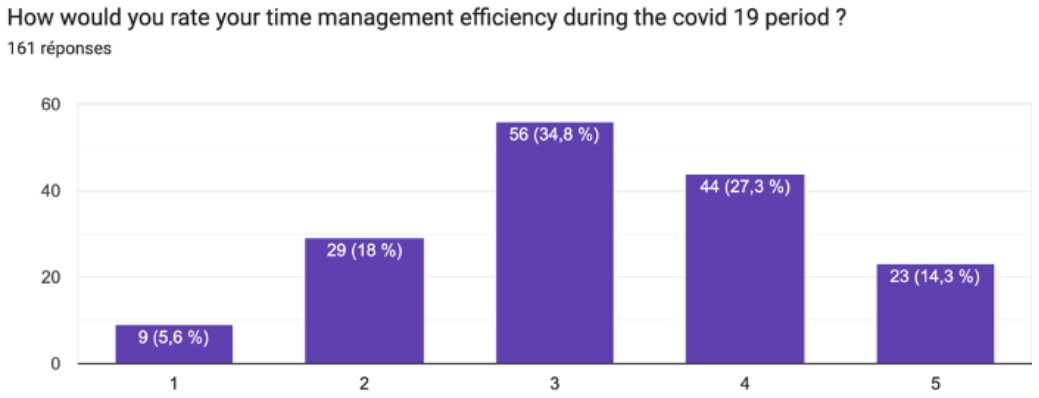

Figure 17: Rating of time management efficiency.

6. Students' engagement :

The study has shown that 12% of students had a very high level of engagement, 19% had a high engagement, and 30% had an average engagement. However, the engagement level was judged as very low and low by 20% of students each.

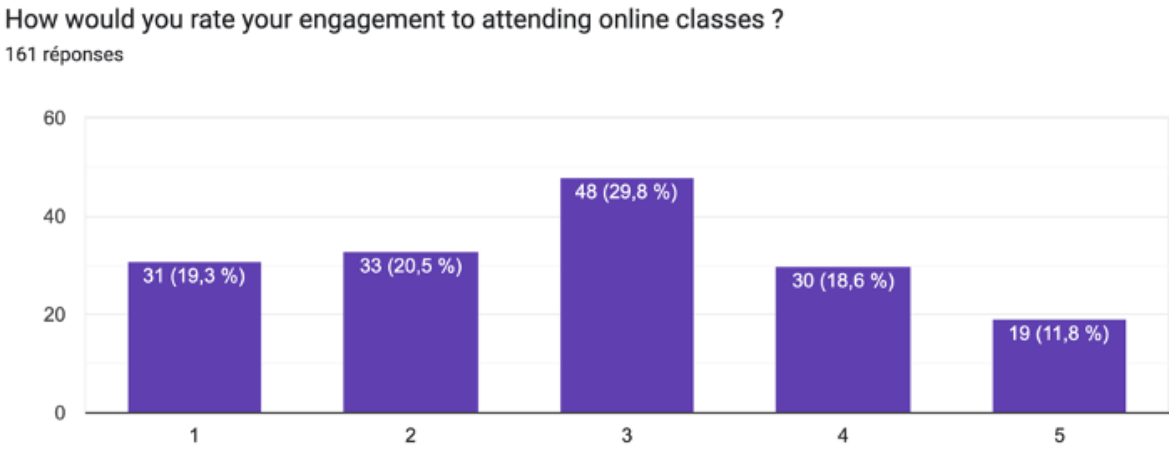

Figure 18: Rating of engagement to attending online classes.

7. Assessment of students' performance through online learning :

29% of participants were satisfied and 7% were very satisfied with their knowledge acquired through online classes. Meanwhile, 24% considered that online learning has affected their knowledge badly and 7% stated that their knowledge acquisition was very bad. Though, 34% judged it as neutral.

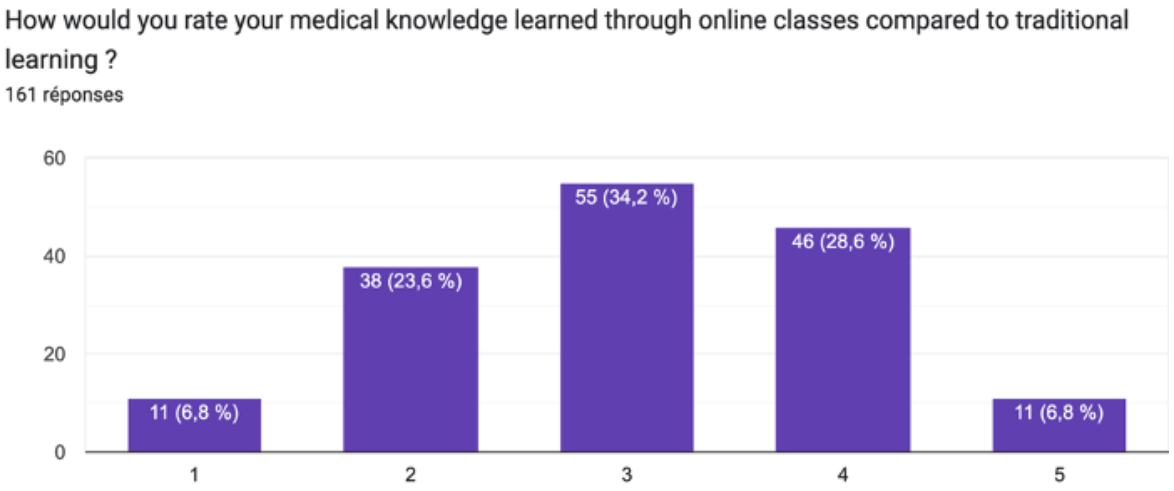

Figure 19: Rating of medical knowledge acquired through online classes.

Students' performance in exams was not affected for a majority of students (62,1%). While 26,1% of them have seen their marks go up through the online method, as opposed to 11,8% who have seen their marks go down.

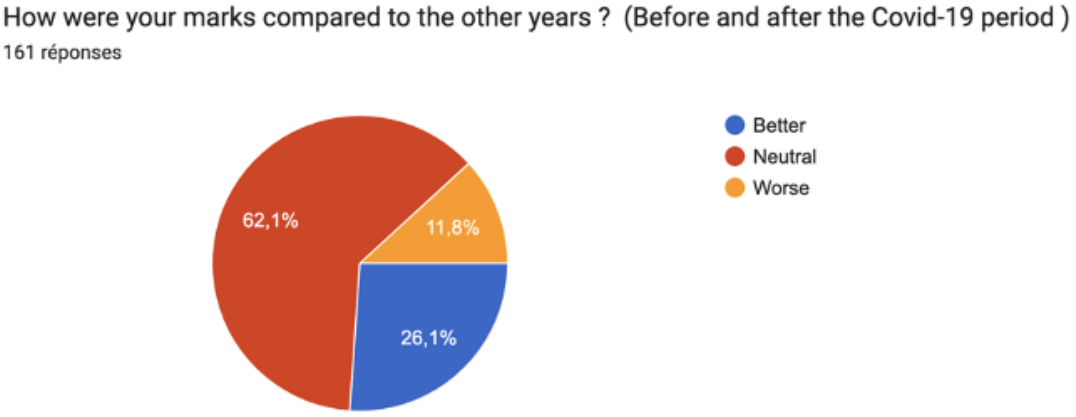

Figure 20: Online teaching's impact on students' performance.

8. Students' success rate :

As seen through the following pie charts, a high majority of students have been able to pass all their modules from the second semester of 2019-2020.

i.e. out of the 39,1% of students who took 5 modules, 33,5% have managed to pass them. While only 1,2% (N=2) students have only been able to pass one or two modules.

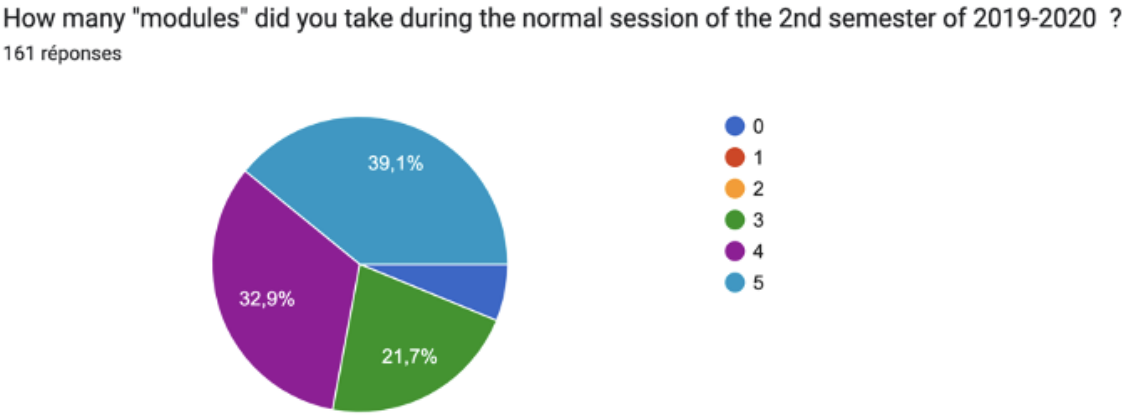

Figure 21: Number of modules taken by students during the 2nd semester of 2019-2020.

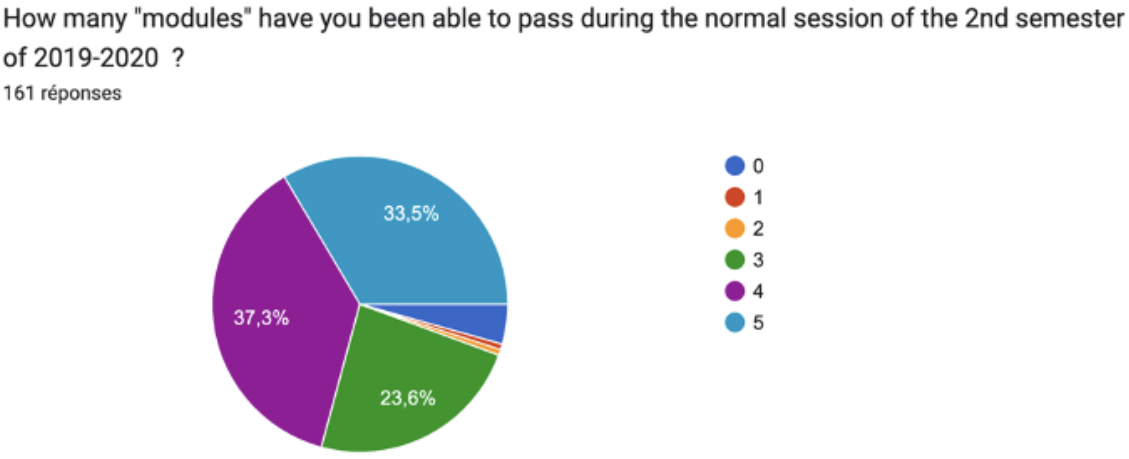

Figure 22: Number of modules passed by students during the 2nd semester of 2019-2020.

E. Simulation through online teaching

1. Management of simulation classes :

During the COVID-19 period, many of the simulation courses have been canceled as stated by the following numbers, as only 19,3% of students declared that they have benefited from them. It is to be noted that 71,4% of students said that the canceled classes have unfortunately not been rescheduled for a further date.

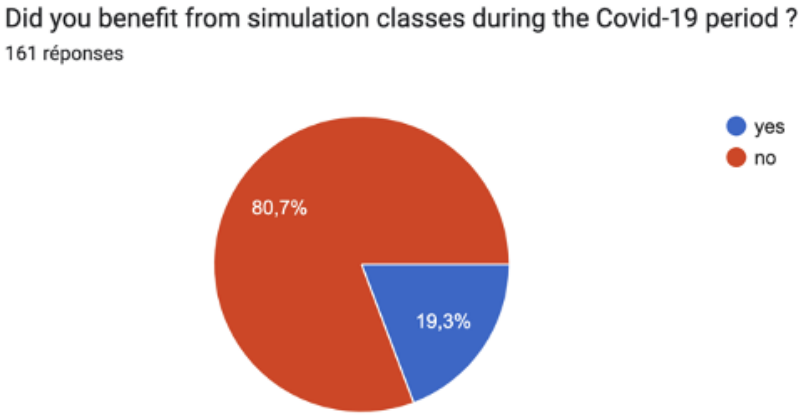

Figure 23: Simulation classes' schedule during the Covid-19 period.

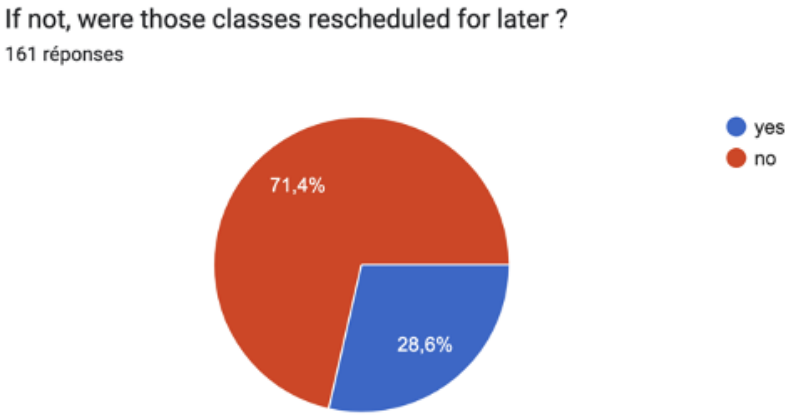

Figure 24: Rescheduling of Online Classes during the Covid-19 period.

2. Students' assessment of the importance of face-to-face simulation classes in their training :

Out of the interviewed students, a large majority (N=72) have judged face-to-face simulation courses to be very important. Another 44 students judged them as important and 29 stated that the simulation classes were of medium importance.

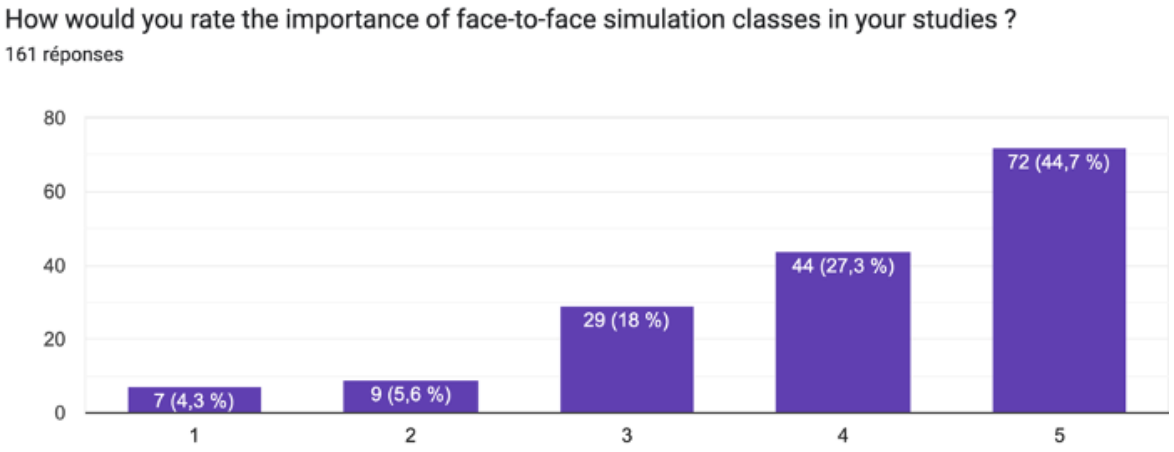

Figure 25: Students' Evaluation of the Importance of In-Person Simulation Classes in Their Training.

F. Advantages and disadvantages of online teaching :

1. Strengths of online teaching :

According to students, flexibility was seen as the strongest asset of the online method compared to the traditional one. In addition, students considered this method as allowing for more durable access to study materials, time-saving, and more time to assimilate new information and considered it as a less stressful method.

36% of students have also declared that this method enabled them to cut on study expenses with 43,5% of the total number of participants considering their financial situation better than it was with face-to-face learning.

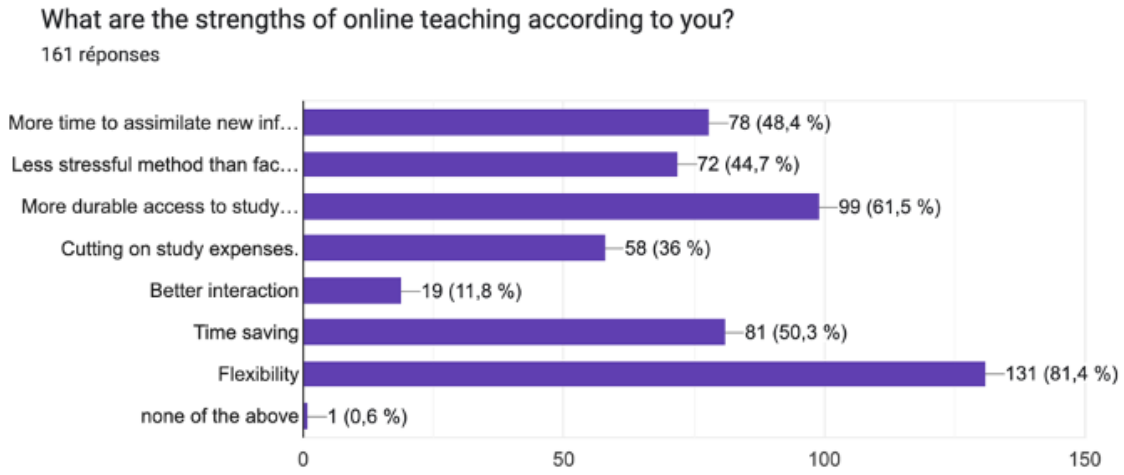

Figure 26: Pros of online teaching.

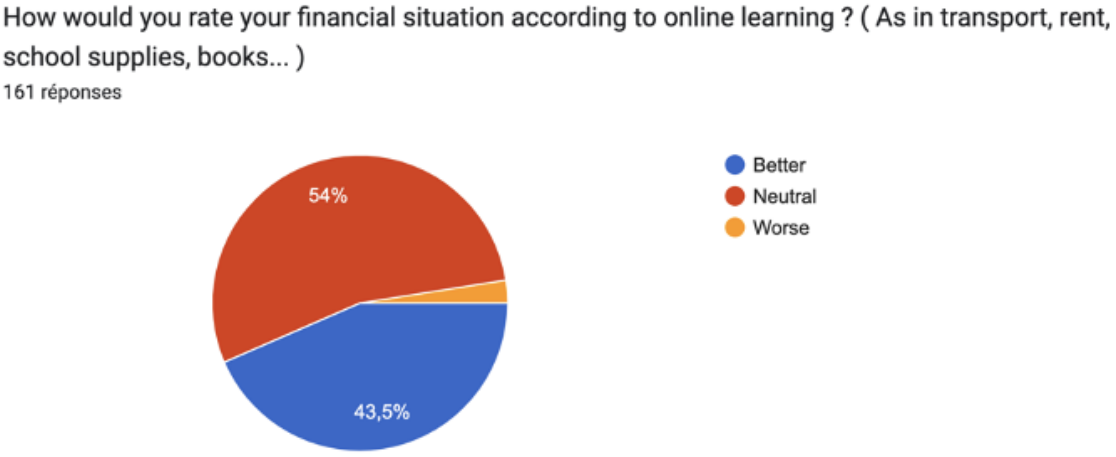

Figure 27: Students' financial situation in regard to the switch to online teaching.

2. Challenges of online teaching :

a. Limits of online teaching :

Technological difficulties have been seen as the biggest limits to online teaching, a majority of students have stated that internet quality and technical issues have been their biggest difficulties.

Following them came communication problems, the lack of clinical skills, and family distractions.

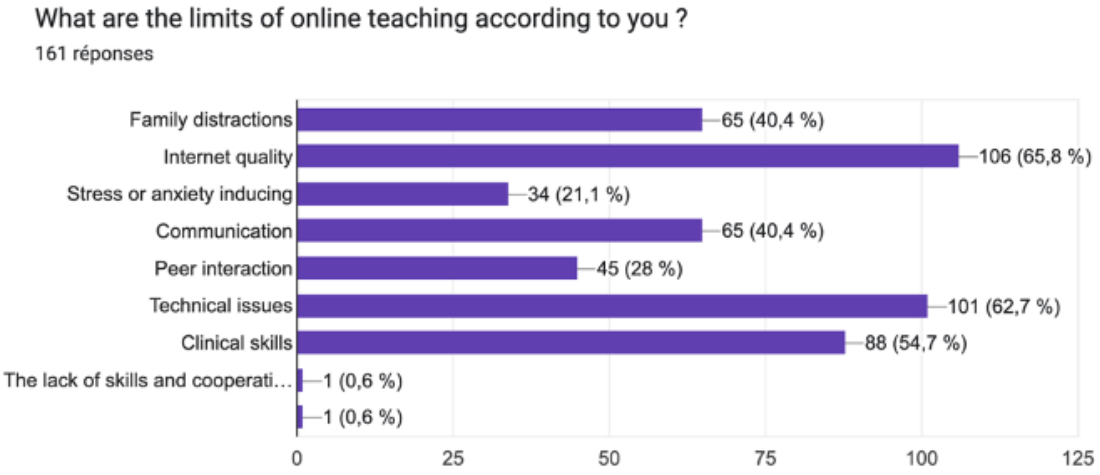

Figure 28: Cons of online teaching.

b. Impact of online teaching on students' mental health :

26% of participants have judged that this method of teaching had a high to very high negative impact on their mental health, declaring that depression, insomnia, hypochondria, and the fear of COVID-19 were all psychiatric problems they have suffered from during this period.

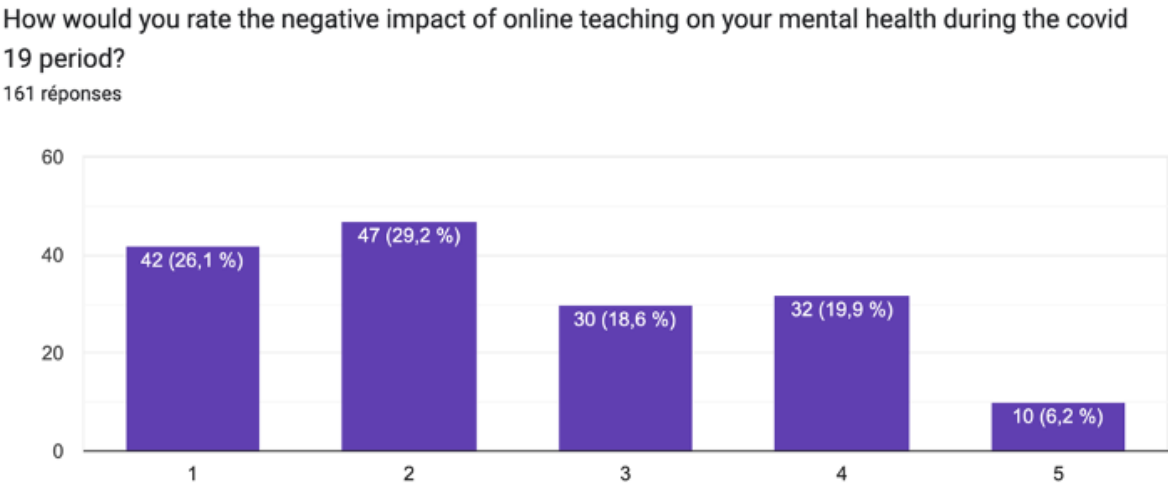

Figure 29: Negative impact of online teaching on students' mental health.

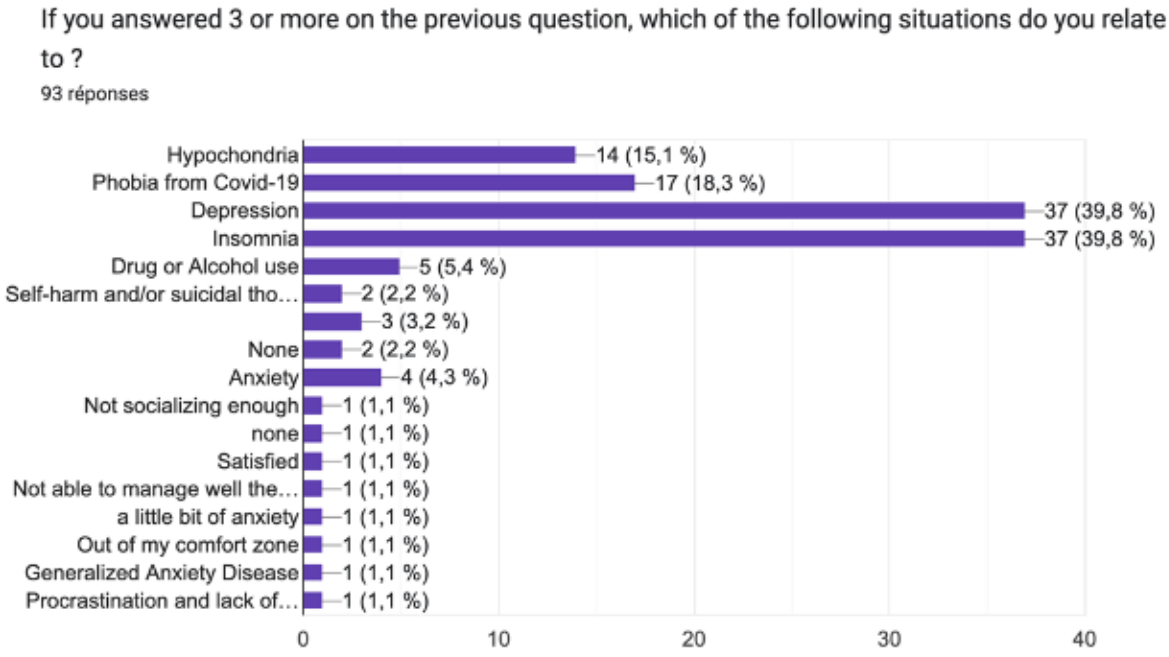

Figure 30: Mental health problems faced by students during the Covid-19 period.

G. Students' overall satisfaction towards online teaching :

1. Students' proficiency with technological tools following the onset of the Covid-19 pandemic :

47,8% of students declared to be proficient with technological equipment and another 17,4% stated to be very proficient with these tools following the pandemic.

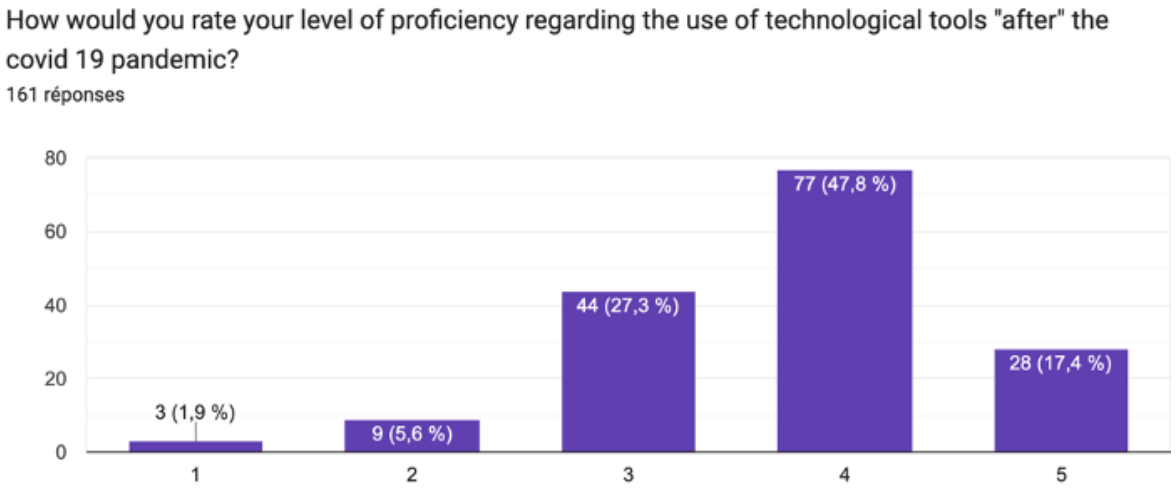

Figure 31: Students' level of proficiency in the use of technological tools after the Covid-19 pandemic.

2. Assessment of the online learning experience :

53,4% of participants claimed that they were neutral to this method of teaching, while 29,2% judged it as good and 6,8% as very good. On the other hand, 7,5% judged their experience as bad and 3,1% as very bad.

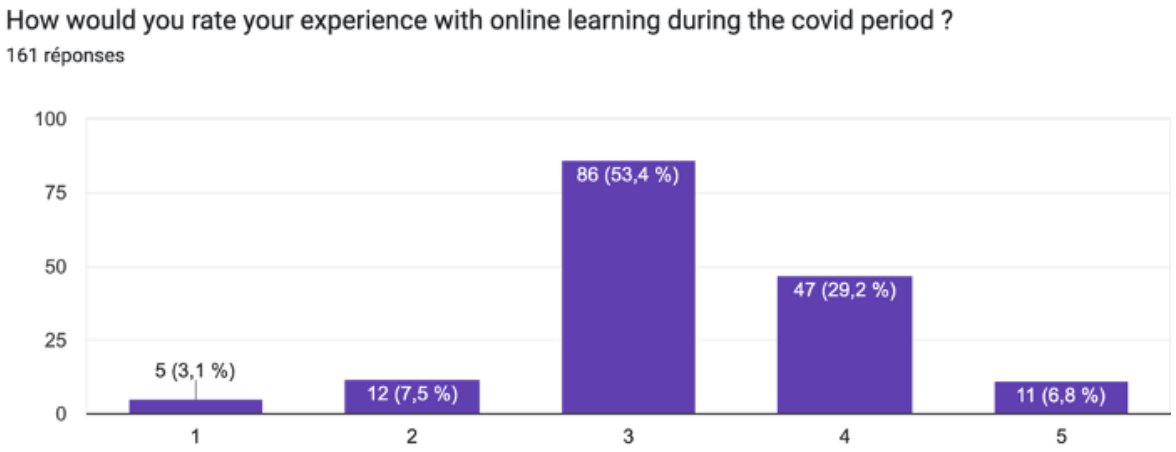

Figure 32: Mental health problems faced by students during the Covid-19 period.

H. Future outlook for the implementation of this learning approach :

1. Preferred learning method of students :

While online learning hasn't been considered the preferred approach for students in comparison to face-to-face, a high majority of participants (75,8%) stated that the hybrid method combining both would be the best option.

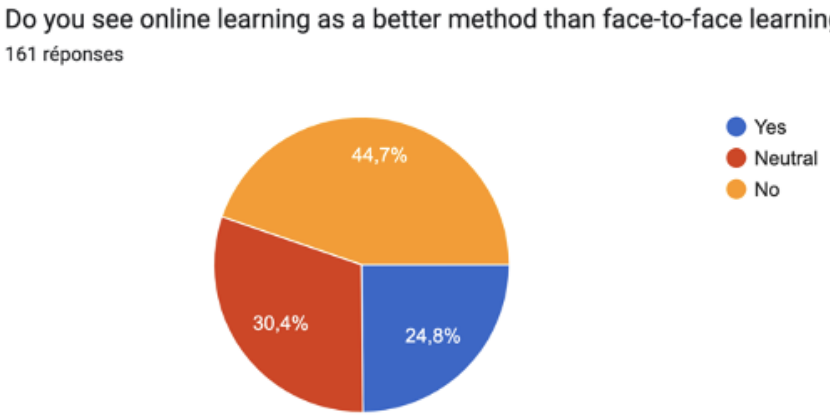

Figure 33: Comparison of Online and Face-to-Face Learning Preference

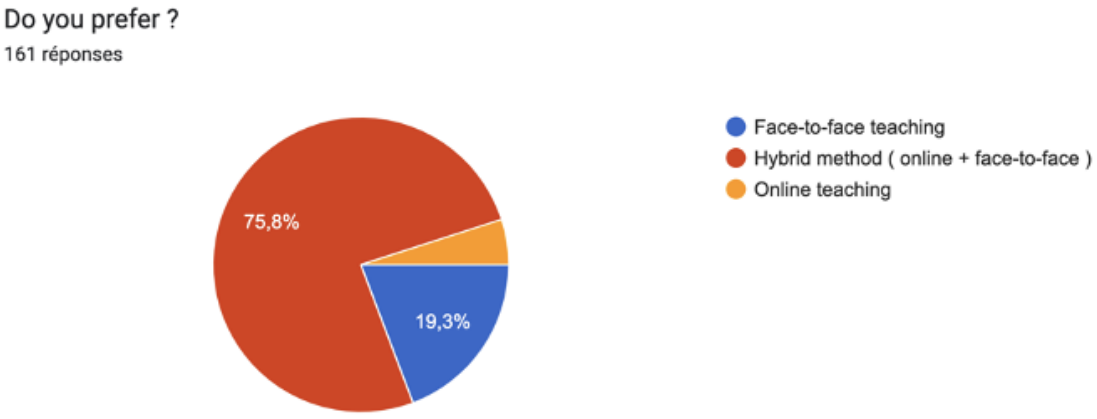

Figure 34: Students' preferred learning method.

2. Students' suggestions for the future implementation of online teaching in their curriculum :

- "Besides simulation classes, I don't really see any advantages of face-to-face learning, since it's time and energy-consuming, as well as non-flexible with the already charged schedule. To answer your question, I would find it more productive if teachers posted courses online, for everyone to see. This would make sure everyone has the same material, unlike currently where most students already don't even attend classes.
  Furthermore, some teachers don't give out courses as soon as they're taught in the amphitheater. Other than that, many people have trouble concentrating during courses, so videos that you can pause and rewind are perfect for that."
- "For me, it will be much better to adopt a hybrid method for learning. Face-to-face courses in the beginning and i think adding other online classes as a supplement will help the students to evaluate their learning during face-to-face classes and fill their gaps."
- "I think lectures should be available on an easy-to-use platform, more efforts should be put into the video and audio quality, using animations, and photos for better understanding. As a slow learner, I prefer the video format it allows me to pause and take notes, rewind, and adjust speed... There should also be a quiz section where you can prepare for exams and MCQ with the correct answer. Including a comment section will allow students to interact with each other and with the professors. Professors will have more time to answer the questions correctly. Face-to-face learning should focus more on the practical side of medical studies, which is the more important part."
- "Having some questionnaires for students to ask them if they prefer online classes we also could have an online class at the same time as the face-to-face one for students who have shifts or can't attend classes if sick or for any other reasons."
- "I think we should have online lectures so that we can learn the topic before going to the face-to-face lectures and do just simulation and discuss clinical cases."

- "It could be employed effectively for selected theoretical modules, reviews, or discussions, but to maintain the quality of medical education, face-to-face instruction should remain the primary mode of instruction for hands-on clinical training and skill acquisition."

3. Students' perception of the impact of online teaching in the future of medical studies in the FMPM :

- "I think there's more and more opportunities for it to be used nowadays, as we can learn from the experiences we've gained through the covid 19 period to fine-tune it into a truly formidable tool."
- "Online teaching can help reach students at all times and mainly store courses to allow much more flexibility, otherwise hybrid teaching seems much more convenient."
- "It will have an impact on time management and also will give so much time for simulation and learning clinical skills."
- "I think there are going to be positive and negative results in these new teaching methods. Positive: fewer expenses for students (especially outside Marrakech), more time, more flexibility for managing your time... Negative: students might skip online classes, less interaction between students(as in some friendships you make in amphitheater are no longer possible), possible mental illness... So I think a hybrid model is the best answer."
- "I think it will help with slow learners in going back and viewing the online materials provided if they are left behind or confused with a certain module it can also improve students' memorization."
- " While online teaching has certainly offered flexibility and accessibility, its impact on the future of teaching at FMPM may not be entirely positive. It presents challenges such as reduced face-to-face interaction, potential for decreased student engagement, and concerns about academic integrity."
- "Online teaching is the future of education in general and particularly at FMPM where a combination of theoretical and practical skills are learned offer the optimal environment to implement it."

DISCUSSION

A. Definitions :

Online Learning, sometimes also referred to as Distance Learning or Distance Education, is education that delivers instruction to students who are separated from the instructor or instructors, and that supports regular and substantive interaction between students and instructor(s) (3). E-learning could also be defined as "the wide set of applications and processes which use available electronic media and tools to deliver vocational education and training"(4)

Institutions can provide three types of online courses: **asynchronous**, **synchronous**, and **bichronous** online learning.

- ✓ **Asynchronous** online learning allows students to engage in courses at their convenience and progress at their own pace from anywhere. However, this format often lacks real-time communication and immediacy, resulting in limited interaction with peers and instructors.
- ✓ **Synchronous** online learning, on the other hand, involves real-time sessions where students can log in through a synchronous tool and engage with instructors and peers simultaneously(5).
- ✓ **Bichronous** learning, a more recently coined term, combines both asynchronous and synchronous online learning elements(6).

Information and communication technologies (ICT) is defined as a diverse set of technological tools and resources used to transmit, store, create, share, or exchange information. These technological tools and resources include computers, the Internet (websites, blogs, and emails), live broadcasting technologies (radio, television, and webcasting), recorded broadcasting technologies (podcasting, audio and video players, and storage devices), and telephone (fixed or mobile, satellite, visio/video-conferencing, etc.)(7).

Hybrid learning, also known as blended learning, represents a dynamic educational approach that combines traditional in-person instruction with online components. This innovative model leverages the strengths of both face-to-face and virtual learning, offering students a flexible and personalized educational experience. In a hybrid learning environment, students often engage in activities such as lectures, discussions, and collaborative projects in a physical classroom setting, while also accessing digital resources, assignments, and interactive content online. This approach not only caters to diverse learning styles but also promotes the use of technology to enhance the educational process(8). Hybrid learning has gained prominence for its ability to accommodate different schedules, provide access to a wealth of digital resources, and foster a more interactive and engaging learning experience that prepares students for the challenges of the modern, tech-driven world.

B. Historical timeline of online learning :

Long before the internet was launched, distance courses were being offered to provide students with education on particular subjects or skills. In the 1840's, Isaac Pitman taught his pupils shorthand via correspondence. This form of symbolic writing was designed to improve writing speed and was popular amongst secretaries, journalists, and other individuals who did a great deal of note-taking or writing. Pitman, who was a qualified teacher, was sent completed assignments by mail and he would then send his students more work to be finished using the same system.

In 1924, the first testing machine was invented. This device allowed students to test themselves. Then, in 1954, BF Skinner, a Harvard Professor, invented the "teaching machine", which enabled schools to administer programmed instruction to their students. It wasn't until 1960 however that the first computer-based training program was introduced to the world. This computer-based training program was known as PLATO-Programmed Logic for Automated Teaching Operations. It was originally designed for students attending the University of Illinois but ended up being used in schools throughout the area.

The first online learning systems were really only set up to deliver information to students but as we entered the 70s online learning started to become more interactive. In Britain, the Open University was keen to take advantage of e-learning. Their system of education has always been primarily focused on learning at a distance. In the past, course materials were delivered by post, and correspondence with tutors was via mail. With the internet, the Open University began to offer a wider range of interactive educational experiences as well as faster correspondence with students via email, etc.

Online learning today:

With the introduction of the computer and internet in the late 20th century, e-learning tools and delivery methods expanded. The first MAC in the 1980s enabled individuals to have computers in their homes, making it easier for them to learn about particular subjects and develop certain skill sets. Then, in the following decade, virtual learning environments began to truly thrive, with people gaining access to a wealth of online information and e-learning opportunities.

By the early 90s, several schools had been set up that delivered courses online only, making the most of the internet and bringing education to people who wouldn't previously have been able to attend a college due to geographical or time constraints. Technological advancements also helped educational establishments reduce the costs of distance learning, a saving that would also be passed on to the students – helping bring education to a wider audience.

In the 2000's, businesses began using e-learning to train their employees. New and experienced workers alike now had the opportunity to improve upon their industry knowledge base and expand their skill sets. At home, individuals were granted access to programs that offered them the ability to earn online degrees and enrich their lives through expanded knowledge(1).

C. The incorporation of Information and Communication Technology (ICT) in online education in Morocco. :

Since the 2000s, educational institutions have endeavored to exploit the inherent capabilities of Information and Communication Technology (ICT) and digital technology. In pursuit of this goal, they introduced the concept of Information and Communication Technology for Education (ICT), encompassing educational tools and methods accessible to both teachers and learners.

Presently, ICT encompasses a spectrum ranging from basic tutorials to online learning platforms, enabling students to engage in communication with one another and fostering significant interactivity between learners and their instructors through applications and websites like videoconferencing, social networks, and various platforms. Additionally, it streamlines the flow of information, leading to cost savings and time efficiency.

Morocco has in fact decided to follow this model by committing to adopting and integrating ICT into its educational system, and that through a number of projects (23) :

- **GENIE program**: initiated in 2005, the GENIE Program is a comprehensive, long-term national policy and initiative crafted and executed by the Ministry of National Education, Vocational Training, Higher Education, and Scientific Research in Morocco. Its objective is to incorporate ICT to enhance the accessibility and quality of education in primary and secondary schools. Thanks to the program, a total of 260,000, which accounts for 87% of education management and staff members, have undergone training aligned with the UNESCO CBTB skills framework. There are 900 primary trainers involved, and the training infrastructure includes 148 ICT training centers spread across the country. The program has successfully trained nearly 120,000 individuals in the utilization of IT tools. The program has been awarded the 2017 UNESCO-King Hamad bin Isa Al Khalifa Prize(24).

- **Nafida program**: since its introduction in May 2008, the Nafida program, initiated by the Mohammed VI Foundation with the objective of easing access to information and communication technologies for teachers in the public sector (including primary, secondary, and higher education) and accredited institutions, has seen the subscription of 91,000 Internet connections and the sale of almost 16,000 computers(25).
- **The "MARWAN" Network (MAROC Wide Area Network)**: founded in 1998, it is a national non-profit computer network, dedicated to education, training, and research. It has to its account more than 200 fiber optic connected institutions over 90 links covering 30 cities in Morocco through its link to the European Network GÉANT. The initiative ensures quality of service as well as reinforced security for critical applications for the Ministry and Universities(26).
- **The Moroccan Virtual Campus (MVC)**: launched in 2004, the initiative aims to endorse and promote the adoption of innovative teaching methods in Moroccan universities. In essence, the MVC is a program that endeavors to bring about a transformation in the utilization of information and communication technologies. It has initiated several pilot projects and facilitated the establishment of University Resource Centers(27).

Génie sup (2008), **the Injaz Operation** (2009), **the emergency plan** (2009-2013), **the Taalimtice National Portal** (2011), **the Varen project** (2013), **Lawhati** (2015), and finally **the Strategic Vision for the Reform of school** (2015/2030) are all additional programs that were put in place in order to achieve the swift adoption of ICT, as a crucial component of Morocco's education system.

D. Covid-19 pandemic as a challenge for medical studies :

At the present time, and long after the lifting of the sanitary restrictions, we can note that the repercussions of the pandemic are still lingering in different fields. Massive efforts were put in place to minimize the pandemic's footprint on medical students' training, knowing full well beforehand of the challenges it presented in this specific field.

According to a study done in 13 medical schools in Libya, 3,251 (97.1%) participants reported suspended lectures and educational programs due to the COVID-19 outbreak, while 2,879 (86%) reported that their medical school had suspended clinical training and laboratory skills training. Only 162 (4.8%) participants reported that they were in training, and 274 (8.2%) had volunteered as healthcare allied forces during COVID-19(9).

As supported by these numbers, the full switch to e-learning in medical schools could not be as simple as in other branches, as clinical rotations and direct contact with patients or equipment are a must in every medical student's curriculum.

When it comes to Moroccan universities, it is important to note that the teaching process has been up until now mainly based on a form of traditional face-to-face learning in classrooms or auditoriums equipped with a board, a video projector, and a computer(10). Whether the students owned technological equipment has not been a necessity, as this way of teaching implies a more convenient printed material approach for their studies.

This brings us to one of the first challenges that this method was expected to face, in consideration of the financial situation of the country: how many of the students actually dispose of technological tools and an internet connection allowing them to continue their training remotely?

Another challenge was the level of proficiency of students and professors with the technological tools they would have at hand and how quickly they could adapt. Even though the newer generations are considered to be more in contact with technology through the daily use of social media platforms, as shown by a study carried out at Alfaisal University in Saudi Arabia that most of the respondents belonged to the Millennial or Post-Millennial generations to whom social media is the primary source of communication(11), the introduction of new platforms seemed relatively challenging.

In addition to these challenges, medical students during this period were seen as vulnerable to mental health problems, as social distancing has forced many students to go back

to their homes, involuntarily giving up their campus life. Medical students are considered to have baseline elevated rates of anxiety, depression, and burnout. As such, they may be especially susceptible to the psychological stresses of COVID-19 (12), as confirmed by a study across 40 medical schools in the US stating that those rates were 61% higher for anxiety and 70% higher for depression during the COVID-19 era(13).

Student's motivation and engagement as well as online teaching's efficiency were all seen as variables that would impede the students' training, therefore forcing experts all over the world to put into place strategies aiming to make the most out of the international outbreak's limitations, and build on it further along the way.

Studies around online learning have shown a fast rate of multiplication since the pandemic, in developed countries as well as the developing ones where financial restrictions are less convenient to this mode of teaching.

Morocco is one of the countries where these studies are up until now seen as scarce and the results are unsatisfactory to build upon, consequently leaving the country in a state of doubt about the efficiency of this method.

E. Strategies for a successful implementation of online teaching :

Online teaching has become an integral part of academic institutions worldwide. As noted before, it is considered as a response to unforeseen circumstances like a global pandemic or as a deliberate shift toward digital education.

The successful implementation of online teaching requires careful planning, effective strategies, and a commitment to fostering an engaging and supportive learning environment. Here are key strategies to ensure the success of online teaching:

➔ **Course design and faculty training :**

The adaptation of courses for online delivery requires a redesign, and various solutions are at our disposal for this purpose. Instructional designers are pivotal in aiding faculty members in the formulation and development of online courses. This support is particularly vital as educators

may find themselves burdened with additional responsibilities or may lack the proficiency needed to create high-quality online courses(14). The model proposed by Czerkawski and Lyman encompassing four integral components: instructional needs, instructional objectives, learning environments, and summative assessment is one of the numerous instructional designs that have been formulated to address this objective(15).

➔ **Student-faculty collaboration :**

Online teaching or online learning implies that there are two sides to this institutional method and that they should be working closely to achieve its full potential. This collaboration can bring enhancements to the system, making it more reliable, user-friendly, personalized, attractive, intuitive, and easier to navigate. Such improvements are anticipated to positively impact the perceived usefulness and satisfaction with this method(16).

➔ **Gathering feedback :**

Employing efficient feedback strategies allows the instructor to recognize and address the unique needs of students, encouraging active participation and sustaining a high level of engagement(17). Students' feedback can be done at the end of each online session directly to the professor, through e-mail, or a feedback platform provided by the faculty.

➔ **Virtual simulation through gamification :**

Games possess the capacity to facilitate learning, boost engagement, permit real-world application, and encourage collaboration. Additionally, they offer possibilities for risk-free clinical decision-making, distance training, utilization of learning analytics, and prompt feedback(18).

➔ **The integration of virtual reality (VR) in medical studies :**

The University of Oxford has implemented VR simulation for their medical students and doctors working in the John Radcliffe Hospital. The university declared: "Embedding VR simulation into what we do has enabled us to give a far greater number of learners access to

simulation in a shorter space of time, and lets them do it as often as they like to transfer their knowledge to practice."(19).

- ➔ **Providing mental health support for students :**

  Research has indicated that increased utilization of electronic devices correlates with higher rates of depression, anxiety, and reduced levels of emotional stability(20). In response to deteriorating mental health among students, medical universities can provide psychological counseling and interventions. Additionally, efforts should be made to enhance interactions with teachers, classmates, friends, and other social peers(21).

- ➔ **Ensuring equity in online learning :**

  Equitable learning occurs when every learner belongs, contributes, and thrives, regardless of race/ethnicity or socio-economic status(22). This requires tackling the digital divide by offering essential resources and support, creating inclusive courses that accommodate diverse needs and learning styles, and cultivating an environment where each student experiences a sense of inclusion.

F. Online platforms used by the FMPM :

- ➔ Theia: Counting more than 250,000 users and 85 million digital copies, the platform simplifies the lives of teachers, ensures equity among learners, and significantly reduces the organizational logistics of assessments, both in-person and remotely(28). This platform allows students to access recorded lectures with audio content, organized in different sections according to the year of studies, the module they belong to, and which professor is giving out the lecture.
- ➔ Microsoft Teams: Microsoft Teams is a collaborative platform within the Microsoft 365 suite, offering integrated features such as chat, video conferencing, file storage, and application integration. It serves as a centralized hub for teamwork, facilitating communication and collaboration among teams or remote groups. Key attributes include channels for organized conversations, direct messaging, meeting scheduling, file sharing, and integration with Microsoft Office applications. Popular for remote work and online education, Microsoft

Teams enables effective communication and collaboration, providing a comprehensive solution for teams to stay connected(29).

➔ The FMPM website: This platform offers a large set of educational resources through various forms and for students, residents and graduates. The anatomy lab is continuously updated, providing a large knowledge platform ranging from basic anatomy to content intended for surgeons. The FMPM website also provides links to access the FMPM MOOCs on YouTube with lectures for students from the 1st to 5th year.

G. Discussion of the results :

1. Student demographics :

The sex ratio of 0,52% in our study shows a female predominance, with 65,8% female participants. This distribution matches the overall demographics, with women making more than half of the total number of medical students. The results of a study in the USA showed that in the course year of 2019-2020, more than 53.5% of applications to MD-granting medical schools came from women, who made up 53.7% of the number of students matriculating(30).

Participants between the age of 23-25 were the most represented (53,4%), which matches their year of study. Most of the participants were from the seventh and sixth year of their studies (64%). The selection bias can be explained by the longer experience of this category with medical studies and the fact that a rather significant portion of them had prior clinical experience making them more involved during the COVID-19 pandemic. In fact, 49,1% of participants were in their 4th or 5th year during the outbreak.

2. Previous experience and Proficiency with technological tools :

One of the important aspects of the introduction of a new tool among a certain population is how accustomed they are to similar methods. Our study has shown that the students of the FMPM have little to no prior experience with online learning, as only 19,9% of the participants considered it to be higher than average. These results seem to be similar to the study from

Alfaisal University in Riyadh, Saudi Arabia, stating that 14,4% of the students had advanced online learning experience before the Covid-19 pandemic(11).

The level of proficiency in the use of technological tools has been mostly rated from average to very low, with only 26,7% of the participants stating it to be higher than average. We observe a disparity with the results from a study across 13 medical schools in Libya, where 47,5% of students declared to be proficient or highly proficient in using technological tools(9). This goes hand-in-hand with the low usage of online materials for medical training in our context, as no more than 34,2% of participants announced that they had used online platforms for their medical studies before the onset of the pandemic.

During the pandemic, YouTube was the most used platform (39,4%) followed by the Theia platform provided by the university (30%). The FMPM's website was used by 17,5% of participants. The results from a study across 40 medical schools in the UK come to further explain the students' preferences for certain platforms, showing that video tutorials from YouTube/Osmosis appeared to be the most effective, and also stating that live tutorials via online platforms from their medical school were only used by 4.46% of students(31). The FMPM's online platforms existed before the pandemic, and have known a continuous update, together with an increasing usage from students. However other more "informal" learning methods still seem to be more appealing to the students.

3. Technological equipment :

In a world where technology is growing faster than ever before, where everyday life tasks require more access to the internet, it is highly important to investigate to what extent is information and communication technology (ICT) present in the academic field. Our study has shown that 91% of the students used a personal computer and 41% a smartphone to keep up with their curriculum during the COVID-19 period. Additionally, 90,1% of these devices were in fact equipped with a built-in mic and camera. The aim was to verify if the requirements in terms

of ICT would actually allow the establishment of the online method for medical studies in our faculty.

Moreover, the internet connection most used by students was ADSL (51,6%), followed by Fiber-optic internet (36%), then 4G (11,2%), while 1,2% of the students claimed not to have access to the internet from their homes. Studies have shown that a total of 5.30 billion people around the world had access to the internet at the start of the 4th quarter of 2023, equivalent to 65.7 percent of the world's total population(32). The internet connection quality was judged as good to very good by 44,7% of the participants, and average by 36%.

Our results match with a similar study at Cadi Ayad University stating that during the lockdown, 82% had a computer for distance learning (DL) and 74% had a good Internet connection to attend classes(33).

4. Students' experience of online learning during the Covid period:

In general, students from our study haven't encountered difficulties navigating through the FMPM's platforms, as 56,5% of them found them easy to very easy to use. It is notable that the FMPM has provided explanatory videos on its website illustrating how to get into and use THEIA for both students and professors, which explains the little to no difficulty for most of the participants. However, it is of interest to put the platforms to the test, by assessing how a sample group interacts with the platform beforehand, noting the difficulties and advantages, in order to be able to come up with more efficient tutorials that can be generalized, ultimately resulting in a higher percentage of accessibility to students.

With the introduction of a new learning method, it is highly important to keep a good quality of the studying material or improve it. When asked about the quality of the online lectures, 47,2% of our participants rated them as average, 32,9% as good and 13,7% as low. With the insufficiency of pre-COVID-19 studies showing the satisfaction of the students in the FMPM towards the quality of the lectures, it is difficult to judge whether these results show an improvement or a deterioration in this aspect.

The FMPM has strengthened its approach to online learning with the introduction of the Microsoft Teams platform, which allowed for virtual classes to take place, in addition to the recorded lectures. The calls were accessible by all the students from the same year and directed by the professor, with the help of a technician. The platform has enabled a more interactive approach, in the form of quizzes, clinical cases, and revisions. Following this, our participants judged the student-professor interactivity, and the results showed that there was an overall satisfaction as 72,1% of them stated that interaction was average to very high.

Online teaching is supposed to allow learners to have control over the content, learning sequence, pace of learning, time, and, often, media, which allows them to tailor their experience to meet personal learning objectives(34). As supported by Dost et al. The main advantages of online teaching appear to be that it saves students time on traveling, provides flexibility, and the ability for students to learn at their own pace(31).

However, in our study, the time schedule of lectures and time management was mostly considered as average among the students. In order to truly potentiate the benefits of online learning in our faculty, the time schedule must be adapted to the students' needs, in consideration of their clinical rotations and revision time prior to exams.

The students' engagement in our study was rated by 69,6% of participants as average to very low, which doesn't match earlier findings, as Dost et al. reported that there was an increase in number of students spending longer periods of time on online teaching platforms during the pandemic. Walsh et al. explained that this less frequent participation in class may indicate that either classes were less focused on active learning due to professors struggling to create engaging activities or that students felt less inclined to participate in the active learning that was occurring(35).

The medical knowledge acquired by our participants through online learning was judged by 23,6% as low, 34,2% as average, and 28,6% as high, with a similar percentage of 6,8% for both options: very low and very high. While Orellano et Carcamo declared that their study

demonstrates that recorded lectures produce the same knowledge gain as traditional face-to-face lectures, making them suitable for clinical courses(36), our results show that the participants' satisfaction towards the knowledge learned during the pandemic is debatable and still needs more work, showcasing that this method needs more development to be adapted to their needs.

Nevertheless, when asked about their performance during exams, 62,1% of the participants declared that there was no change in their marks compared to previous years, and 26,1% stated an improvement in their exam performance.

Furthermore, we have seen a large percentage of success among the first to fifth class year students on their exams, as numbers have shown that most of the students managed to pass all of their modules or at most had only failed one.

It is noteworthy to mention that out of the participants, 10 have not taken any exam during the 2nd semester of 2019-2020, which translates to 6,2%. The lack of implication should be looked into, as the reasons for it could be related directly to the pandemic, by being subject to the infection, or indirectly through its repercussions, either in terms of mobility or financially.

5. The place of simulation in online teaching :

In recent years, simulation has become a crucial part of medical training. Our faculty has adopted simulation very early on and continues working on its improvement and generalization over all years of study going all the way to residency years, as it is considered vital for skill acquisition, and also goes with the general vision of the FMPM: "Never the first time on a patient".

In the midst of the many challenges of medical education during COVID-19, skills training was largely affected due to social distancing(37). In fact, 80,7% of the participants declared not having benefited from any simulation classes during the COVID-19 period. However, 71,4% of them assured that they had those classes rescheduled for a further time, which leaves us with 28,6% of participants not having benefited at all from any simulation classes during the same

period. Face-to-face simulation was considered of high to very high importance by 72% of the participants, emphasizing how important skill learning is in medical training.

The future of clinical education depends on the integration of virtual simulation-based technologies and virtual clinical experience into the medical curriculum(38). Thus, broadening the range of knowledge accessibility to students, as well as having a strong basis, capable of resisting another health crisis.

6. Strengths and limits of online teaching :

a. Strengths of online teaching :

Following our study, flexibility, more durable access to study materials, time-saving, and more time to assimilate new information in addition to it being a less stressful method were the advantages of online teaching. According to Dost et al. the main advantages of online teaching appeared to be that it saves students time on traveling, provides flexibility, the ability for students to learn at their own pace, cuts on costs, is more comfortable, more time efficient, allows more time for students to focus on preparing for clinical placements(31). These results match the previously cited ones from our study, in addition to that 43,5% of our participants noted that their financial situation had gotten better with online learning, throught the cut on the costs of transportation, rent, school supplies, and books.

b. Limits of online teaching :

Telecommunications technology has proven to be a valuable solution for addressing the learning challenges caused by the pandemic. Nevertheless, individuals participating in online education may encounter disparities, leading to frustration and stress. This is even true for developed countries, where not all students possess the necessary digital devices or infrastructure to fully engage in online learning(39). Moreover, individuals in remote areas often face the obstacle of inadequate internet connections(40).

Our study has shown that Internet quality and technical issues were the biggest limits to the online method, contrasting with their good judgment of the internet service quality as shown

before. It is very likely that the limitations discovered in our study are more in relation to the technical aspect, which might need more improvement, granting easier and more dependable access to the different platforms.

Other limits found were family distractions as well as the lack of clinical skills and communication. Our results are similar to those of Dost et al. stating that family distractions (26.76%), Internet connection (21.53%), timing of tutorials (17.31%), anxiety (11.08%), and lack of space (11.03%) were all barriers to effective online teaching. As well as those of Rajab et al . where the most encountered issues were regarding in-person communication (59%), student assessment (57.5%), use of technology tools (56.5%), experience in online education (55.0%), pandemic-related anxiety and stress (48%), learning curve (35.5%), time management (35.0%), students' evaluations of faculty (24.0%), and technophobia (17.0%)(11).

The negative impact on our participants' mental health was rated as high to very high by 26,1% of the participants, with the most common problems being depression and insomnia with 39,8% each, followed by COVID-19 phobia and hypochondria, meanwhile, anxiety has been stated by 4,3% of participants who suffered from mental health problems.

A study conducted among Kazakhstan medical students has found that burnout and the prevalence of depression, anxiety, and somatic symptoms among students were lower during the online learning period compared with the same indicators during the traditional one(41). Chinelatto et al. have also supported these findings, relating the mental health improvement to students having a higher investment in their mental and physical health through adopting new hobbies for example due to having more time(42).

7. Students' overall satisfaction towards online teaching :

We have seen a large increase in students' proficiency after the use of this method compared to before the COVID-19 pandemic, as 92,5% of the participants rated it from average to very high, compared to 59,1%. These numbers translate the high adaptation level of the students to the use of technological tools after the adoption of the online method for a short

period. The difficulties cited before related to technological material seem to be overcome by the students, therefore showing a possible future implementation for online teaching outside of the pandemic context. Especially that the satisfaction levels of students from this experience show hopeful numbers as a majority (53,4%) stated that their experience was average and 36% judged it as good to very good. Our results show that a high level of satisfaction was reached in comparison with a study done over 5 faculties belonging the Mohamed V University of Rabat showing that concerning the students' level of satisfaction, 37.40% declared that they are not at all satisfied or only slightly satisfied with this mode of teaching, 28% moderately satisfied, compared to 34.60% who were satisfied, or even very satisfied(43).

This goes to show that the FMPM was successful in building a strong basis during the COVID-19 period for online teaching, with the expectation that improvements can be made to reach higher satisfaction levels.

8. Future implementation of online teaching :

According to our study, more students see online teaching as a better method compared to the face-to-face one. Although online learning might work as well as offline learning, it doesn't imply that it is an effective teaching method for every student in every learning context(44). To avoid the potential limitations of online learning in medical education, it might be worthwhile to combine the advantages of online and offline teaching methods, called hybrid learning (45). Our study has shown the willingness of the students to adopt hybrid teaching as 75,8% of the participants have stated that they would in fact prefer this method.

H. Limits of the study :

The study took place during the third quarter of 2022-2023, practically 2 years after the adoption of the online method. We have been able to collect only 161 responses to the questionnaire, even though it has been shared multiple times on different social media groups. We therefore assume that students who felt most concerned by the subject were more willing to answer the questionnaire. This could have induced a recall bias as well as a nonresponse bias.

Our study's aim was to assess students' experience and satisfaction towards online teaching. More studies are needed to assess this method from the faculty and professors' point of view, as well as more research concerning the hybrid method and how to implement it, potentially in the whole country, in order to be able to have a common digitalized curriculum across Morocco.

I. Strengths of the study :

Our internet-based self-report questionnaire offers the advantage of being more user-friendly and is less likely to influence responses. It also ensures anonymity, fostering an environment that encourages students to provide responses with maximum honesty and sincerity.

This study is supposed to be an overview of the online teaching method and could be considered as a basis for upcoming similar works in this area, potentially leading to tangible results.

CONCLUSION

The transition to online teaching during the COVID-19 pandemic brought forth a multitude of challenges, notably the impact on mental health and technical difficulties. While pandemics have historically posed major challenges, it is imperative to recognize them as opportunities for growth and transformation in the realm of education.

Despite the urgency of the situation and the lack of preparedness caused by the sudden onset of the COVID-19 pandemic, our study revealed an overall satisfaction towards online teaching, as well as a quick adaptation to this new teaching method from the students. The integration of ICT into the curriculum of the FMPM appears not only feasible but also promising, given the evident readiness of students. Moreover, online teaching exhibits numerous advantages, particularly its financial and time-friendly nature. The study also highlighted the favorable possession of technological equipment by students, further supporting the viability of introducing digitalized teaching methods.

The efforts invested during the pandemic, such as the creation of online platforms and study materials, should not be fleeting but rather capitalized upon for the full-time integration of digitalized teaching in our faculty and potentially across all medical faculties in the country. This move could prove highly beneficial for both students and professors, as the hybrid method promises to maximize time efficiency and enhance student learning.

To further enhance the educational experience, there is a need for concerted efforts to provide students with access to trusted information platforms, including scientific article databases and established medical websites. Additionally, initiatives like Body-interact, already adopted in our faculty, could significantly benefit students if granted direct access. This would address challenges related to simulation and contribute to better skill development.

As we contemplate the future of education, the lessons learned from the forced adoption of online teaching underscore the critical importance of adaptability and innovation. The hybrid learning model emerges as a promising solution, necessitating collaborative efforts from educators, institutions, and policymakers to refine and implement effective strategies.

Moving forward, a determined commitment to technological integration, pedagogical innovation, and inclusivity will be essential in shaping a resilient and responsive educational system capable of withstanding future challenges.

In summary, this thesis has brought to light several recommendations for the improvement of education in the context of medical faculties, in consideration of the experiences gained during the COVID-19 pandemic, which are :

- ✓ Full-Time Integration of Digitalized Teaching.
- ✓ Utilizing a Hybrid Learning Model.
- ✓ Access to Trusted Information Resources.
- ✓ Incorporation of Interactive Educational Tools.
- ✓ Collaborative Efforts for Educational Enhancement.
- ✓ Commitment to Technological and Pedagogical Innovation.

By embracing the opportunities presented by online and hybrid learning, we pave the way for a dynamic and transformative educational landscape that prepares students for the evolving demands of the future.

ABSTRACT

Abstract

Objectives: This study aimed to assess and analyze students' experience with online teaching during the COVID-19 pandemic at the FMPM, focusing on the difficulties and advantages presented by this method, the students' satisfaction with online teaching, and the possible future implementation of this learning style in the FMPM.

Methodology: A survey employing a cross-sectional design was conducted with the dual objectives of description and analysis. Using an anonymous self-administered questionnaire, we gathered responses from students through non-probability sampling. An anonymous questionnaire, designed on Google Forms, served as the measurement instrument and was distributed online. Subsequently, upon data collection completion, a descriptive approach was adopted. The data entry, as well as the descriptive and analytical analyses of the results, were conducted using Google Sheets.

Results: A total of 161 students participated in the study, with a sex ratio of 0.52. The predominant age group was 23 to 25 years old. The majority of students were in their seventh year/second-year interns, and most have studied their fourth year online.

Students' exposure to online learning before the pandemic was low to very low (50,3%), and their proficiency in the use of technological tools was judged as neutral by 32,3% of participants and low to very low by 41% of them. 34,2% of students stated they were using online platforms prior to the COVID-19 pandemic, 29,2% used them only during this period, while 34,2% are still using them, with YouTube being the most used platform (39,4%), followed by Theia (30%) and the FMPM website (17,5%). 91% of the participants also declared having used ther personal computer to attend classes and 90% stated that the device was equipped with a built-in mic and camera. ADSL internet connection was the most used (51,6%), and 44,7% judged the internet connection quality as good to very good.

The use of the online platforms provided by the FMPM during the Covid-19 period was generally easy to very easy with 56,5% of votes. 47,2% of students judged the quality of online

materials they received as average, the student-professor interaction was also considered as average by 31,7% of the participants. 41% of the participants stated that the time schedule allocated for online teaching at the FMPM was average, and 41,6% of them judged the time management efficiency as good to very good. Students' engagement was low to very low for 39,8% of the students. 35,4% have judged their medical knowledge learned through online classes as good to very good, with Students' performance in exams not being affected for a majority of students (62,1%), and a very high success rate as 33,5% out of 39,1% have passed all 5 modules they took during the 2019-2020 second semester.

Concerning simulation classes, 44,7% of the participants assured that the importance of face-to-face simulation classes is very high for them, 80,7% of the participants did not benefit from any simulation classes during the pandemic, and 71,4% stated that the classes have not been rescheduled later. Flexibility was seen as the strongest asset of the online method. In addition, students considered this method as allowing for more durable access to study materials, time-saving, and allowing for more time to assimilate new information and considered it as a less stressful method. Participants also stated that it allowed them to cut on costs and 43,5% stated they had a better financial situation during this period. Technological difficulties have been seen as the biggest limits to online teaching, followed by communication problems, the lack of clinical skills, and family distractions. 26% of participants have judged that this method of teaching had a high to very high negative impact on their mental health, declaring that depression, insomnia, hypochondria, and the fear of COVID-19 were psychiatric problems they have suffered from during this period.

After the experience of online teaching, 65,2% of the students were proficient to very proficient with the use of technological tools and 53,4% were neutral toward this method. 44,7% of the participants didn't judge online teaching as a better teaching method than the face-to-face one, and a high majority of participants (75,8%) stated that the hybrid method would be the best approach in the future.

Discussion: Our study aligns closely with the existing literature, indicating that various actors played a crucial role in facilitating a successful transition to digital learning. This involved important logistical measures and a significant mobilization of resources. It is of utmost importance to take advantage of the progress made especially during the pandemic, and put it to use in favor of creating dynamic, engaging, and interactive materials tailored to students' needs. The complexity of the medical curriculum makes it challenging to incorporate this new teaching method, but brings nonetheless a myriad of opportunities. The implementation of innovative tools in medical universities should ultimately achieve a better training for students, and hopefully, better doctors.

Conclusion: Our suggestion after this study is for the full time implementation of online resources to complement face-to-face teaching, in our faculty, our university hospital, and the rest of the medical community.

Résumé

Objectifs: Cette étude visait à évaluer et analyser l'expérience des étudiants avec l'enseignement en ligne pendant la pandémie de COVID-19 à la FMPM, en se concentrant sur les difficultés et les avantages présentés par cette méthode, la satisfaction des étudiants à l'égard de l'enseignement en ligne et la possible mise en œuvre au future de ce style d'apprentissage à la FMPM.

Méthodologie: Etude transversale, à visée descriptive et analytique. Par le biais d'un auto-questionnaire anonyme nous avons recueilli les réponses des étudiants grâce à un échantillonnage non probabiliste. Un questionnaire anonyme, conçu sur Google Forms, ayant servi d'instrument de mesure, a été diffusé en ligne. Par la suite, une fois la collecte des données terminée, une approche descriptive a été adoptée. La saisie des données, ainsi que les analyses descriptives et analytiques des résultats, ont été réalisées à l'aide de Google Sheets.

Résultats: Au total, 161 étudiants ont participé à l'étude, avec un sex-ratio de 0,52. La tranche d'âge prédominante était celle des 23 à 25 ans. La majorité des étudiants étaient en septième année/deuxième année d'internat, et la plupart ont étudié leur quatrième année en ligne.

L'exposition des étudiants à l'apprentissage en ligne avant la pandémie était faible à très faible (50,3 %), et leur maîtrise des outils technologiques était jugée neutre par 32,3 % des participants et faible à très faible par 41 % des participants. 34,2 % des étudiants ont déclaré qu'ils utilisaient des plateformes en ligne avant la pandémie de COVID-19, 29,2 % les utilisaient uniquement pendant cette période, tandis que 34,2 % les utilisent encore, YouTube étant la plateforme la plus utilisée (39 ,4%), suivie de Théia (30%) et du site FMPM (17,5%). 91% des participants ont également déclaré avoir utilisé leur ordinateur personnel pour assister aux cours et 90% ont déclaré que l'appareil était équipé d'un micro et d'une caméra intégrés. La connexion Internet ADSL était la plus utilisée (51,6%), et 44,7% ont jugé la qualité de la connexion Internet comme bonne à très bonne.

L'utilisation des plateformes en ligne proposées par la FMPM pendant la période du Covid-19 a été globalement facile à très facile avec 56,5% des voix. 47,2% des étudiants ont jugé la qualité du contenu en ligne qu'ils ont reçu comme moyenne, l'interaction étudiant-professeur a également été considérée comme moyenne par 31,7% des participants. 41% des participants ont déclaré que le temps alloué à l'enseignement en ligne à la FMPM était moyen, et 41,6% d'entre eux ont jugé l'efficacité de la gestion du temps comme bonne à très bonne. L'engagement des étudiants était faible à très faible pour 39,8% des étudiants. 35,4% ont jugé de bonnes à très bonnes leurs connaissances médicales acquises grâce aux cours en ligne, les performances aux examens n'étant pas affectées pour une majorité d'étudiants (62,1%), et un taux de réussite très élevé de 33,5 % sur 39,1% qui ont réussi les 5 modules suivis au cours du deuxième semestre 2019-2020.

Concernant les cours de simulation, 44,7% des participants ont assuré que l'importance des cours de simulation en présentiel était très élevée pour eux, 80,7% des participants n'ont bénéficié d'aucun cours de simulation pendant la pandémie, et 71, 4% ont déclaré que ces cours n'avaient pas été reportés ultérieurement. La flexibilité a été considérée comme l'atout le plus important de la méthode en ligne. De plus, les étudiants considéraient cette méthode comme permettant un accès plus durable au matériel d'étude, un gain de temps plus important et leur laissant plus de temps pour assimiler de nouvelles informations et ont considéré cette méthode comme moins stressante. Les participants ont également déclaré que cela leur avait permis de réduire leurs coûts et 43,5% ont déclaré avoir eu une meilleure situation financière pendant cette période. Les difficultés technologiques sont considérées comme les principales limites de l'enseignement en ligne, suivies par les problèmes de communication, le manque de compétences cliniques et les distractions familiales. 26% des participants ont jugé que cette méthode d'enseignement avait un impact négatif élevé à très élevé sur leur santé mentale, déclarant que la dépression, l'insomnie, l'hypocondrie et la peur du COVID-19 étaient des problèmes psychiatriques dont ils ont souffert pendant cette période.

Après l'expérience de l'enseignement en ligne, 65,2% des étudiants étaient compétents à très compétents dans l'utilisation des outils technologiques et 53,4% étaient neutres à l'égard de cette méthode. 44,7% des participants n'ont pas jugé l'enseignement en ligne comme une meilleure méthode d'enseignement que le présentiel, et une grande majorité de participants (75,8%) ont déclaré que la méthode hybride serait la meilleure approche dans l'avenir.

Discussion: Notre étude s'aligne étroitement sur la littérature existante, indiquant que divers acteurs ont joué un rôle crucial dans la facilitation d'une transition réussie vers l'apprentissage numérique. Cela a impliqué d'importantes mesures logistiques et une mobilisation importante de ressources. Il est de la plus haute importance de se baser sur les progrès réalisés, notamment pendant la pandémie, et de les mettre à profit pour créer un matériel dynamique, engageant et interactif adapté aux besoins des étudiants. La complexité du programme de médecine rend l'intégration de cette nouvelle méthode d'enseignement difficile, mais apporte néanmoins une myriade d'opportunités. La mise en œuvre d'outils innovants dans les universités de médecine devrait permettre, à terme, d'offrir une meilleure formation aux étudiants et, espérons-le, de meilleurs médecins.

Conclusion: Notre suggestion après cette étude est la mise en œuvre à temps plein de ressources en ligne pour compléter l'enseignement en présentiel, dans notre faculté, notre hôpital universitaire et le reste de la communauté médicale.

ملخص

الأهداف: هدفت هذه الدراسة إلى تقييم وتحليل تجربة الطلاب مع التدريس عبر الإنترنت خلال جائحة كوفيد-19 في FMPM، مع التركيز على الصعوبات والمزايا التي تقدمها هذه الطريقة، ورضا الطلاب عن التدريس عبر الإنترنت، والتنفيذ المستقبلي المحتمل لـهذا النمط من التعلم في FMPM.

المنهجية: تم إجراء مسح باستخدام تصميم مقطعي بهدف مزدوج للوصف والتحليل. وباستخدام استبيان مجهول المصدر ذاتيًا، قمنا بجمع استجابات الطلاب من خلال أخذ العينات غير الاحتمالية. وكان استبيان مجهول، مصمم على نماذج جوجل، بمثابة أداة القياس وتم توزيعه عبر الإنترنت. وبعد ذلك، وبعد الانتهاء من جمع البيانات، تم اعتماد المنهج الوصفي. وتم إجراء إدخال البيانات، وكذلك التحليلات الوصفية والتحليلية للنتائج باستخدام جداول بيانات Google

النتائج: شارك في الدراسة 161 طالباً، وكانت نسبة الجنس 0.52. وكانت الفئة العمرية السائدة هي من 23 إلى 25 سنة. كان غالبية الطلاب في السنة السابعة/المتدربين في السنة الثانية، ودرس معظمهم سنتهم الرابعة عبر الإنترنت.

كان تعرض الطلاب للتعلم عبر الإنترنت قبل الوباء منخفضًا إلى منخفض جدًا (50,3%)، وتم الحكم على كفاءتهم في استخدام الأدوات التكنولوجية على أنها محايدة من قبل 32,3% من المشاركين ومنخفضة إلى منخفضة جدًا بنسبة 41% من المشاركين. صرح 34,2% من الطلاب أنهم كانوا يستخدمون المنصات عبر الإنترنت قبل جائحة كوفيد-19، واستخدمها 29,2% فقط خلال هذه الفترة، بينما لا يزال 34,2% يستخدمونها، وكان YouTube هو النظام الأساسي الأكثر استخدامًا (39,4%) يليها (THEIA (30%، ثم موقع (FMPM (17,5%. كما أعلن 91% من المشاركين أنهم استخدموا الكمبيوتر الشخصي لحضور الدروس، وذكر 90% أن الجهاز مزود بميكروفون وكاميرا مدمجين. كان اتصال الإنترنت ADSL هو الأكثر استخدامًا (51,6%)، وحكم 44,7% على جودة الاتصال بالإنترنت بأنها جيدة إلى جيدة جدًا.

كان استخدام المنصات الإلكترونية التي تقدمها FMPM خلال فترة Covid-19 سهلاً بشكل عام بنسبة 56,5٪ من الأصوات. حكم 47,2% من الطلاب على جودة المواد التي تلقوها عبر الإنترنت بأنها متوسطة، كما اعتبر التفاعل بين الطالب والأستاذ متوسطًا أيضًا بنسبة 31,7% من المشاركين. أفاد 41% من المشاركين أن الجدول الزمني المخصص للتدريس عبر الإنترنت في الكلية كان متوسطًا، و41,6% منهم حكموا على كفاءة إدارة الوقت بأنها جيدة إلى جيدة جدًا. كانت مشاركة الطلاب منخفضة إلى منخفضة جدًا بالنسبة إلى 39,8% من الطلاب. حكم 35,4% أن معرفتهم الطبية التي تعلموها من خلال الفصول

الدراسية عبر الإنترنت تتراوح ما بين جيدة إلى جيدة جدًا، مع عدم تأثر أداء الطلاب في الامتحانات بالنسبة لغالبية الطلاب (62,1%)، ومعدل نجاح مرتفع جدًا يصل إلى 33,5 % من 39,1% نجحوا في جميع الوحدات الخمس التي درسوها خلال الفصل الدراسي الثاني 2019-2020.

وفيما يتعلق بفصول المحاكاة، أكد 44,7% من المشاركين أن أهمية فصول المحاكاة وجهاً لوجه كبيرة جداً بالنسبة لهم، و80,7% من المشاركين لم يستفيدوا من أي فصول محاكاة خلال الجائحة، و71, وذكر 4% أنه لم يتم إعادة جدولة الدروس في وقت لاحق. كان يُنظر إلى المرونة على أنها أقوى أصول الطريقة عبر الإنترنت. بالإضافة إلى ذلك، اعتبر الطلاب أن هذه الطريقة تسمح بوصول أكثر استدامة إلى المواد الدراسية، وتوفر الوقت، وتسمح بمزيد من الوقت لاستيعاب المعلومات الجديدة ويعتبرونها طريقة أقل إرهاقًا. وذكر المشاركون أيضًا أن ذلك سمح لهم بخفض التكاليف، وذكر 43,5% أن وضعهم المالي أفضل خلال هذه الفترة. ويُنظر إلى الصعوبات التكنولوجية على أنها أكبر القيود على التدريس عبر الإنترنت، تليها مشاكل الاتصال، ونقص المهارات السريرية، والتشتت الأسري. رأى 26% من المشاركين أن طريقة التدريس هذه كان لها تأثير سلبي كبير إلى مرتفع جدًا على صحتهم العقلية، معلنين أن الاكتئاب والأرق والوساوس المرضية والخوف من كوفيد-19 كانت مشاكل نفسية عانوا منها خلال هذه الفترة.

بعد تجربة التدريس عبر الإنترنت، كان 65,2% من الطلاب ماهرين إلى ماهرين جدًا في استخدام الأدوات التكنولوجية و53,4% كانوا محايدين تجاه هذه الطريقة. 44,7% من المشاركين لم يحكموا على التدريس عبر الإنترنت باعتباره طريقة تدريس أفضل من التدريس وجهًا لوجه، وذكرت أغلبية كبيرة من المشاركين (75,8%) أن الطريقة الهجينة ستكون أفضل طريقة في التدريس المستقبل.

المناقشة: تتوافق دراستنا بشكل وثيق مع الأدبيات الموجودة، مما يشير إلى أن الجهات الفاعلة المختلفة لعبت دورًا حاسمًا في تسهيل الانتقال الناجح إلى التعلم الرقمي. وتضمن ذلك اتخاذ تدابير لوجيستيكية مهمة وتعبئة كبيرة للموارد. ومن المهم الاستفادة من التقدم المحرز خاصة أثناء الوباء، واستخدامه لصالح إنشاء مواد ديناميكية وجذابة وتفاعلية مصممة خصيصًا لتلبية احتياجات الطلاب. إن تعقيد المنهج الطبي يجعل من الصعب دمج طريقة التدريس الجديدة هذه، ولكنه يوفر مع ذلك عددًا لا يحصى من الفرص. إن تطبيق الأدوات المبتكرة في الجامعات الطبية يجب أن يؤدي في النهاية إلى تدريب أفضل للطلاب، ونأمل أن يؤدي ذلك إلى تدريب للأطباء أفضل.

الاستنتاج: اقتراحنا بعد هذه الدراسة هو دمج الموارد عبر الإنترنت بدوام كامل لاستكمال التدريس وجهاً لوجه، في كليتنا، والمستشفى الجامعي، وبقية المجتمع الطبي.

APPENDIXES

Online Teaching Assessment During The Covid Period Among The FMPM Students.

Due to the Covid-19 global pandemic, declared by the World Health Organization (WHO) on 11th march 2020, the Faculty of Medicine and Pharmacy of Marrakesh among other universities worldwide have chosen Online Teaching as a solution to the problem faced with social distancing to keep giving out classes to its students.

Thus, we have decided to carry out a study assessing this method, its difficulties, advantages, its future in medical studies inside our faculty and your satisfaction.

Through your feedback, you will help us have a better understanding of the points mentioned above.

* Indique une question obligatoire

Section sans titre

1. By voluntarily filling this form, i consent to the use of the non-identifiable data collected for research purposes only. *

Plusieurs réponses possibles.

☐ I consent

Passer à la question 2

General information

2. Year of Medical Studies *

Une seule réponse possible.

- ◯ 2nd year
- ◯ 3rd year
- ◯ 4th year
- ◯ 5th year
- ◯ 6th year / 1st year intern
- ◯ 7th year / 2nd year intern
- ◯ Graduate

3. During which year did you study online ? *

Une seule réponse possible.

- ◯ 1st year
- ◯ 2nd year
- ◯ 3rd year
- ◯ 4th year
- ◯ 5th year

4. Gender *

Une seule réponse possible.

- ◯ Male
- ◯ Female

5. Age *

Une seule réponse possible.

- 18-20
- 21-23
- 23-25
- >25

Difficulties and Advantages.

*Questions asking a rating from 1 to 5 are meant to be considered as 1 = very low and 5 = very high

6. How would you rate your online learning experience before the covid 19 pandemic ? *

Une seule réponse possible.

- 1
- 2
- 3
- 4
- 5

7. How would you rate your level of proficiency regarding the use of technological tools "before" the covid 19 pandemic? *

Une seule réponse possible.

- 1
- 2
- 3
- 4
- 5

8. When did you first use online platforms for your medical studies ? (faculty and non-faculty related platforms : Theia, youtube, other faculties' websites ...) *

Une seule réponse possible.

- Before the covid 19 period
- Only during the covid 19 period
- Still using them

9. What is your go to online platform when it comes to medical studies ? *

Une seule réponse possible.

- ◯ FMPM website
- ◯ Theia
- ◯ Other faculties' websites
- ◯ Youtube
- ◯ Autre : _____

10. How would you rate your level of proficiency regarding the use of technological tools "after" the covid 19 pandemic? *

Une seule réponse possible.

1	◯
2	◯
3	◯
4	◯
5	◯

11. How would you rate your time management efficiency during the covid 19 period ? *

Une seule réponse possible.

- 1
- 2
- 3
- 4
- 5

12. How would you rate the negative impact of online teaching on your mental health during the covid 19 period? *

Une seule réponse possible.

- 1
- 2
- 3
- 4
- 5

13. If you answered 3 or more on the previous question, which of the following situations do you relate to ?

Plusieurs réponses possibles.

- [ ] Hypochondria
- [ ] Phobia from Covid-19
- [ ] Depression
- [ ] Insomnia
- [ ] Drug or Alcohol use
- [ ] Self-harm and/or suicidal thoughts
- [ ] Autre : _____

14. What type of internet connection did you have access to during online classes * ?

Une seule réponse possible.

- 4G
- ADSL
- Fiber-optic internet
- Other

15. How would you rate the quality of the internet service used ? *

Une seule réponse possible.

1
2
3
4
5

16. What device did you use to attend online classes? *

Plusieurs réponses possibles.

- [ ] Personal computer
- [ ] Family computer
- [ ] Phone
- [ ] Tablet
- [ ] Autre : _____

17. Was the device equipped with built-in camera and mic? *

Une seule réponse possible.

- ◯ yes
- ◯ no

18. How would you rate your financial situation according to online learning ? (As in transport, rent, school supplies, books...)

Une seule réponse possible.

- ◯ Better
- ◯ Neutral
- ◯ Worse

Passer à la question 19

Your experience with online teaching

The aim of the questions here is to assess the lectures provided by the FMPM during the Covid-19 period

19. How would you rate the difficulty of navigating through the online platforms used by the FMPM " Theia, Microsoft Teams" ? *
(1 = very easy , 5 = very difficult)

Une seule réponse possible.

- 1
- 2
- 3
- 4
- 5

20. How would you rate the quality of the online lectures ? *

Une seule réponse possible.

21. How easy was it for you to interact with professors during online lectures compared to face-to-face learning ? (asking questions, answering quizzes ...) *

Une seule réponse possible.

- 1
- 2
- 3
- 4
- 5

22. How would you rate the time schedule for online lectures ? *
(time allocated for each lecture and timing of the lectures)

Une seule réponse possible.

- 1
- 2
- 3
- 4
- 5

23. How would you rate your engagement to attending online classes ? *

Une seule réponse possible.

- 1
- 2
- 3
- 4
- 5

24. How would you rate your medical knowledge learned through online classes compared to traditional learning ? *

Une seule réponse possible.

- 1
- 2
- 3
- 4
- 5

25. Did you benefit from simulation classes during the Covid-19 period ? *

Une seule réponse possible.

- yes
- no

26. If not, were those classes rescheduled for later ? *

Une seule réponse possible.

- yes
- no

27. How would you rate the importance of face-to-face simulation classes in your studies ? *

Une seule réponse possible.

- 1
- 2
- 3
- 4
- 5

28. How were your marks compared to the other years ? *
(Before and after the Covid-19 period)

Une seule réponse possible.

- Better
- Neutral
- Worse

29. How many "modules" did you take during the normal session of the 2nd semester of 2019-2020 ? *

Une seule réponse possible.

- 0
- 1
- 2
- 3
- 4
- 5

30. How many "modules" have you been able to pass during the normal session of the 2nd semester of 2019-2020 ? *

Une seule réponse possible.

- 0
- 1
- 2
- 3
- 4
- 5

Satisfaction

31. What are the strengths of online teaching according to you? *

Plusieurs réponses possibles.

- [ ] More time to assimilate new information.
- [ ] Less stressful method than face-to-face learning.
- [ ] More durable access to study materials.
- [ ] Cutting on study expenses.
- [ ] Better interaction
- [ ] Time saving
- [ ] Flexibility
- [ ] Autre : _____

32. What are the limits of online teaching according to you ? *

Plusieurs réponses possibles.

- [ ] Family distractions
- [ ] Internet quality
- [ ] Stress or anxiety inducing
- [ ] Communication
- [ ] Peer interaction
- [ ] Technical issues
- [ ] Clinical skills
- [ ] Autre : _____

33. How would you rate your experience with online learning during the covid period ? *

Une seule réponse possible.

- 1
- 2
- 3
- 4
- 5

34. How effective was online learning for you compared to face-to-face learning ? *

Une seule réponse possible.

35. Do you see online learning as a better method than face-to-face learning ? *

Une seule réponse possible.

- Yes
- Neutral
- No

36. Do you prefer ? *

Une seule réponse possible.

- Face-to-face teaching
- Hybrid method (online + face-to-face)
- Online teaching

37. What for you is an effective way to implement online teaching in medical studies in the Faculty of Medicine and Pharmacy of Marrakesh?

38. How do you see the impact of online teaching in the future of teaching at FMPM ?

Ce contenu n'est ni rédigé, ni cautionné par Google.

Google Forms

BIBLOGRAPHY

1. Epignosis LLC. TalentLMS [Internet]. [cited 2023 Oct 19].
The Evolution and History of eLearning.
Available from: https://www.talentlms.com/elearning/history-of-elearning
2. Coronavirus disease (COVID-19) pandemic [Internet]. [cited 2023 Oct 16].
Available from: https://www.who.int/europe/emergencies/situations/covid-19
3. Definition of Online Learning - University of Houston [Internet]. [cited 2023 Nov 9].
Available from: https://uh.edu/power-on/rsi/online-learning-defined/
4. **Abbas Z, Umer M, Odeh M, McClatchey R, Ali A, Farooq A.**
A semantic grid-based e-learning framework (SELF). In: CCGrid 2005 IEEE International Symposium on Cluster Computing and the Grid, 2005 [Internet]. 2005 [cited 2023 Nov 25]. p. 11-18 Vol. 1. Available from: https://ieeexplore.ieee.org/abstract/document/1558528
5. **Zawacki-Richter O, Jung I, editors.**
Handbook of Open, Distance and Digital Education [Internet]. Singapore: Springer Nature Singapore; 2023 [cited 2023 Nov 23]. Available from: https://link.springer.com/10.1007/978-981-19-2080-6
6. **Martin F, Polly D, Ritzhaupt A.**
EDUCAUSE Review [Internet]. [cited 2023 Nov 23].
Bichronous Online Learning: Blending Asynchronous and Synchronous Online Learning. Available from: https://er.educause.edu/articles/2020/9/bichronous-online-learning-blending-asynchronous-and-synchronous-online-learning
7. Institut de statistique de l'Unesco. Guide to measuring information and communication technologies (ICT) in education. [Internet]. Montréal: UNESCO Institute for Statistics; 2009.
Available from: https://unesdoc.unesco.org/ark:/48223/pf0000186547
8. **Singh J, Steele K, Singh L.**
Combining the Best of Online and Face-to-Face Learning: Hybrid and Blended Learning Approach for COVID-19, Post Vaccine, & Post-Pandemic World. J Educ Technol Syst. 2021 Dec 1;50(2):140-71.
9. **Idrissi AN.**
Les TICE au Maroc : entre usage et gestion, cas de l'enseignement du français dans le cycle collégial à Agadir. Sēmēion Méditerranée [Internet]. 2020 Aug 6 [cited 2023 Nov 25];(4).
Available from: https://revues.imist.ma/index.php/SEMEION_MED/article/view/22281
10. Évolution du Programme GENIE du Maroc depuis l'attribution du Prix UNESCO pour l'utilisation des TIC dans l'éducation 2017 | UNESCO [Internet]. [cited 2023 Nov 25].
Available from: https://www.unesco.org/fr/articles/evolution-du-programme-genie-du-maroc-depuis-lattribution-du-prix-unesco-pour-lutilisation-des-tic
11. **Marfouq A.**
TIC au service de l'évaluation pédagogique à distance. De l'expérience d'évaluation à l'évaluation de l'expérience. Cas de l'Institut des Science du Sport de l'Université Hassan Premier de Settat-Maroc. Réflex Sport. 2023 Nov 9;(3):240-54.

12. Mag TIC. Maroc : Le projet Marwan a permis la connexion de 80 universités à la fibre optique [Internet]. Digital Business Africa. 2018 [cited 2023 Dec 17]. Available from: https://www.digitalbusiness.africa/maroc-projet-marwan-a-permis-connexion-de-80-universites-a-fibre-optique/
13. Bennani PA.
Le Campus Virtuel Marocain. 2006;
14. Alsoufi A, Alsuyihili A, Msherghi A, Elhadi A, Atiyah H, Ashini A, et al.
Impact of the COVID-19 pandemic on medical education: Medical students' knowledge, attitudes, and practices regarding electronic learning. PLOS ONE. 2020 Nov 25;15(11):e0242905.
15. Benseddik M.
Coronam-2: L'université marocaine à l'épreuve du Covid-19. Le Libellio [Internet]. [cited 2023 Nov 9].
Available from: http://lelibellio.com/wp-content/uploads/2020/04/Coronam-2.pdf#page=37
16. Rajab MH, Gazal AM, Alkattan K, Rajab MH, Gazal AM, Alkattan K.
Challenges to Online Medical Education During the COVID-19 Pandemic. Cureus [Internet]. 2020 Jul 2 [cited 2023 Oct 11];12(7). Available from: https://www.cureus.com/articles/30131-challenges-to-online-medical-education-during-the-covid-19-pandemic
17. Eleftheriou A, Rokou A, Arvaniti A, Nena E, Steiropoulos P.
Sleep Quality and Mental Health of Medical Students in Greece During the COVID-19 Pandemic. Front Public Health. 2021 Nov 19;9:775374.
18. Halperin SJ, Henderson MN, Prenner S, Grauer JN.
Prevalence of Anxiety and Depression Among Medical Students During the Covid-19 Pandemic: A Cross-Sectional Study. J Med Educ Curric Dev. 2021 Feb 15;8:2382120521991150.
19. Martin F, Ritzhaupt A, Kumar S, Budhrani K.
Award-winning faculty online teaching practices: Course design, assessment and evaluation, and facilitation. Internet High Educ. 2019 Jul 1;42:34–43.
20. Czerkawski BC, Lyman EW.
An Instructional Design Framework for Fostering Student Engagement in Online Learning Environments. TechTrends. 2016 Nov 1;60(6):532–9.
21. Al-Fraihat D, Joy M, Masa'deh R, Sinclair J.
Evaluating E-learning systems success: An empirical study. Comput Hum Behav. 2020 Jan;102:67–86.
22. Strategies for Providing Feedback in Online Courses | University of Illinois Springfield [Internet]. [cited 2023 Nov 24].
Available from: https://www.uis.edu/ion/resources/tutorials/pedagogy/feedback-strategies
23. McCoy L, Lewis JH, Dalton D.
Gamification and Multimedia for Medical Education: A Landscape Review. J Osteopath Med. 2016 Jan 1;116(1):22–34.
24. Pottle J.
Virtual reality and the transformation of medical education. Future Healthc J. 2019 Oct;6(3):181.

25. Maras D, Flament MF, Murray M, Buchholz A, Henderson KA, Obeid N, et al.
Screen time is associated with depression and anxiety in Canadian youth. Prev Med. 2015 Apr 1;73:133–8.
26. Michaeli D, Keough G, Perez-Dominguez F, Polanco-Ilabaca F, Pinto-Toledo F, Michaeli J, et al.
Medical education and mental health during COVID-19: a survey across 9 countries. Int J Med Educ. 2022 Feb 26;13:35–46.
27. Tate T, Warschauer M.
Equity in online learning. Educ Psychol. 2022 Jul 3;57(3):192–206.
28. THEIA - Plateforme d'évaluation numérique [Internet]. [cited 2023 Nov 11].
Available from: https://www.theia.fr/
29. Microsoft Teams for Teachers & Schools | Microsoft Teams [Internet]. [cited 2023 Nov 11].
Available from: https://www.microsoft.com/en-us/microsoft-teams/education
30. Murphy B.
American Medical Association [Internet]. 2021 [cited 2023 Nov 13].
Women in medical schools: Dig into latest record-breaking numbers. Available from: https://www.ama-assn.org/education/medical-school-diversity/women-medical-schools-dig-latest-record-breaking-numbers
31. Dost S, Hossain A, Shehab M, Abdelwahed A, Al-Nusair L.
Perceptions of medical students towards online teaching during the COVID-19 pandemic: a national cross-sectional survey of 2721 UK medical students. BMJ Open. 2020 Nov 1;10(11):e042378.
32. DataReportal – Global Digital Insights [Internet]. [cited 2023 Nov 13].
Digital Around the World. Available from: https://datareportal.com/global-digital-overview
33. Sebbani M, Adarmouch L, Mansouri A, Mansoury O, Michaud S, ElAdib AR, et al.
Implementation of Online Teaching in Medical Education: Lessons Learned from Students' Perspectives during the Health Crisis in Marrakesh, Morocco. Educ Res Int. 2021 Apr 16;2021:e5547821.
34. Chodorow S.
Educators must take the electronic revolution seriously. Acad Med. 1996 Mar;71(3):221.
35. Walsh JN, O'Brien MP, Costin Y.
Investigating student engagement with intentional content: An exploratory study of instructional videos. Int J Manag Educ. 2021 Jul 1;19(2):100505.
36. Orellano C, Carcamo C.
Evaluating learning of medical students through recorded lectures in clinical courses. Heliyon. 2021 Jul 5;7(7):e07473.
37. Ahmady S, Kallestrup P, Sadoughi MM, Katibeh M, Kalantarion M, Amini M, et al.
Distance learning strategies in medical education during COVID-19: A systematic review. J Educ Health Promot. 2021 Nov 30;10:421.
38. Tabatabai S.
Simulations and Virtual Learning Supporting Clinical Education During the COVID 19 Pandemic. Adv Med Educ Pract. 2020 Aug 5;11:513–6.

39. Sharma D, Bhaskar S.
Addressing the Covid-19 Burden on Medical Education and Training: The Role of Telemedicine and Tele-Education During and Beyond the Pandemic. Front Public Health [Internet]. 2020 [cited 2023 Nov 15];8. Available from: https://www.frontiersin.org/articles/10.3389/fpubh.2020.589669
40. Pather N, Blyth P, Chapman JA, Dayal MR, Flack NAMS, Fogg QA, et al.
Forced Disruption of Anatomy Education in Australia and New Zealand: An Acute Response to the Covid-19 Pandemic. Anat Sci Educ. 2020;13(3):284–300.
41. Bolatov AK, Seisembekov TZ, Askarova AZh, Baikanova RK, Smailova DS, Fabbro E.
Online-Learning due to COVID-19 Improved Mental Health Among Medical Students. Med Sci Educ. 2021 Feb 1;31(1):183–92.
42. Chinelatto LA, Costa TR da, Medeiros VMB, Boog GHP, Hojaij FC, Tempski PZ, et al.
What You Gain and What You Lose in COVID-19: Perception of Medical Students on their Education. Clinics. 2020 Jul 10;75:e2133.
43. Bouferas N, Elalami A.
Enseignement à distance au Maroc: Etude de satisfaction des étudiants de.
44. Pei L, Wu H.
Does online learning work better than offline learning in undergraduate medical education? A systematic review and meta-analysis. Med Educ Online. 2019 Jan 1;24(1):1666538.
45. Garrison DR, Vaughan ND.
Blended Learning in Higher Education: Framework, Principles, and Guidelines. John Wiley & Sons; 2008. 264 p.

قسم الطبيب

أقْسِم بِالله العَظِيم

أن أراقبَ الله في مِهْنَتِي.

وأن أصُونَ حياة الإنسان في كآفّةِ أطوَارهَا في كل الظروف

والأحَوال باذلا وسْعِي في انقاذها مِن الهَلاكِ والمرَضِ

والألَم والقَلَق.

وأن أحفَظَ لِلنَاسِ كرَامَتهُم، وأسْتر عَوْرَتهُم، وأكتمَ سِرَّهُمْ.

وأن أكونَ عَلى الدوَام من وسائِل رحمة الله، باذلا رعايتي الطبية للقريب والبعيد،

للصالح والطالح، والصديق والعدو.

وأن أثابر على طلب العلم، وأسَخِّرَه لِنَفْعِ الإِنْسَان لا لأذَاه.

وأن أُوَقّرَ مَن عَلَّمَني، وأُعَلّمَ مَن يَصْغرَني، وأكون أخا لِكُلِّ زَميلٍ في المِهنَةِ الطِّبِّيَة

مُتعَاونِينَ عَلى البرِّ والتقوى.

وأن تكون حياتي مِصْدَاق إيمَاني في سِرّي وَعَلانيَتي،

نَقِيَّة مِمّا يُشينهَا تجَاهَ الله وَرَسُولِهِ وَالمؤمِنين.

والله على ما أقول شهيد

كليـــــــة الـطـب
والصيدلة - مراكش
FACULTÉ DE MÉDECINE
ET DE PHARMACIE - MARRAKECH
جامعة القاضي عياض
UNIVERSITÉ CADI AYYAD

السنة 2023 الاطروحة رقم445

تقييم التدريس عبر الإنترنت خلال فترة فيروس كورونا وسط طلاب كلية الطب و الصيدلة بمراكش

الأطروحة

قدمت ونوقشت علانية يوم 08/12/2023

من طرف

السيد : محمد أشرف اللماط

المزداد في 1998/06/29 بمدينة مراكش

لنيل شهادة الدكتوراه في الطب

الكلمات المفتاحية

التدريس عبر الإنترنت–طلاب كلية الطب و الصيدلة بمراكش-كوفيد-19–تكنولوجيا المعلومات والاتصال

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