

Does the Implementation of Flipped Classroom Model Improve the Learning Outcomes of Medical College Students? A Single Centre Analysis

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ABSTRACT

Objective: To assess the perspectives of the first year and second year MBBS students of College, regarding the effectiveness of flipped classroom learning as compared to the traditional mode of teaching.

Study Design: A descriptive study.

Place and Duration of Study: Shifa College of Medicine, Islamabad, Pakistan, from August to September 2021.

Methodology: This descriptive study was conducted on all first and second year MBBS students in College after informed consent. A self-developed questionnaire formulated after a thorough literature search, with 16 questions was given. Quantitative data was collected after ethical approval and was analysed using SPSS version 22. Percentages and mean were calculated for descriptive analysis whereas qualitative data was analysed through thematic analysis

Results: Out of the 156 responders, 61% students believed that flipped classroom buttressed a better understanding of study objectives, 24% stated that it didn't make much of a difference whereas 15% had a negative response in this respect. The majority (90%) reckoned that learning beforehand fostered better discussions and made the whole learning process much easier. Seventy-five percent believed that it has improved their grades. Although, some students did point out that sometimes meandering through various study sources consumed a lot of their time but overall they held a satisfactory opinion of flipped pedagogy (85%).

Conclusion: The students enrolled in the study asserted the usage of flipped classrooms as a likeable and preferable teaching method in medical institutions. Not only it engaged students in active learning and helped them improve their grades but also enabled them to sharpen cognitive and presentation skills, which are the prime objects of undergraduate pedagogy.

Key Words: *Flipped classroom, Medical education, Medical students, e-learning.*

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INTRODUCTION

Medical school learning is comparatively more challenging than other subjects, owing to the demands it exacts. Medical students continuously struggle with academic pressure, listening to lectures, learning huge syllabus, preparing assignments, managing frequent tests, group discussions, *viva voce* and professional exams.¹ Such an overwhelming nature of learning calls for effective teaching strategies on part of medical school faculty. The rapid progress of technology has digitally empowered the learner and led to the increasing complexity of healthcare knowledge.²

Despite the foregoing, medical students are being taught in the same traditional didactic style in many medical schools. Many educationists have questioned the effectiveness of instructing *via* lectures, for the purpose of education is not to infuse the knowledge but to make every strata of students learn by any effectual way necessary.³ This model is teacher-centred and is conducive on part of teachers as an instructional strategy, simply due to its ease of administration. Donald Clark, an educational blogger, cites several impediments to learning *via* lectures, notably "passive role of students in lecturing environment, diminution of attention over time, tyranny of place and time, cognitive overload, and poor presentation on part of some instructors."⁴ Realisation of such impediments led few educationists to develop the flipped classroom model to enhance the efficiency and effectiveness of the learning process.⁵ In such a system, lectures are delivered using digital platforms and are readily accessible to students so that the freed class time is utilised for group discussions with peers and learning practical skills *via* one-to-one interaction with the instructor. By knowing the learning objec-

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tives beforehand, students learn the basic knowledge at home and can also meander through information *via* means that suit their learning the style. In the class, they encounter case scenarios that mimic the clinical practice thus learning practical application of their knowledge *via* hands-on approach.

The efficacy and usefulness of this new teaching style have been supported by the plenitude of research.^{6,7} Contrary to listen-remember and reproduce in exam style of lecturing system, flipping the classroom offers more time bracket for the students to engage in complex higher-order cognitive tasks in their classes that promote and sharpen their thinking faculties such as analysis, integration, evaluation, critical appraisal and practical application of knowledge. Apart from this, studying becomes meaningful because students now know the clinical co-relation and the relevance of what they are learning especially in their pre-clinical years.² The face-to-face interaction with the mentor in small groups, helps address queries and misconceptions thus promoting a better understanding of the topic.⁷ This in turn leads to better student satisfaction and improved test scores.^{7,8}

A student being the centre of an educational institution is the best judge of the effectiveness of any teaching method utilised by that institution. His response can serve as a guide for refining the pedagogical methods exercised by the Faculty.

This study aimed at finding out and understanding the perception of medical students in pre-clinical years regarding flipped classroom model employed by a medical College.

METHODOLOGY

This descriptive study was carried out at Shifa College of Medicine, Islamabad. After approval from the ethical committee, data was collected from the class of first year and second year MBBS through non-probability convenient sampling technique from August to September 2021 over a period of two weeks. Written consent was taken from all the participants of the study. All those students who did not give consent and students from third, fourth and final year MBBS of Shifa College of Medicine were excluded from the study.

Quantitative data and qualitative data were collected through Survey Questionnaire. The 16-item questionnaire was developed after a thorough literature search^{5,6,9,10} and suggestions contributed by the authors. It was subjected to a pilot run over a sample of 15 students and then distributed among the students of respective classes. The questionnaire was divided into 2 sections, and could only be filled after consent had been provided. It focused on students' perceptions with regard to the potential benefits of flipped classroom learning and the likely challenges faced by them. Quantitative data were assessed using SPSS (Statistical Package for Social Sciences) 23. Frequencies, percentages, mean, and standard deviation (SD) values were calculated for descriptive analysis whereas qualitative data was analysed through thematic analysis.

RESULTS

Out of 200 students, 156 provided their response making the response rate 78%. Out of 156 students, 83(53%) responses were from the female students and 73(47%) from the male students. Class-wise, 57% responders were from second year and 43% from first year of medical school.

On further analysis of the data, about 95 (61%) students believed that the flipped classroom mode of learning helped students understand the study objectives better with about 38 (24%) feeling that there was not much difference from the traditional system and 23 (15%) believing it to be ineffective. When asked about the use of electronic study material such as videos, e-books etc. compared to just reading physical books or listening to on campus lectures it was seen that female students preferred the use of e-books, videos, 3D models etc whereas the male students were more comfortable with the traditional method of physical book reading and lectures. They were then asked about the most popular material/application accessed by them for online learning which showed videos (82.6% n=129) and Powerpoint presentations (35.8%, n=56) being the most popular mode used compared to other mediums such as e-books (17.3%, n=27) and Encyclopedias (8.9% n=14) with TED being the least used resource (2.5% n=4).

Table I compares the perspective of first and second year students about the flipped classroom mode of learning. The response of individual classes did not vary greatly with regard to the overall perception of flipped classroom. Around 90% (n=141) students from both classes believed that learning beforehand followed by hands-on practical sessions and discussions was a better approach as it made the learning process easier and more effective. Seventy-six percent (n=51) of first year students and 70% (n=62) of Second year students felt that through such a system they were better motivated and more actively involved in the class as well as peer collaborative activities. Quite interestingly 87% (n=136), the students did not find this mode of learning to be efficient in terms of managing their workload. However, the majority of the students (75%, n=117) stated that it has improved their grades.

The flipped classroom system of education proved to be more satisfactory (85% n=134) for both classes *versus* the traditional system and was a recommended choice of the students as a continuum (83%, n=130).

When asked about the greatest benefit that flipped classroom offers, flexibility, active participation, better clarity and depth of understanding were the pros overwhelmingly stated by the students. They also stated that it offered a better chance for brainstorming and analysis of the learning task at hand by inculcating the habit of accessing versatile educational sources. However, the majority of the students felt that meandering through multiple sources consumed a lot of time and hence increased their workload.

Table I: Students perspective of flipped classroom.

Student perspective	Class of 2025 (First year) N=67		Class of 2024 (Second year) N=89	
	Yes	No	Yes	No
Does learning the topic beforehand followed by on campus practical work and discussions lead to a better understanding of the topic?	90%(60)	10%(7)	91%(81)	9%(8)
Does Flipped classroom provide more flexibility and mobility with regards to learning process?	88%(59)	12%(8)	85%(76)	15%(13)
Do you think it provides you better opportunities for improving intrinsic motivation for learning?	76%(51)	24%(16)	70%(62)	30%(27)
Is Flipped classroom learning followed by on-campus practical work easier and more effective?	94%(63)	6%(4)	82%(73)	18%(16)
Through such a system do you feel yourself to be an active learner?	88%(59)	12%(8)	81%(72)	19%(17)
Availability of study material on educational platform before the on-campus session helps with better understanding?	94%(63)	6%(4)	92%(82)	8%(7)

DISCUSSION

“What if we prerecorded all of our lectures, students viewed the video as ‘homework’, and then we used the entire class period to help students with the concepts they do not understand?” were the words uttered by educator Aaron Sams while he, with Jonathan Bergman, was trying to crack the problem of students’ ineffective reproduction of knowledge taught in the class. And henceforth began the flipped classroom.⁵ Since then a plethora of research have demonstrated its effectiveness.^{2,6,7,10-12} The students enrolled in this research also state the same. The teaching of content followed by one-to-one discussion in short groups helped them understand study objectives in a better way as compared to a large group session. The advances in information and communication technology in the digital era have enhanced teaching and learning experiences with introduction of learning platforms such as YouTube, Google classroom, Microsoft teams, and Zoom. This has provided a further upbeat to the idea of flipping the classroom. With the leverages of e-learning, students can structure their preferable style of acquiring information independently. When asked, most of them preferred videos (84%) over other sources. The benefit of sequencing and pacing a video through pausing, replaying or fast forwarding confers on the viewer with flexibility; promotes engagement and enhances retention through better sensory experience by employing audio-visuals. In a nutshell, it reduces cognitive load and boosts active learning.^{9,13} Quite interestingly, while considering gender-based preferences for educational material used, females demonstrated more interest in the use of electronic study material/ resources as compared to male students who showed an inclination towards physical books and listening to on-campus lectures. Although in literature, listening to lectures has been shown to be the least preferred by both genders.¹⁴ This particular finding of this research might be due to the increase number of female responders as compared to the males.

Students encounter multiple challenges in traditional pedagogical methods. These methods cannot help a heterogeneous student population with diverse learning preferences. Furthermore, there are always the pressing factors of the absolutism of time, place, cognitive overload, and a single chance of listening to the teacher. All of these problems can

be effectively tackled by flipping the classroom. And gauging through the overwhelmingly positive responses of the students, the authors conclude that the students also felt the same (Table I). They believed themselves to be now intrinsically motivated (nearly 70%), actively participating in debates and discussions in class. Through division into small groups, they feel it easier to communicate and constructively collaborate with their peers. In a small group session, equipped with pre-handedly studied knowledge, they are more comfortable mentioning their queries. The class hours are more yielding as it has been freed for sake of raising constructive questions, an active mind search for answers, analysis and practical application in clinical scenarios- which are all higher-order cognitive functions.

The students also stated that it helped promote self-regulated learning. Rather than becoming passive absorbers of knowledge, they actively searched through versatile educational resources. Although, increased time consumption while looking through the study sources was cited as a problem. This might be the probable reason for the increased workload that still remains a constant grievance of the students.

These findings are in line with other researches with regard to improved student performance in the examination.¹⁵ This represents an overall student satisfaction with flipped pedagogy which can certainly be attributed to well-established benefits of this instructional method. Once a topic has been learnt by heart and well researched, the following discussion in class time ensures spaced repetition, active recall and use of memory associations once it has been discussed upon through case scenarios and practical examples. This buttresses a good memory with a consequential boost in exam grades.¹⁶

To sum it up, the flipped classroom is an effective and fruitful study methodology which can provide promising results. Having acquired the students’ insight, the authors tend to escalate the endeavour to the next step that shall be understanding the perceptions of the faculty. The authors further suggest that proper guidance to the students especially those who are novice to this concept, is necessary, as in Pakistan majority of the students are taught through conservative teaching methodologies till the time they enter a university. Homogenizing such diverse strata of students with versatile

backgrounds might pose a challenge in the beginning. This can be grappled easily by training the faculty regarding stewardship of guiding the students.

Due to the convenience of access to first and second year medical students for the faculty (authors), the respective classes were selected which restricted the sample size to the population of these two classes only. The study content have to be filtered to be uploaded to enable students to go through the learning material before the class without burdening them with additional cognitive load. Creating an online discussion room where students can clarify their queries may better utilise the time. Shared material should also be reviewed, and longer videos (more than 50 minutes) should be avoided as students lose track and the main topic is not given due attention. Short, crisp and to-the-point animated videos, and Powerpoint presentations can be shared to engage the students.

CONCLUSION

The students enrolled in this study assert the usage of flipped classrooms as a likeable teaching method in medical institutions. Their perception was that it not only engaged students in active learning and helped them improve their grades but also enabled them to sharpen cognitive and presentation skills, which are the prime objects of undergraduate pedagogy. They were of the opinion that they feel more engaged in the classroom when gone through the basic concepts of the lessons beforehand.

ETHICAL APPROVAL:

The ethical approval was obtained from the institutional review board and ethics committee of Shifa International Hospital, Shifa Tameer-e-millat University, Islamabad.

PATIENTS' CONSENT:

Informed consent were taken from the students regarding data collection and publishing the results.

COMPETING INTEREST:

The authors declared no competing interest.

AUTHORS' CONTRIBUTION:

MB: Conception of idea, questionnaire development, data collection and compilation, data entry, literature search, and drafting.

SS: Data entry, result compilation, data analysis, data interpretation, and drafting of result section, critical appraisal.

SS: Idea conception, data analysis, critical appraisal, and submission.

AN: Idea conception, drafting of synopsis, and critical appraisal.

SM: Study design and critical appraisal.

All the authors have approved the final version of the manuscript to be published.

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