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Flipping the “Learning Skills” Course during COVID-19: A Mixed-Modality Study

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ABSTRACT

The purpose of this study was to compare the male and female medical students’ perceptions of the flipped classroom (FC) using the Zoom online platform during the COVID-19 pandemic. A mixed-modality study proceeded for first-year undergraduate medical students ($n = 149$). Three topics (learning how to learn, stress management and doctor-patient communication) were flipped using the Zoom platform. Following the flipping, relevant videos and PowerPoint slides were sent to the students. Home assignments were done through the online classroom. The students were then made to answer a questionnaire on their perceptions of FC consisting of 5-point Likert items. In addition, a focus group discussion (FGD) was carried out with voluntary participation ($n = 13$) for an in-depth discussion of flipped teaching. The quantitative data were analysed using the independent t -test, and Atlas.ti was used to analyse the qualitative data. For most of the Likert statements, there was no significant difference ($p > 0.05$) between the mean results obtained by the male and female students. For example, for the item “The learning material was available before class time”, both the male (mean [SD] = 1.857 [0.443]) and female (mean [SD] = 1.966 [0.365]) respondents confirmed the learning material’s availability before class time ($p = 0.121$). However, the mean result obtained by the male respondents for the variable “I understood the topics in lesser time compared to the traditional lecture method” was higher than the mean result obtained by the female participants by 0.236, which was statistically significant (95% CI [0.373, -0.100], $p = 0.001$). Modified FC teaching for the “learning skills” course is thus an effective teaching method. The male students took significantly lesser time understanding the three included topics compared to the female students.

Keywords: *Flipped teaching, Learning skills, Mixed-modality study, Undergraduate medical students*

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INTRODUCTION

Flipped classroom (FC) is a form of blended learning and teaching method that has gained popularity. Formally implemented in 1998, FC “flips” the lecture from taking place within the classroom to being given outside class meetings (1). This strategy allows completing active learning and “homework” during class activities to enable the learners to concentrate on the content and to obtain a deeper understanding of the material being taught. In FC, according to Bloom’s updated taxonomy, students are held responsible for their learning by completing a pre-class learning task that covers the lower stages of cognition, whereas the instructor transforms into a learning facilitator (2–3).

Recently, the evolving FC model, a common educational model in medical, nursing and pharmacy education, has become a proven tool to improve students’ comprehension of the material through its active learning phase (3–5). Three educational platforms are present in the traditional FC (6): pre-class, in-class and after-class. Therefore, conventionally, FC starts with the students’

pre-class training, followed by in-class discussion, leading to after-class evaluation sessions (Figure 1). This process allows the learners to learn self-reliantly in advance for the teaching session, employing print, audio or video-based content (6–7). The FC model boosts student learning and achievement, in addition to receiving positive reviews from the students and faculty (8–9).

In December 2019, COVID-19 hit several countries and individuals who may have contacted the virus were ordered to isolate themselves at home or in a dedicated quarantine facility (10). This led academics to explore alternative ways of reaching out to their students for teaching and learning purposes, and this resulted in the greater attention given to e-learning options, which were actually already in the limelight even before the pandemic. Thus, e-learning in medical education became a part of the mainstream (11–13).

Higher education institutions have the heavy burden of coping with the current difficult situation caused by the COVID-19 pandemic, and hence to sustain and even

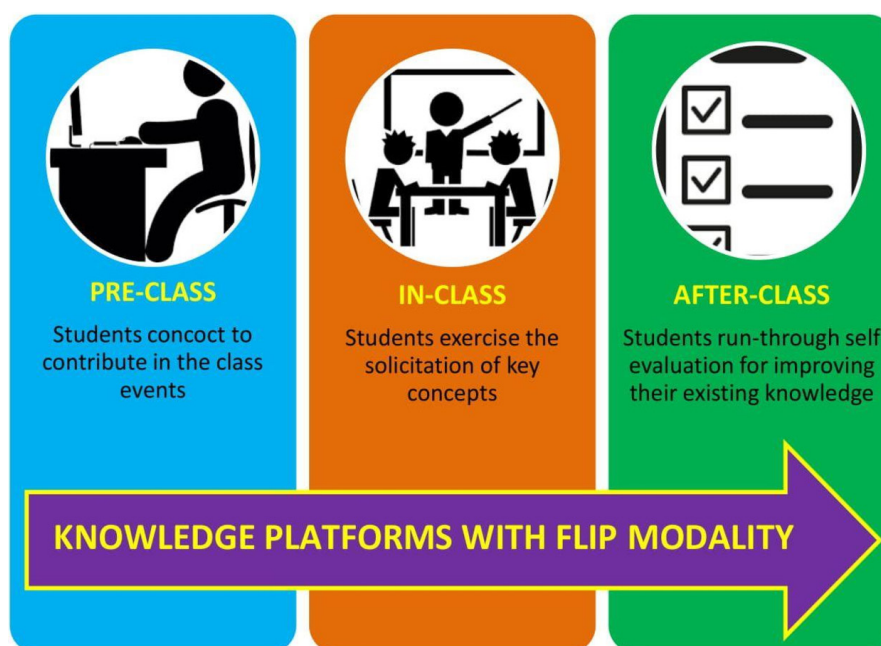


Figure 1: Educational platforms in a traditional FC.

enhance their students' learning despite the challenges involved in doing so. While academics have access to various online teaching resources, we know that technology is not just about teaching and learning; one has to be adept at the technology itself to be able to use it effectively as an educational tool. Moreover, student engagement is one of the primary components of successful teaching that the e-learning setup struggles with mainly through the educational use of technology. Despite these, FC is ideal for the pandemic situation, where face-to-face learning activities, as in the traditional setup, cannot continue.

Current evidence shows that FC has massively upgraded health professional education compared to the traditional teaching methods (14). Yet, the literature and adaptation of FC in Saudi Arabian medical institutions are still in the early stages. Modified FC (Figure 2) was implemented for teaching three topics (learning how to learn, stress management and doctor-patient communication) within the "learning skills" course at the College of Medicine, King Saud University (KSU). The purpose of adopting the FC model was to gauge how the students would receive

the FC method as an alternative teaching-learning method during or even after the COVID-19 pandemic as it could be adopted for the teaching of the remaining topics to be learned. Therefore, we aimed to compare the male and female medical students' perceptions of FC using the Zoom online platform during the COVID-19 pandemic. The Institutional Review Board of the university approved this study.

MATERIALS AND METHODS

Study Design and Participants

A mixed-modality study protocol was adopted for the first-year undergraduate medical students ($n = 149$). The study was carried out in February 2020 to March 2020 at the College of Medicine, KSU-Riyadh. KSU is the premier university in the Middle East, and its medical programme, the oldest in the region, is a five-year programme. Its curriculum is hybrid. The first two years of the programme make up the pre-clinical phase, delivered through modules, and the remaining three years make up the clinical phase, carried out as a discipline base.

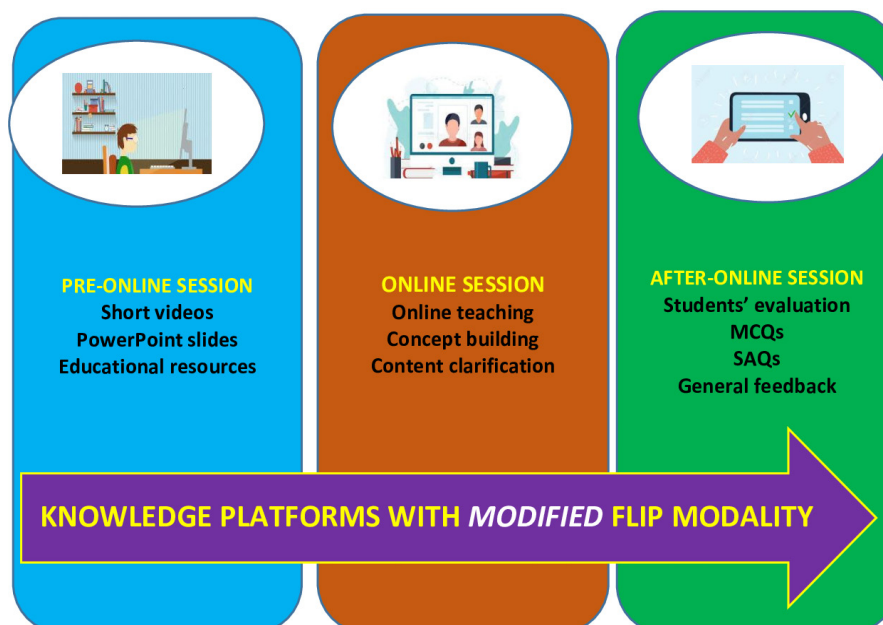


Figure 2: Educational platforms in a modified FC (6).

The study participants' signed written consent was obtained at the beginning of the questionnaire survey as the participation was entirely voluntary, and the objective of the study was then clearly explained to the study participants.

The survey was carried out electronically using the Google Forms, and the notice was sent via the students' e-mails, as provided by the Student Council. The students were asked to participate in the survey anonymously and voluntarily. Their details were kept safe and confidential.

Modified flipped teaching method for a learning skills course

Learning skills are among the various disciplines in the undergraduate medical curriculum. Various topics including learning how to learn, stress management and doctor-patient communication, are taught in the first year of the medical programme at KSU. This is done through lectures, problem-based learning (PBL), tutorials and seminars. However, when the COVID-19 pandemic broke out, all these were toggled off to the online platform, which contrasted with the typical educational interventions.

To maximise student engagement, the topics of the learning skills course were taught by adopting the modified flipped teaching method. Short didactic videos (five minutes long) on the three aforementioned topics were provided (15). The videos featured native English speakers. The learning skills course ran from February 2020 to April 2020. Initially, the classes were conducted in the usual way, face to face. However, in the middle of March 2020, there was a lockdown in the country. Thus, the remaining topics that were scheduled to be delivered traditionally were decided to be delivered via the flipped modality.

PowerPoint slides and links to other educational resources were also provided to the students. The flipped classes were

60 minutes long per topic; hence, three topics were tackled in three weeks. The assigned instructor (an onsite expert) clarified the content during a discussion in the online class. Later, another online session was held (called an after-online session) to monitor and assess student learning through a formative assessment using multiple choice questions (MCQs) and short answer questions (SAQs). General feedback on student performance was also given, with the instructor showing the learners the correct answers and the rationale for these so that they would know their weak areas and strive to improve on them. As a final stage, a survey questionnaire consisting of 5-point Likert items were distributed via the students' e-mail portal. Participation was voluntary, and the written consent of each participant was obtained before the questionnaire was distributed. An invitation was also sent to the 15 students randomly selected for the FGD. A total of 13 participants were available on the date of the FGD, and a further in-depth discussion about flipped teaching was thus held within such group.

Data Collection

After an exhaustive literature review, a panel of four experts developed a self-administered questionnaire and also finalised the discussion questions for the FGD. The survey was piloted with six faculty members of the Department of Medical Education. Based on the outcome of the pilot study, we were able to finalise 12 statements for the survey questionnaire to achieve the objectives of the study.

The questionnaire that was used to obtain the students' feedback on FC teaching had closed-ended statements with five response options each: strongly disagree, disagree, not sure, agree and strongly agree. The expert panel carefully planned six FGD questions that would help explore the participants' feelings about the FC method.

The questions that were asked were short and straightforward, and the number

was kept reasonable (9) to prevent the participants from becoming exhausted due to a long discussion. Our nine finalised questions (Table 1) for the FGD consisted of three probe questions to familiarise the participants with the discussion topic (i.e., FC) and to make them feel more relaxed when sharing their views with the group, five follow-up questions to delve further into the discussion topic and the participants' opinions and one exit question to make sure that nothing important was missed with regard to the study's main purpose.

Moreover, the number of participants was controlled in accordance with the guidelines from the literature. As for the FGD, it followed the established guidelines, such as that it was conducted by persons skilful in group discussions, used pre-determined questions, followed verifiable procedures and included systematic analysis and appropriate reporting of the data obtained.

For the data analysis, the received responses were scrutinised for their completeness and were then coded. The ordinal data (5-point Likert items) were converted into nominal (dichotomous) data. The independent *t*-test was applied using SPSS version 23.0 to obtain the mean results of the two groups (i.e., the male and female groups). The

threshold of statistical significance was 0.05. The qualitative data obtained from the FGD were assessed by Atlas.ti and a thematic approach was employed.

RESULTS

A total of 185 questionnaires were distributed to the first-year medical students of the College of Medicine, KSU-Riyadh, and 168 completed responses were retrieved. After checking for the completeness of the responses, 19 questionnaires were excluded (e.g., forms with more than one chosen answer on the 5-point Likert items). The total completed responses were 149 (male 91, 61.1%; female 58, 38.9%), and for the FGD, there were 13 participants.

Modified FC – Learning Material and Its Access

Table 2 shows that by applying an independent *t*-test, for most of the Likert statements used for feedback purposes on the FC method, there was no significant difference ($p > 0.05$) in the means of the two groups. For example, with regard to the item “The learning material was available before class time”, both the male (mean [SD] = 1.857 [0.443]) and

Table 1: Questions used to obtain the study participants' views about FC during the FGD

Question type	Items used
Probe questions	How familiar are you with FC? How often do you attend FC? What is your favourite topic covered by FC?
Follow-up questions	What aspects of FC are your most favourite in terms of content? What aspects of FC are your least favourite? How is the students' communication with their teachers and among themselves during FC? How does FC influence your learning? What will influence your decision on whether to attend FC in future or not to?
Exit question	Is there anything else you would like to say about FC?

female (mean [SD] = 1.966 [0.365]) respondents confirmed the availability of the learning material before class time ($p = 0.121$). In addition, both the male and female respondents were able to solve the assignments with the help of their peers and the instructor ($p = 0.285$).

The mean results of the male respondents for the variable “I understood a topic in lesser time than through the traditional

lecture method” were higher than those of the female respondents by 0.236, which was statistically significant (95% CI [0.373, -0.100], $p = 0.001$). Similarly, a significant difference in the mean results of the male and female groups was found for the variable “I had more time to clarify the difficult content of the topic” (95% CI [-0.247, -0.023], $p = 0.018$) (Table 2).

Table 2: Perception (expressed as means) of undergraduate medical students ($n = 149$) on modified flipped teaching method

Statement (Modified flipped teaching method)	Group		Mean difference 95% CI	t (df)	p-value
	Male, n Mean (SD)	Female, n Mean (SD)			
The learning material was available before class time.	91 1.857 (0.443)	58 1.966 (0.365)	-0.109 (-0.246, 0.029)	-1.558 (147)	0.121
I had enough time to go through the learning material of the topic.	91 1.938 (0.363)	58 1.954 (0.348)	-0.016 (-0.134, 0.103)	-0.265 (147)	0.791
The learning material sent by the instructor gave me a clear concept of the topic.	91 1.856 (0.424)	58 1.863 (0.421)	-0.007 (-0.147, 0.134)	-0.093 (147)	0.926
I already knew the learning content and the class time was spent clarifying the facts and principles.	91 1.891 (0.449)	58 1.711 (0.459)	0.18 (-0.132, 0.169)	0.242 (147)	0.809
I got greater opportunities to communicate with other students.	91 1.648 (0.437)	58 1.694 (0.409)	-0.046 (-0.187, 0.096)	-0.640 (147)	0.523
I was more motivated to learn.	91 1.773 (0.285)	58 1.806 (0.329)	0.033 (-0.068, 0.133)	0.645 (147)	0.520
With the help of my classmates and instructor, I did the course exercise correctly as compared to doing the assignment alone.	91 1.738 (0.454)	58 1.817 (0.409)	-0.079 (-0.224, 0.066)	-1.073 (147)	0.285
The given link of the video was easy to access through the internet.	91 1.902 (0.480)	58 1.909 (0.479)	-0.007 (-0.166, 0.153)	-0.085 (147)	0.933
I understood a topic in lesser time as compared to the traditional lecture method.	91 1.928 (0.352)	58 1.692 (0.489)	0.236 (0.373, -0.100)	0.236 (147)	0.001
I could learn at my own pace.	91 1.843 (0.501)	58 1.736 (0.500)	0.107 (-0.059, 0.274)	1.277 (147)	0.204
I had more time to clarify the difficult content of the topic.	91 1.819 (0.392)	58 1.954 (0.223)	-0.135 (-0.247, -0.023)	-0.2388 (147)	0.018
I could participate in group discussion easily.	91 1.672 (0.383)	58 1.727 (0.329)	-0.055 (-0.176, 0.65)	-0.905 (147)	0.367

Notes: 5-point Likert statements: strongly disagree, disagree and not sure options were combined as “Not agreed” while agree and strongly agree were merged as “Yes agreed”. An independent *t*-test was performed.

Qualitative Analysis

For the FGD ($n = 13$), the analysis of the transcripts of the in-depth interviews revealed six themes: (a) availability of learning materials; (b) reading the provided material; (c) knowing the learning content; (d) communication with peers; (e) understanding the topic; and (f) learning pace. However, there were greater chances that the qualitative data would partially overlap with each other.

Availability of learning material

Most of the students expressed very positive views on the open-ended section of the questionnaire saying “the learning material was available before the actual class discussion”. One respondent wrote, “I was happy to have received a link for a YouTube video with instructions for having an online class discussion” (R7). The link for videos was available, as the following statement illustrates, “I think the video was quite descriptive...and I think FC is awesome” (R4). “Yeah, I found it easy to understand the accent, and its link was quite easy to open” (R6).

Reading the provided learning material

Some respondents agreed that the time they were given to watch the video was too short, and they could thus not watch the video properly. “Oh my God, just one day left when I found the link for the video” (R2). “Same here” (R11).

Knowing the learning content

When modified FC and traditional teaching were discussed in the FGD, it was pointed out that in most Saudi Arabian universities, most of the time lectures are delivered using PowerPoint slides (traditional teaching). One respondent was in favour of traditional teaching. She said, “I have more chances to discuss with the doctors, and I get a chance to answer questions” (R3). A few students, however, favoured modified FC: “It is easier

to study with FC than with the traditional teaching methods because with FC, I know almost everything that is important in relation to each topic” (R11).

Communication with peers

Most of the respondents agreed that modified flipped teaching had allowed them to communicate with the teacher and their coursemates. Some raised certain issues, however, with the ongoing discussion using Zoom. One participant stated, “I was wondering if the teacher had heard my voice because I was sitting far away from my college because of COVID-19” (R13). Similarly, another participant wrote, “I waited and waited, but some of my friends kept speaking” (R2). Several students responded that modified flipped teaching provided them with an opportunity to discuss the topic, but the use of microphones somehow distorted the discussion pattern: “When I discuss with my teachers and the other students, I get more interesting information in the days before the final” (R8). They suggested that the teacher control the microphones. Some student respond, however, had positive views about learning in FC. One participant said, “I think the videos help a lot. Watching videos about the information, like simulation, will [help you] remember the information” (R6).

Understanding the topic

Most of the students did not agree that they understood the topic more with the online flipped model. As flipped teaching was adopted online during the COVID-19 lockdown phase, many students said that they had less or almost negligible time to watch the video. In addition, it was their first time to learn using the flipped method. One respondent said, “Someone in my family got infected with COVID-19 and I was worried about his treatment, so I had no time for my classes” (R2). As expressed in the earlier section, most of the students found the discussion problematic when it

was carried out online. When the flipped method was adopted, many teachers had difficulty proceeding with their teaching because they were not experts in technology use. As a result, one student said, “I did not know what the teacher said as my internet just went away” (R5). A similar situation happened to R3, R11 and R9.

When modified flipped teaching was adopted using the Zoom application, a few students found it challenging to use. Some student respondents wrote, “Oh, my Allah! What is happening here? I cannot understand a single word! Everybody is speaking! The teacher cannot control their microphone” (R1, R7, R12).

Learning pace

Despite the foregoing, most of the students actually favoured modified flipped teaching as they could control the learning pace. One suggested, “Flipped classroom looks attractive because I watched the video four times” (R8). Many of the participants watched the video more than once. Flipped teaching allowed them to learn at their own pace. Another student said, “The first time I watched the video, I could not understand the accent, so I watched it again and again” (R4).

DISCUSSION

This study revealed the effectiveness of modified FC for the learning skills course. More specifically, an overwhelmingly positive response to the pre-class video lectures was observed from students of health professional education who attended flipped courses (16). The small-group discussion activities of this study were also highly regarded, with the student respondents saying that these had helped increase their motivation to learn and had enhanced their level of engagement in the teaching modality (17–18).

In this study, most of the students favoured FC more than the traditional classroom. This statement is like the previously published findings (19) where medical students were more confident and active in the classroom exercises because they had acquired knowledge before any conversation began. In the traditional classroom setting, some students learn more quickly, many students remain moderate, and a few understudies need to tune in to the talk more than once to understand.

In the present study, most of the students expressed positive feelings about FC when the tutor gave the learning material before the online class, allowing them ample time to go through it. A similar observation was reported that there were more positive attitudes towards the pre-class learning material (16). However, some of the students reported a shortage of time to go over the pre-class study material, although previous studies reported ample time for the students to watch the study video (17–18). We could argue that the students just might have been more stressed during the time frame of the study because the COVID-19 situation was at its peak from February 2020 to June 2020 in Saudi Arabia.

From the results of this study, we could infer that modified flipped teaching had provided an opportunity for students to communicate with the teacher and their coursemates, but the students raised some issues regarding discussion, asking questions and giving answers; some of the students worried if the tutor had heard their questions; some students waited a long time to ask a question; sometimes too many sounds distorted the learning environment because everyone was talking at the same time as there was less control of the microphone by the tutor. Similar findings were reported by other studies (14, 20).

In this study, with FC, the students reported that they understood the topics, but they also raised some issues. For example, they said that they did not have the time

to devote to their classes if any one in their family acquires COVID-19. Similar situations were found in other studies (21–23). The implementation of a viable and effective online learning platform and the use of digitally enabled resources managed properly to provide a scope of other positive results, including building a learning environment that provides the students with various paces of learning and numerous learning channels, as if encouraging open doors for more profound learning.

Although the FC model offers many advantages, it also has a range of drawbacks. The lack of student preparation before class time is a problem. Students' performance in the classroom will suffer if they do not practice at home by watching the learning videos provided. One of the most common issues among students in connection with FC is that they do not observe the FC guidelines and need proper instructions on how to use their time and how to study the subject matter before the class begins. Students must of course have access to technology, whether provided by their college or at home, because it is essential in FC (24). Cultural background and language barriers can also play essential roles in the students' learning from online contents (e.g., the language, accent, etc. within the videos and other resources). All these can be avoided if all the contents intended to be used for FC will be pilot-tested before being used to foster student learning.

CONCLUSION

Modified FC teaching was effective. It provided the course contents to the undergraduate medical students at home through videos and PowerPoint slides to consolidate knowledge. The students were able to learn the included “flipped” topics at their own pace. Compared to the female students, the male students had a significantly higher liking of the course through the modified flipped modality.

ETHICAL STATEMENT

The Institutional Review Board approved the study.

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