Impact of the Covid 19 pandemic on preclinical teaching in medical schools-Lessons learned

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Abstract

Objectives: *The authors analyzed the weaknesses and areas of opportunities with the online teaching imposed by the COVID19 lockdown, and the new measures adopted to control the online examinations for medical students.*

Method: *In addition to personalized question sets we had location mapping and Open Broadcaster Software (OBS) for monitoring students during the exams as well as disabling the back-button during examination.*

Results: *The academic year was successfully completed on time. There was no change in the exams format or scope, yet the results were similar in terms of grade distribution, average and standard deviation as well as the validity and reliability scores.*

The students' perception of online teaching was evaluated through a survey. It revealed the importance and added value of online teaching but also exposed the gaps related to lecturers' preparedness and need for training.

Conclusion: *The online experience was a valuable lesson for us, as we discovered not only the weaknesses or areas to improve, but also new ways and opportunities that can be explored to enhance the learning experience.*

Our plan is to introduce online teaching gradually to all modules and align it with students' readiness through direct implications of students; however, every center should develop its own long-term plan to address its own problems and weaknesses.

Introduction

The imposition of the social lockdown due to Covid 19 pandemic produced new challenges concerning the education in medical schools, not only for lectures delivery but also for online exams and assessment of students.

The Faculty of Medicine (FOM), at the University of Balamand, maybe the first faculty in Lebanon, and certainly one of the few worldwide, to go completely online with no delays in the schedule for the basic sciences years, and was able to finish the academic year on time, with no compromise on the content or quality of the curriculum.

The FOM adopts the American system of medical education where students are accepted after three years of undergraduate studies and earning a BS degree. The medical program consists of two years of basic sciences and 2 years of clinical clerkship. Our study covers the two basic years. We have started the horizontal integration system five years ago, with system-based integrated modules for the first and second medical years, the preclinical years, with a vision for a more holistic horizontal integration of both years into one bulk of preclinical medical studies.

Normally, we use the MOODLE platform (Modular Object-Oriented Dynamic Learning Environment) to post grades, notifications, syllabi and lectures handouts for the students and on some occasions for computer-based exams done in FOM's computer lab with direct supervision and monitoring. We upgraded our use for MOODLE to online exams.

Having finished the curriculum on time, and looking back at this experience, we can say that it was a valuable lesson for us, as we discovered not only the weaknesses or areas to improve, but also new ways and opportunities, that can be explored to enhance the learning experience. We hope, once the lockdown is lifted, to use these modalities alongside the classic classroom teaching.

Areas affected by the lockdown

The problems faced were due to the lack of physical presence of both students and staff, and the decision to go completely online.

1. Lectures: Of course all lectures had to go online and from the beginning all lectures were started the lectures on WebEx where students could attend and interact. Only few lecturers opted for posting recorded lectures, however, a Q&A or review session was added in that case.

   One of the major challenges encountered is that the internet is not always reliable and we have multiple power failures, thus affecting online teaching and exams. Other specific challenges were also encountered:

- Several students and lecturers didn't have a compatible PC they can use to connect to the lectures or exam, so a laptop was ensured by the university for those students.

- Several students didn't have good internet connection all the time and so all lectures were recorded and posted.

2- Exams: The challenge with the exams was to monitor the students and control and prevent students' communication. As we follow a modular system, the exams were the final exams and sometimes the only exams for each module. Exams are usually between 80 and 100 MCQ questions with 1 minute per question. The decision to have exams online was understandably met with considerable resistance from the students who raised concerns as to the ability to control and prevent cheating and the reliability of the internet; however, with proper explanation and briefing about the methodology, it was widely accepted.

Assessment methodology

Exams: The online exams for medical students are previously reported by some colleges (Tapper, Batty and Savage, 2020) and the measures described to prevent communication are based mainly on the time limitation and shuffling of the questions.

To ensure the integrity of the exams different control modalities were taken:

a. Location mapping: this was done to ensure that students are distant geographically from each other so direct communication was impossible.
b. Online streaming with screen monitoring and recording: All students had to use the Open Broadcaster Software (OBS) for streaming and were watched over monitors. All exams were also recorded for future reference.
c. Personalized version: all questions and answers were shuffled.
d. Back button disabled: This means one can't review his answers and this is certainly a limitation for the students but a necessary measure to control student's communication.
e. One question per screen.
f. Each exam into sections of 20 questions each, in case of a major system failure.

Lectures:

All lecturers were contacted and all had a WebEx account created for them and online training and support. All lectures were recorded and posted on MOODLE for review and for students who had internet problems. Lecturers who wanted to post a recorded lecture were also supported online.

Lab sessions:

Since the dissection laboratory couldn't be accessed, we had to resort to virtual dissection which is a valuable alternative, though not as real as the hands-on dissection.

Results

The results comprise the students' evaluation of lectures, lecturers and exams. The validity and reliability of exams are also reported.

Lectures and lecturers

A survey to evaluate the students' perception of online teaching, material and lecturers was carried out among the med1 and med 2 students. Out of a total of 183 students, 99 med 1 and 84 med 2, 151 students completed the survey (95 med 1 or 96% and 56 med 2 or 67%).

The comparison of online to classroom lectures is summarized in [table 1].

Table 1 comparison between online lectures and classroom lectures in terms of converying information

	Yes	No	Depends on the lecturer	Depends on the content
Recorded lectures convey the information properly despite the fact that they lack the physical presence of the lecturer	15.2%	16.6%	44.4%	23.8%
The WebEx lectures were similar to class lectures in terms of interaction and explanation	12.6%	33.1%	54.3%	

The lecturer was the most important factor in the success of online lectures, although for recorded lectures the content was also a significant factor. One can assume that for certain basic, informative lectures where a lot of information is given and the student may need to go over and over the material several times, less interaction may be required that clinically oriented lectures.

The feedback about the lecturer's mastering of the online delivery methodology and techniques are summarized in [table 2].

Table 2 feedback about the lecturer's mastering of delivering lectures online.

	Yes	No	Not sure
The recorded lectures are more affected than the class lectures by the lecturer's mastering of the language and tonality.	62.9%	12.6%	24.5%
Training the lecturers to record lectures would improve the quality of the recorded lectures.	90.7%	2%	7.3%
Training the lecturers for online interactive lectures would improve the quality of these lectures.	88.7%	3.3%	7.9%

About 90% of all students agree that training the lecturer would improve the quality of the lectures. This involves the duration of recorded lectures and the number of slides as well as the ability to use easily the online platform including screen and multimedia sharing.

Exams

We had three online final exams for med 2, for 3 modules out of a total of 13 modules, accounting for 11 credits out of the total of 43 credits; for the Med 1 students, we had 6 exams for 6 modules out of 13 modules, accounting for 23 out of the total 43 credits. There was no change in the exams as far as number of questions or difficulty and material covered as compared to previous years, yet the results were similar in terms of grade distribution, average and standard deviation as well as the validity and reliability scores [table 3].

Table 3 Comparison of validity and reliability score between this year's online exams and last year's in-house exams.

		Med 1 (99 students)		Med 2 (84 students)	
		Online	Last year's in house exam	Online	Last year's in house exam
Exam1	*Combach's alpha Reliability Coef*	0.92	0.85	0.92	0.65
	S-CVI/Average Validity Coef	0.63	0.65	0.74	0.65
Exam2	*Combach's alpha Reliability Coef*	0.84	0.91	0.85	0.66
	S-CVI/Average Validity Coef	0.73	0.65	0.71	0.57
Exam3	*Combach's alpha Reliability Coef*	0.88	0.49	0.92	0.96
	S-CVI/Average Validity Coef	0.73	0.63	0.76	0.63
Exam4	*Combach's alpha Reliability Coef*	0.82	0.91		
	S-CVI/Average Validity Coef	0.71	0.66		
Exam5	*Combach's alpha Reliability Coef*	0.80	0.9		
	S-CVI/Average Validity Coef	0.71	0.57		

Also, comparison of students' performance prior to the lockdown and after it was made in terms of grades and ranking.

For the Med 2 students, the top 20% remained unchanged with the same order for the top 5 %. For the Med 1 students, the top 10% remained unchanged with a switch in order between the second and third places, with 2 new students who made it into the top 20%.

Discussion

A careful analysis of what was achieved, enticed a review all the procedures and look into gaps in infrastructure and preparedness, and how to make use of this experience to enhance the teaching and learning experience.

We live in a country where internet is not reliable and we have multiple power failures and this certainly can jeopardize online teaching and assessment. In addition, other problems were also encountered and had to be dealt with immediately.

The problems described so far could have been avoidable and can be divided into technical and human but also into preparedness and readiness as depicted in the [table4] below:

Table 4 Problems encountered in online teaching and exams.

	Technical	Logistics
Preparedness	• Not having the required platform updated and debugged. • Not having a unified format for all lectures delivered by doctors	• Not all doctors and students have a compatible PC and internet to get connected.
Readiness	• Not all doctors are oriented how to connect to the university platform for online lectures or to upload.	• Not being accustomed to online exams and lectures. • Resistance to change

Although virtual classrooms have been around for sometime now, they were not used globally for education as it happened during the pandemic. Opponents and proponents alike were forced into virtualization whether they were prepared or not.

The problems we faced were not peculiar to our faculty but are well known and clearly identified in the literature and include time constraints in an overcrowded schedule, poor technical skills or preparedness to use the virtual classrooms, and inadequate or unreliable infrastructure (Bediang et al., 2013; O'Doherty et al., 2018). In addition, one should expect the resistance to any new modality and the expected fear to change (Petterson and Olofson, 2015). On the other hand, the students mix and background is a critical factor in determining the success of any strategy that one would adopt to enhance distance learning. Cognitive and emotional maturity of the students should be taken into consideration when deploying a system that engages

the students and it is the student's learning readiness that we need to improve while introducing online lectures and exams (Bhagat et al., 2016). In our quest to make our students active independent learners, we have found in the experience we got from online teaching, an opportunity to help achieving this goal. The online teaching is not an end by itself and we intend to implement it in as much as it promotes the active learning, improves the quality of the teaching, and helps us achieving our vision in developing a horizontal integration throughout the basic sciences years. This is why it should be complemented with adequate student's feedback.

Lectures:

The online lectures may not always be a blank substitute for classroom lectures especially when it comes to students' engagement and motivation that can be enhanced by the physical presence and appropriate body language (Zeki, 2009), in addition to the difference in cognitive maturity of students within the same faculty that makes the physical presence within a classroom more important (Cigdem and Ozturk, 2016), but they can have added values that shouldn't be abandoned once the lockdown is lifted (Brecht, 2012):

- Help the students to get the most out of in-class sessions as they prepare or go over the recorded lectures.
- Provide the possibility of reviewing the material at any time.
- Encourages the student to be self-dependent
- Alleviates the crowded schedule giving more time for interactive and group discussion sessions.
- Interactive live online lecture can be used for oversees lecturers or to join a keynote lecture given by a prominent specialist anywhere in the world.

Reengineering of the modules to become knowledge oriented rather than topic oriented this prevent the duplication and redundancy of some information, which might be inherent in an integrated system (Royal, Gillilan and Dent, 2014; Mayer and Johnson, 2014).

Exams

The online exams can certainly offer much more than paper-based exams. One can incorporate dynamic media such as CT or MRI and not mere pictures and even whole electronic medical records. This would help changing the testing methodology to more of combination of formative and summative types, combining the MCQ questions to case-based open type questions that can be added as open book take home exams (Walsh, 2015). This would certainly help the student to assimilate the information gathered into problem solving knowledge, and can help the smooth transition into a vertical integration where clinical cases are gradually introduced into the basic sciences curriculum.

Time management

Going online, even partially and gradually, and adhering to an online schedule and calendar, and allowing the students to choose when to study a lecture may improve the time management skills of the students especially in a crowded schedule where some students are unable to find their pace, or unable to keep up with the material. (Schimming, 2008)

Technical issues

This is mainly related to the gaps that were identified and mentioned above. It is not enough to have fixed them on time and for the time of lockdown; rather, they should be centralized and continuously monitored through the creation of an educational IT team or the faculty that should oversee the utilization and maintenance of all technical platforms.

We have prepared a list of minimum and maximum requirements that need to be present on every student and lecturer laptop, such as OBS, Moodle, media for medical imaging etc. All laptops would be required to have passed an IT check at the beginning of next year.

For the coming year our plan includes:

1- Creating an educational IT team: the aim of this team is to ensure that all laptops and tablets for all the staff and students are well up to date and all necessary software are downloaded with training of the staff and students how to use the required platform and manage frequent dysfunctions, in addition to a help desk.

2- In addition to the in-class lectures, in case the lockdown is not imposed, we plan to have up to 10% online lectures

3- Training sessions for the staff on order to improve the presentation of recorded lectures including the number of slides and lecture format.

4- Training sessions for better interactions during the WebEx lectures and hands-on for the utilization of multimedia and animation during the WebEx lectures.

Conclusion

With the lockdown imposed, the online teaching was imposed on all, but for some, this experience was a fear breaker. We should build on what was achieved in the field of online teaching and explore its potentials. We have learned that:

1- Students believe that online teaching has an important added value to complement class teaching.

2- Students' familiarity with online interaction is a major factor in adapting to online teaching.

3- Lecturers need to be trained to use online platform and to adapt the lectures to online teaching.

Our plan is to introduce online teaching gradually to all modules and align it with students' readiness through direct implications of students. Every center should develop its own long-term plan to address its own problems and weaknesses.

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