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Students' Perception And Learning Outcome Of First Year Medical Students About Flipped Classroom.

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ABSTRACT

Flipped classroom which comprises of self-study, group discussions, watching video to understand concepts is learner-friendly and involves active learning by the undergraduate medical students. Presently, the tech savvy generation Y learners use social media to share and comprehend the subjects. In the present study, besides didactic lectures, flipped class has been implemented to reinforce teaching and learning. Hence this study explores the effectiveness of flipped classroom delivered to undergraduate students. This is a cross-sectional study undertaken at the Department of Anatomy, Rajarajeswari Medical College and Hospital. First year MBBS students participated in the study (n=196). The data collected was perception and challenges of flipped classroom module which was recorded as questionnaire administered through google form. In addition, formative assessment through multiple choice questions were made before and after the implementation of the module to assess the efficacy of the module. The responses were analyzed and p-value obtained using SPSS. Results have shown that flipped class module has provided students with better understanding of subject through accessibility, flexibility, additional data (p-value of 0.0001). Formative assessment was done using google forms in the form of Multiple-choice questions. Average performance of students after implementation of flipped class module was found to be significantly higher indicating better retention of concepts. Our findings suggests that active learning through flipped classroom has improved the performance of the students by understanding the concept, although they cannot replace the traditional didactic lectures.

Keywords: Flipped classroom. Medical education, Variety, Pre-class video.

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INTRODUCTION

Recently flipped classroom are gaining popularity [1]. Teaching Generation Z learners who are more concerned with academic performance has become imperative in present scenario. They prefer an independent learning style which involves use of digital learning and they learn quickly through use of visual media [2]. To assist in active learning, we have engaged them in flipped classroom which includes active and collaborative learning, self- study, discussions, problem-based learning. In a flipped classroom, recorded lectures, or readings are viewed by students prior to class, while in-class time is utilized for group discussions and lectures. Traditional lectures are mainly based on passive learning by the students. In typical classroom lectures, the student tries to learn the topic in a single set-up whereas in a flipped classroom, students are actively involved in learning activities by reading the articles, watching videos and discussing with the peers before the class and reinforcing the learning through lectures and self-assessments.

This module is commonly employed in preclinical setting specially in physiology [3]. Beale in their study suggested the need for well-designed prospective studies to determine whether online lectures can be used to enhance the efficacy of embryology instruction [4]. Since Embryology is integrated in clinical anatomy, it is imperative for the students to learn congenital anomalies and hence problem- based solving. Considering the necessity for reinforcement of the subject, we have made an attempt to apply this flipped classroom module to invoke active learning among students.

Aims and Objectives

The aim of this study was to identify students' preferences about flipped classroom and evaluate the learning outcome, with the goal of increasing opportunities for student learning.

MATERIALS AND METHODS

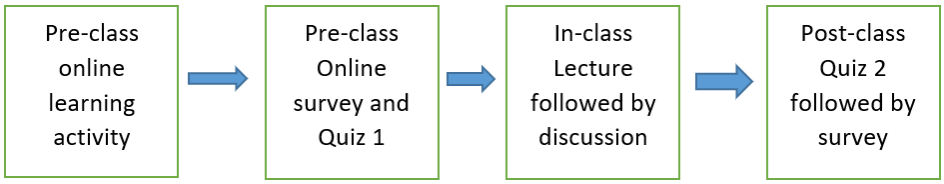
Participants and sampling

This is a cross-sectional study done at Rajarajeswari Medical College and Hospital. Out of 250 Undergraduate First year MBBS students of 2021-22 batch, a total of 196 students voluntarily participated in the study and formed the inclusion criteria for the study. They were offered self-administered questionnaire made available through google forms. Thus, the exclusion criteria were students who did not submit the self-administered questionnaire. An implied consent was collected and personal information was not taken. The participants were in the age group of 18-19 yrs. and of varying ethnicity and socio-economic status. The study was approved by institutional ethics committee.

Study design

They were offered flipped classroom module on Development of Gastro-intestinal system which comprised of sharing PowerPoint slides and conducting quiz 1before the class followed by lecture and discussion and further trailed by post-class quiz 2. Pre and post class survey on flipped classroom learning was done to assess the students' perception on flipped classroom module.

Schematic diagram of the study



Pre-class learning activity

PowerPoint slides of the lecture class and animation video on development of GIT were shared 2 days prior to the class with the students using telegram application. Students were required to self- study the concepts in their own free time.

Pre-class Survey

A survey specific to aspects of the flipped classroom was administered to the students which had 6 questions that were specific to features of the flipped classroom. This survey was designed using google forms. The results of this survey are purely subjective student responses of how they felt about the flipped classroom.

Pre-class Quiz 1: Following self- directed learning, students took quiz 1 which comprised of 5 multiple choice questions of which 3 were on foundational concept and 2 were on clinical case scenarios. Students were given 10 min to complete the quiz. Each MCQ was awarded I mark.

Post-class Quiz 2: Following didactic lecture, 5 multiple choice questions were given, however the students were not aware that quiz 2 had same set of questions as quiz 1.

Post- class Survey: This was last step of flipped class module which was administered 2 days after the class. This survey asked students about their understanding of the concept and learning preferences.

Statistical analysis

Responses to the closed-ended questions in the survey were analyzed using descriptive statistics and Inferential statistics, using statistical software SPSS version 23.0. By descriptive statistics, demographic data was expressed as frequency and percentage whereas continuous data was expressed as mean and standard deviation. By inferential statistics, Z test and t-test were used. All the statistical analysis was carried out at 5% level of significance and a p-value of ‹0.05 is considered statistically significant.

RESULTS

Survey given to the students to investigate their perception of the flipped classroom was purely subjective. Total of 196 students participated in the survey. All the questions in the survey were individually analyzed as depicted in table 1.

Table 1: Students' perception on flipped classroom module (n= 196)

Sl No.	Flipped class module perception response	Mean	Standard deviation	Significance (P value)
1	I can go through slides at my own pace and repeat whenever required	4.24	0.862	<0.0001
2	Having video/animation helped me to understand better	4.61	0.636	<0.0001
3	The best part was multiple choice questions in which were included clinical case scenarios	3.98	0.877	<0.0001
4	I really enjoyed learning concept before class and then test/expand my knowledge during the class	4.41	0.736	<0.0001
5	Overall quality of Flipped classroom module was excellent	4.53	0.592	<0.0001

Descriptive statistics on participants' response in survey

Likert scale item measured on 5-point scale: 1=Strongly disagree; 2= Disagree; 3= Neutral, 4= Agree; 5= Strongly agree

Graph 1: Impact on student performance

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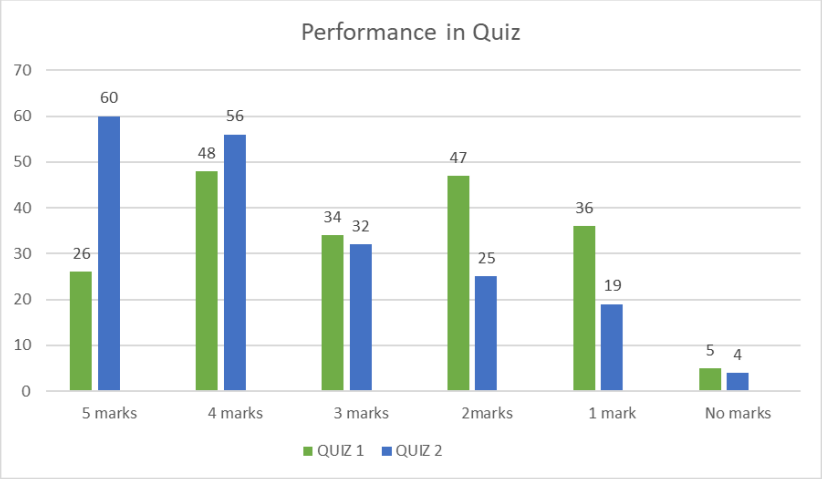

Graph 1: Comparison of Performance of students in quiz 1 and quiz 2.

Formative assessment was done in which a total of 196 students participated in quiz 1 and 2. We compared students' performance in quiz 1 and quiz 2 to determine if the performance improved. Average performance of students in quiz 1 and quiz 2 were compared using Student's t- tests (2-tailed). The mean of quiz 1 was 2.83 and that of quiz 2 was 3.42. Average performance of students was significantly higher in quiz 2 than in quiz 1.

Table 2: Students' challenges of flipped classroom

Sl No	Challenges of Flipped classroom	Mean	Standard deviation	Significance
1	Learning with computer/mobile is more distracting than in lecture class	2.82	1.807	<0.0001
2	I didn't like the flip class since it happened when we had other test/assignments	3.03	1.292	<0.0001
3	The ability to ask questions in flipped classroom is detached as we have to wait till the lecture	2.82	1.109	<0.0001

DISCUSSION

Most of today's medical students are Generation Z learners, who are active problem solvers and independent learners [5]. They use social media to share and comprehend the concepts, and use mobile communication and multimedia to learn. Since flipped class was a new experience for the students, we explained the entire process in detail, provided the content 2 days prior and guided them throughout the process. Students were sensitized regarding the flipped class module. When implementing the module, the faculty time and resources were also taken into consideration.

Several articles are published on Flipped class is more focused on 'learner' [6]. However, research on using flipped class in teaching embryology is limited. Further embryology is difficult to comprehend. Hence, we explored the perceptions of students.

Category 2 of table1 was about effectiveness of educational video for learning. Technology was used to enhance their learning by sharing educational Video in digital format through telegram application. Students are required to view the video in their free time outside the class using their personal computer or mobile. Long [7] provided video-lectures before the class and through pre-class survey demonstrated that students had positive attitudes towards using videos in the flipped classroom. In addition, research by Davies [8] concluded that technology-based learning is motivating for the students. Video is frequently used as the pre-class learning material in the flipped classroom [9]. From the table it is imperative that video has helped the students to understand better with p value of <0.0001.

Category 3 of table 1 is about inclusion of clinical case scenarios in multiple choice questions. Exposure to clinical case in embryology is part of the Competency-based medical education (CBME) curriculum. Hence knowledge of congenital anomalies is of utmost importance in clinical practice. In current study it was extremely significant with mean of 3.98±0.877.

Next category is about learning the concept before the class and further expanding the knowledge which the students expressed with mean of 4.41±0.736. Recently e- learning has seen a spike and students have expressed that traditional lectures with e-learning has given better results. Although the reports of student perceptions of the flipped classroom are to some extent mixed, but are overall generally positive [10]. Consequently, provision of study material and videos has enabled the students to learn actively.

Assessment of students by conducting online quiz has shown improvement in their performance implying that pre-class video has reinforced their knowledge retention. Formative assessment done by quiz has encouraged the students to learn using pre-class video [11].

The use of mobile devices by medical students to facilitate access to a wide range of resources including anatomy and eBooks (Electronic Books) has shown a positive impact on learning [12]. If we analyze the pros and cons, the use of mobile can also be distracting as shown in category 1 of table 2. In addition, challenges faced by the students are mentioned in table 2 which was statistically significant.

CONCLUSION

In conclusion, this is a qualitative study with quantification of data to explore the perception of students in the new method of learning through flipped class. Our implementation of the flipped classroom in embryology class was successful based on student performance in quizzes, preference ratings, and qualitative feedback from the stakeholders.

Future research should focus on comparisons across multiple cohorts and student samples consisting of various demography.

Limitations

This research is limited by the institutional and cultural contexts in which it was conducted. Surveys were collected anonymously to reduce the likelihood of response bias. The non-responders may or may not have had perception. We were not able to characterize non-responders, who may or may not have had different perceptions of pedagogical approach.

An effective flip requires time and effort by the faculty to integrate the module and also to motivate the students to prepare for the class.

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