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## Effectiveness Of Flipped Classroom As A Teaching – Learning Method Among First Year MBBS Students.

Siddiqui Mahaiboob Fatima Mohd Sirajuddin Ahmed Siddiqui\*, Motilal C Tayade, Anand Badwe, and Aamir Naushad.

Department of Physiology, Pravara Institute of Medical Sciences, Loni, Ahmednagar, Maharashtra, India.

### ABSTRACT

Flipped classroom (FC), also known as 'reversed' or 'inverted' classroom, is a type of blended learning that integrates distance learning outside the class and face-to-face learning in class. Students gain first exposure to material via online lectures, videos or even by reading textbooks at home. Class time is focused on development of knowledge by active learning strategies like discussion, problem solving and clearing queries with the teacher. It has been accepted to promote critical thinking and to develop competencies for better management of patients in future. Students prepared the topics of 'Endocrine Physiology' with the help of online Power Point presentation, YouTube video and reference of textbook provided to them. In class, activities were used to foster the understanding and comprehension on the topic. Study group comprised of 100 students, who were divided into two groups. Group-1 was exposed to flipped classroom (FCR) teaching method and Group-2 was subjected to traditional classroom teaching by authors. Study material like power-point presentations, links for the video lectures and page numbers of standard textbooks of the topics to be taught were shared with students belonging to FCR group. Pre-test was taken from both the groups before beginning of study. Classroom time was utilised for making students achieve deeper knowledge and understanding by self-directed learning methods for FCR group while non-FCR group was taught by didactic lecture sessions. Evaluation was done by post-test. Student's perception with more than 75% students responding as agree and strongly agree option of five-point Likert scale was considered as positive outcome. Students' understanding and in depth learning was assessed with MCQ test score. Flipped classes helped 91% of students in self-motivation and active participation, 94% of students to achieve in depth learning and 92% of students for increased overall understanding of the topic. Also, 83% students found it more interactive. In objective MCQ test, 82% students got more than 75% scores for flipped class-room topics in contrast to only 18% students for topics taught as didactic lectures. To conclude, students were more satisfied with approach and in depth learning was improved. FC has been useful in studying physiology with prime objectives of motivating medical students and cultivating skills of self-learning.

**Keywords:** Blended learning, Flipped classroom, Inverted classroom, Medical education, Self learning, active participation, Teaching learning method.

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*\*Corresponding author*



## INTRODUCTION

The Medical Council of India has recently recommended various curricular reforms including early clinical exposure of undergraduate students (in the first year itself as against the usual practice of students being exposed to patients only from their second year onwards) and integration of one subject with other subjects being taught in the same year of study (E.g., Physiology with Anatomy and Biochemistry) or in subsequent years (E.g., Physiology with Pathology, Pharmacology and General Medicine) of the course [1]. Medical education is shifting from traditional classroom teaching to Competency Based Medical Education that focuses on active learning & deeper levels of domains in pedagogy (adult learning). Traditional method of teaching focuses on the knowledge level or tests only memory level of cognitive domain of Bloom's taxonomy in didactic lectures.

Among the various available teaching learning methods for the medical students, the largest proportion is contributed by the didactic method. The didactic method is characterized by lecture or teaching session by an expert to a group of learners. Any prospect for questioning or clearing any doubts regarding the taught topic is usually restricted to closing moments of the session as the learner is occupied with the task of recording the session or making notes of the same [2]. Research in medical education technologies has supported that active learning strategies

Professors of medical colleges need to create interactive course materials and share them with the students, monitor whether students' study/watch these materials and, more importantly, inform students about what this model involves and why it is used. For the successful implementation of the flipped classroom method, it is crucial that the method is well understood, and education activities are carried out by taking the above problems into account.

Studies on solutions to the problems mentioned above can help other researchers and practitioners. The aim of this study was to use flipped classroom as teaching learning method in Physiology and to know the effectiveness of flipped classroom in context to student's active participation, interactivity, self-motivation, learning facilitation, time management, and learning material accessibility. Also to assess the impact of flipped classes on in-depth learning and overall understanding of students.

## MATERIALS AND METHODS

A descriptive cross-sectional study was conducted among first year MBBS students of Ashwini rural Medical College, Solapur. The research project was conducted in the department of Physiology after obtaining Institutional Ethical Committee (IEC) Clearance. Total 100 students were enrolled for the systematically planned Endocrine Physiology module. Inclusion criteria: Students who voluntarily gave written and informed consent were included in the study.

Exclusion criteria: Students who were absent on the days of study were excluded from the study however, all students were present on the days of study, hence all 100 students were included in the study population.

100 students were divided into 2 groups having equal number of students in each group. Group 1 consisted of fifty students randomly selected and they were taught using the flipped classroom method and the group 2 consisted of other fifty students were taught using traditional method by the author.

Conduction of Flipped classroom and traditional didactic lectures sessions endorsed in Endocrine physiology module included 10 topics (one in each session):

Pre-test in the form of paper based multiple choice questions were taken to both groups before beginning of the study. More than 75% students getting more than 75% MCQ test score was considered as positive outcome.

Students were asked to make WhatsApp group for receiving instructions and link of online material. Learning material in the form of Power-point presentations, Photographs, links for the video lectures were provided to the group-1 students (FCR group) five days prior to study days through WhatsApp group. Students of FCR (Flipped class room) group-1 were also suggested to refer standard text books of physiology ( viz Guyton & Hall and Ganong ) , reference books and websites for topic related

material. Students went through this material, understood basic concepts and discussed with peers as well as author through WhatsApp outside the classroom. They were encouraged by author for asking questions, after studying the topic students gathered in classroom for problem solving skills, critical thinking and decision-making skills. In the classroom students were asked to identify endocrine disorders from photographs and case reports, discuss signs, symptoms, and investigations of various disorders, compare and contrast hyper and hypo secretion of endocrine glands and discuss physiological basis of treatment for these disorders.

A survey of student perspectives regarding the flipped classroom module was also obtained at the end of the study. The feedback was obtained anonymously. The students were not asked to write their name and roll number. Responses were collected using a 5-point Likert scale. Students perception with more than 75% students responding as agree and strongly agree option of five-point Likert scale was considered as positive outcome.

### RESULTS

Feedback was taken from students. Cronbach's alpha was 1.0 for the feedback questionnaire. Table 2 shows the proportion of students responding to each statement of the Likert item. There was positive feedback for flipped classroom as a teaching learning method

As seen in table 1 and 2, Ninety-four percentage of students did not know about the flipped classroom as a teaching learning method. 91% of students felt that flipped classes made them participate more actively in the in-class sessions than didactic lectures. Also, eighty-three percentage of students found that their interaction with fellow students and faculty increased during flipped classes.

Whereas, eighty-one percentage of students reported that it is easier to manage time with flipped classes. Access to the study material was reported to be easier by ninety six percentage of students.

Flipped classes helped ninety-one percentage of students in self-motivation.

Also, it helped 94% of students to achieve in depth learning of the topics and ninety-two percentage of students for increased overall understanding of the topic. As flipped classes facilitated overall process of learning, Ninety percentage of the students felt more satisfied with it than didactic lectures.

Table 1: Student's feedback								
	Active participation	Interaction	Time management	Access to study material	Self motivation	In-depth learning	Overall satisfaction	Overall understanding
Students' perception	90%	79%	76%	94%	88%	92%	87%	86%

  

Table 2: Proportion of students responding to each statement (n=50)						
Q. No.	Statement	Students response on Likert scale				Total No. of students = 50 (100%)
		Strongly agree	Agree	Neutral	Disagree	
1	I was familiar to flipped classes before beginning of this study.	0%	2%	4%	8%	86%
3	Flipped classes make you participate more actively than didactic lectures.	90%	1%	4%	3%	2%
4	Interaction with peers and teacher increased during flipped classes than didactic lectures.	79%	4%	9%	6%	2%
5	It is easier to manage time during flipped classes than traditional lectures.	74%	7%	4%	3%	2%
6	It is easier to access study material during flipped classes than traditional lectures.	94%	2%	2%	1%	1%
7	Flipped classes help in self-motivation.	86%	5%	3%	4%	2%
8	Flipped classes help in-depth learning.	92%	2%	3%	3%	0%
9	Flipped classes increase overall understanding of topic.	89%	3%	5%	2%	1%
10	More satisfaction with flipped classes than didactic lectures as Flipped classes facilitate overall process of learning.	89%	1%	7%	1%	2%

Positive findings regarding perception of students about flipped classes are also objectively supported by MCQ test scores, 83% students got more than 75% scores for flipped classroom topics in contrast to only 17% could score more than 75% for topics taught traditionally as didactic lectures. (Table 3).

**Table 3: MCQ test score**

Groups	Group 1 (FCR Group)	Group 2 (Non-FCR Group)
Students with MCQ score >75%	83%	17%

### DISCUSSION

A successful flipped classroom can help stimulate development of a deeper understanding of the topic, increasing student participation and engagement in class discussion making it student-centric. It helps cut down on wastage of time and energy for both teachers and students.

Although the perceptions of students towards the flipped classroom approach have been evaluated in several disciplines and at varying levels of learning, such data is not available for medical students. More specifically, data on the efficacy of this model in the teaching of human physiology (which is a first-year subject) is lacking in literature. There is evidence that the flipped classroom creates opportunities to develop critical thinking skills [20], and makes the best use of students' learning time [3]. Study by Nouri [4], S K Gubbiyyapa et al [4], Veeramani et al [5] found that student satisfaction was very high and flipped classroom was accepted as effective teaching learning tool. In their study 86% students felt that flipped classroom was a better approach to learning.

The positive student perception and greater effectiveness of flipped classroom can be explained with multiple reasons like having unrestricted access to pre-class material anywhere, anytime, at their own pace and multiple times if needed as well as availability of more time in the class for interaction and active learning[6,7,8]. It is also a well-known fact that prior knowledge influences learning [9,10].

A meta-analysis done by Hew and Lo of 28 comparative studies also showed an overall significant effect in favour of the flipped classroom approach for health professions education [11]. Other studies also have reported similar findings supporting the effectiveness of flipped classroom [12-14]. Flipping the traditional classroom is both a feasible and necessary move to educate students to reinvent their classrooms in a way that empowers students to develop higher order cognitive skills and to engage in meaningful learning that will ultimately improve the delivery of health care [15, 16].

Our study concluded that FC helped in better understanding and clearing of doubts in students.

It encouraged self-learning in students. Both individual and group activities in class time created interest and motivated for learning. Majority of the students wanted this method to be continued for more topics in the subject

### CONCLUSION

Medical teaching with flipped classroom approach improved the student performance and learning experience effectively as compared to conventional methods.

The flipped classroom approach improved the students' performance and perceptions of the learning experience.

Student response to the flipped classroom structure was largely positive, indicating it to be an approach worth pursuing in future years for advancement in medical education technologies. We highly recommend the application of FC learning models into the medical college curriculum. We encourage the development of an integrated program with a combination of traditional learning opportunities and FC-based teaching modules. By engaging medical trainees through a variety of teaching methods, medical colleges will equip future doctors with various cognitive skills that will help them develop into safe and successful doctors.

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