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Analysis and perception of flipped classroom teaching method among first year medical students

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Abstract: *Introduction:* Flipped Classroom (FC) method is a new approach in which there is a switch between the work done in class and work done as homework. *Background:* Previous studies have had variable results. Some conclude neither an improvement nor degradation in students' performance, while others agree that the Flipped Classroom teaching model has value over traditional teaching styles. *Objectives:* To assess the effectiveness of the FC learning module on phase I medical students. *Methods:* There were mixed methods used in this study. For the students to compare the teaching methods, first a didactic lecture class was conducted followed by a more interactive flipped classroom for the interested students. After the classes, two questionnaires were given to them. One to receive their feedback on the teaching model, and one to assess the difference in performance between traditional and Flipped Classroom teaching models. *Results:* The test done to assess performance proved that the FC model was more effective as a teaching method. A high percentage of students also provided feedback in support of the FC model as compared to the traditional teaching method. *Conclusion:* The results of this study provide conclusive evidence of the Flipped Classroom teaching model being more effective for the understanding of concepts as well as the performance of phase I MBBS students. It is also a better method as per the students as understood from the feedback form.

Keywords: Cross-sectional studies, Questionnaires, Flipped Classroom, Perceptions, Feedback

Introduction

Creating classrooms that foster higher order thinking skills is essential for students to become problem solvers, innovators and change makers. To achieve active participation and higher-level thinking, many other alternative approaches are sought after instead of traditional classroom lectures, such as peer teaching, puzzle-based pedagogy, and concept mapping [1-4]. One such approach that is widely used today is the Flipped Classroom (FC) method. It is also called 'the flipped classroom' and more simply 'flipped' [5].

This model differs from the traditional model where the "first exposure" of the students to concepts is in class using a didactic teaching model following which students can delve deeper through homework. Hence the term "Flipped Classroom" [6]. Flipped Classroom intentionally shifts teaching to a learner-centric model where meaningful learning opportunities are created in classrooms and topics are dealt with in detail. In the Flipped Classroom model, work done in class and as homework are exchanged. Instead of observing lectures and then going home to work on stipulated problems, students first read material on specific topics and watch videos before coming to class, and then engage in active learning in class using case studies, labs, games, and simulations or experiments. The guiding principle of Flipped Classroom is that work that is usually done as homework (e.g. solving assignments, or writing an essay) is better done in class under the supervision of an instructor. It is better to listen to lectures or watch videos at home. Hence, the term flipped classroom is used [7-8]. Due to its innovative approach, it is widely recognized and used in India.

This enables students to independently learn introductory information before entering the classroom. Hence it also allows students to be prepared as well as come to class with doubts they may have while doing their independent

study which can be clarified by the teacher in the classroom itself [9]. The theoretical advantages of FC are based on social constructionism and active learning [10-11]. Flipped Classroom can provide lifelong learning skills such as independent identification, evaluation, analysis, and synthesis of information recommended by modern doctors. Flipped Classroom can also help improve communication skills. It is suitable for both slow and fast learners. The slow learners can take their own time the previous day to go through the provided material. Similarly, the faster learners can complete it at their own pace and choose to read more materials with any extra time they have [12].

The content and importance of medical education is rapidly changing in healthcare and pharmaceuticals. In addition, it is important to develop the competence, communication skills and attitude required by medical staff [7]. To achieve this, an active learning approach can be used instead of a passive process [12]. Therefore, this study was conducted to evaluate the effectiveness and perception of FC learning module among Phase I medical students.

Material and Methods

This cross-sectional study was conducted in the Department of Physiology for MBBS Phase I regular batch (2018-2019) comprising of 200 students. Ethics approval was obtained from the institutional ethics committee. The research protocol was explained to the students and informed consent was obtained from all the interested participants. A general sampling technique was used to determine the sample size. This study was designed using mixed methods. The chosen subject was taught to the whole (200) group in two sessions. The first session was in the form of a traditional lecture with flow charts and a PowerPoint presentation for all 200 students.

In the second session, 130 students were included in the study (depending on the willingness of the students to participate). The students were then randomly divided into two groups A and B, each having 65 students. Group A was the study group (Flipped Classroom group) and group B was the control group. Group A participated in interactive exercises, reading materials were sent to students by email in the form of videos. The video covered the theoretical foundations of the topic covered in the first session, case-based scenarios and a discussion related to the topic. The questions were answered by students in real time using a digital response system on their smartphones, tablets, and computers. Group B students only had lecture notes.

The expert group prepared a questionnaire consisting of 10 multiple-choice questions and two case-based scenarios. After completing the three-day rotated and normal modules, both groups were asked to complete a questionnaire and their performance was assessed. In the third session, the researcher used a response questionnaire to receive comments from the students of the study group (Group A) on the measurement of students' perceptions of supporting learning processes within the Flipped Classroom study module.

Statistical Methods: R software version 3.6.1 and Excel were used to analyse the Data and Categorical variables were presented in the form of a frequency table. Continuous variables were presented as mean ± SD. Categorical data were compared using the chi-square test. Between-group analysis was performed using the t-test/Mann-Whitney U-test. Between-group analysis was performed using a paired t-test. A P value of less than 0.05 was considered statistically significant.

Results

A total of 130 subjects were considered for the study and divided into two groups (conventional and FC) consisting of 65 subjects in each group.

Table-1: Comparison of assessment scores across the group

	Conventional group (n=60)	Flipped Classroom group (n=52)	P-value
Score	13.05±3.58	17.13±3.62	<0.0001*[M]

[M] indicates the Mann-Whitney U-test, * Statistically significant, FC: Flipped Classroom

Using the one-tailed Mann-Whitney U test, it was observed that the median of scores after the session was significantly higher in the Flipped Classroom group than in the

conventional group. Out of the 65 subjects in each group, 5 and 13 subjects were absent on the day of the test in the conventional and Flipped Classroom groups respectively (Table-1).

Table-2: Feedback on the Flipped Classroom training session

Question	Count (%)
Watched Video lessons	54 (94.74%)
Find that videos are easy to understand	54 (100%)*
Helped to learn class materials	48 (84.21%)
Find group quizzes are useful	32 (57%)
Flipped classroom has not improved learning	5 (8.77%)
Homework helped to synthesize learning	48 (84.21%)
FC reading material provided more time for learning	50 (87.72%)

*Indicates the % taken among those who watched video lessons; other percentages are taken among the subjects who gave feedback

Out of the 57 subjects who gave feedback on the Flipped Classroom session, 54 (95%) students watched the video lessons and all of them found that the videos were very easy to understand. 48 (84.21%) students found that the videos helped them to understand the teaching material. 32 (57%) students found the group quizzes to be useful for the assimilation of knowledge. Only 5 students did not think the Flipped Classroom model improved their learning.48 (84.21%) students found the homework to help synthesize the learning. For 50 (87.72%) students, Flipped Classroom reading material provided more time for learning (Table-2).

Discussion

The purpose of this study was to determine how students perceived and reacted to Flipped Classroom the teaching model in medical education. It was also to compare the academic performance of students learning using the Flipped Classroom model and the conventional teaching method. The aspects that were considered are the student's experiences of using video lectures and the content material as a medium for learning in the frame of the Flipped Classroom model, and their involvement in active learning in the classroom setting by showing participation in the activities conducted.

In the present study, it has been observed that the Flipped Classroom group has better results than the conventional group as it has better overall test scores. Flipped Classroom group has also received favourable feedback froma majority of the students. One study with a similar study population was carried out by Aggarwal et al. (2019) [1], in which they compared a traditional teaching method with the Flipped Classroom method. In their study, it was observed that the overall assessment score for the Flipped Classroom method was neither better nor worse when compared to the traditional teaching method. However, students gave feedback that a combination of the traditional teaching method and Flipped Classroom method should be followed, or even just the Flipped Classroom model is preferable [12].

Also, studies by Fatima et al. (2017) and Tune et al. (2013) found that the Flipped Classroom method has shown better performance results in students and can be used as a new and effective technique of education [13-14]. On the other hand, Tang et al. (2017) [12], mentioned the Flipped Classroom method as a promising method but also found that students have given some negative feedback against the same. The reasons behind the negative feedback given were the burden of extra academic stress and the pressure of preparing for the Flipped Classroom beforehand [15].

Some of the disadvantages of the Flipped Classroom teaching model include the fact that it mostly relies on students' preparation.Increased screen time and eye problems, issues relating to time spent on digital devices and effort required on the part of the teacher to prepare for the Flipped Classroom is also higher than that of a traditional class. Also, this method may not be sufficient to cover all the knowledge required for a test. It might require more effort from the student's side to read as much information as they can about the topic to imbibe the concepts better and be well-equipped for tests.

Limitation: As the duration of the present study was less, it was not possible to understand the long-term effects of the two

methods in comparison. That is one of the limitations of our study.

Future Prospects: Hence, the future perspective of the study is to plan long-term studies with a larger number of students to achieve a better understanding of the effects of the above learning methods as well as how students respond to each method.

Conclusion

It can be concluded that the Flipped Classroom model is an effective way of learning. It provokes interest in students as well as encourages them to put in more time and effort for their learning. It has shown promising results in the current study and has also managed to get a positive response from the students in the form of feedback. The benefit is seen in both academic performance as well as engagement of the students in the classroom. So, it can be used to improve the student's overall performance.

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