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ORIGINAL RESEARCH ARTICLE

New approach in teaching learning methods in Microbiology to overcome challenges of CBME curriculum.: Flipped Classroom

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ABSTRACT

Background and objectives

The flipped classroom help to connect the subject to clinical situations and make learning engaging for the students.(1,15,16) The flipped classroom uses technology-enhanced pre-class learning to transmit knowledge, incorporating in-class interaction to enhance higher cognitive learning.(4,18)

The aim of our study was to introduce flipped classroom as a new learning method for making teaching sessions more engaging and interesting.

Materials and Methods

The current study was carried out at rural based tertiary care medical institute SBKSMI&RC, Vadodara for a period of 6 months. All 149 students of second MBBS in our medical college participated.

In the present study, we compared conventional teaching method with newer teaching approach flipped classroom .Feedback from students and teachers was evaluated through online questionnaire.

Results

Out of total 149, 100 students gave feedback, out of which 92 students liked flipped classroom while 8 students were in favor of didactic lectures.

In the tests conducted after the conventional teaching in some competencies and tests after flipped classroom approach in selected competencies the difference in outcome showed no statistical significance (p value =0.3105)

Conclusion

Flipped classroom is promising but improved format and Longitudinal studies are needed to further evaluate this pedagogical method.

Keywords: Flipped classroom, Small group discussion (SGD) and Pedagogy

Introduction

The new competency-based curriculum was introduced to Indian medical colleges in 2018. Implementation of curricular reforms take effort and adjustment from both educators and learners. In the second phase subjects, Microbiology there was transition to system wise clinical based approach.

There was inadequate training and preparation time for the teachers for learning new teaching methods and creating content. Teachers observed gaps in cognitive knowledge, its application to clinical situations and skill development in students.

This prompted us to research other approaches like flipped classroom which would help connect the subject to clinical situations and make learning engaging for the students. In a traditional course, students learn fundamental concepts in the classroom, either through lecture or practical, and read or use other online sources after the classroom to substantiate learning.(1,15,16) In a flipped classroom, this approach is inverted: Students acquire fundamental knowledge prior to class, such as through reading, online lectures, teacher's notes, technical videos, and other online sources and expand upon that knowledge through activities conducted in-class with the support of the facilitator.(2,3,17)

The flipped classroom uses technology-enhanced pre-class learning to transmit knowledge, incorporating in-class interaction to enhance higher cognitive learning.(4,18) The FC utilises technology for pre-class learning, with face-to-face classrooms becoming interactive learning activities. This methodology restructures and reorders traditional lecture-based approaches by moving students, rather than teachers, to the centre of learning.(5,6,)

The aim of our study was to introduce flipped classroom as a new learning method for optimal utilization of classroom time , to get better outcome and making teaching sessions more engaging and interesting through active participation by students .We analyzed new learning method by taking feedback from students through a questionnaire.

Materials and Methods

The current study was carried out at rural based tertiary care medical institute SBKSMI&RC, Vadodara for a period of 6 months (June 2023 to November 2023). The study was observational and qualitative.

All 149 students of the current batch in second MBBS in our medical college participated The flipped classroom were carried out in DOAP session of Microbiology for 2 hours.

Flipped classroom were carried out where students prepared the topic before the class through online material, videos, notes, and papers followed by participatory session conducted in selected topics which help in clinical problem solving. This was to increase student interest, active participation and better retention of the information thus acquired.

In the present study, we carried out conventional teaching method in selected topics of Microbiology like Respiratory & Cardiovascular System and flipped classroom sessions in selected topics like Central nervous system & Genitourinary system where students prepared the given topic followed by participatory sessions where the case and diagnosis were discussed in the case histories relevant to the topic by the students in small groups.

The case discussions were initiated and facilitated by a teacher in each group. Participants were given complete information regarding this method before conducting the study. Eight small groups were made and clinical case histories relevant to the competency were given as problems. Students were given required guidance in selecting books, online reference material,

videos etc. a week ahead of scheduled class activity. Student groups discussed the case among themselves, applied their pre class knowledge and presented their discussions and solutions. The process was facilitated and closely observed by the teachers. Teachers added the missing important points, cleared doubts, cemented the gaps, and helped in connecting the microbiology content to the case in question. Teachers observed each student in the group. Test questions answer session was conducted at the end of the topic to evaluate cognitive, skill and other aspects.

Data was collected as observations noted by the facilitator during the session. Feedback from students and teachers was evaluated through online questionnaire.

ETHICAL CONSIDERATIONS : The present study was conducted after taking ethical approval from institute.

STATISTICAL METHODS : Unpaired T test was carried out for data analysis. Data is presented in tabulated as well as graphical format. $P < 0.05$ was considered statistically significant.

Results

The sessions of flipped classroom were well received by the students. It was observed that two subunits in each competency could be covered in one session and this was a better utilization of classroom time as compared to other teaching formats which would have taken two sessions for the same.

Out of total 149 second year MBBS students who participated in flipped classroom session 100 students completed feedback. Out of 100 students, 92 students liked this teaching method while 8 students were in favor of didactic lectures.(Figure 1)

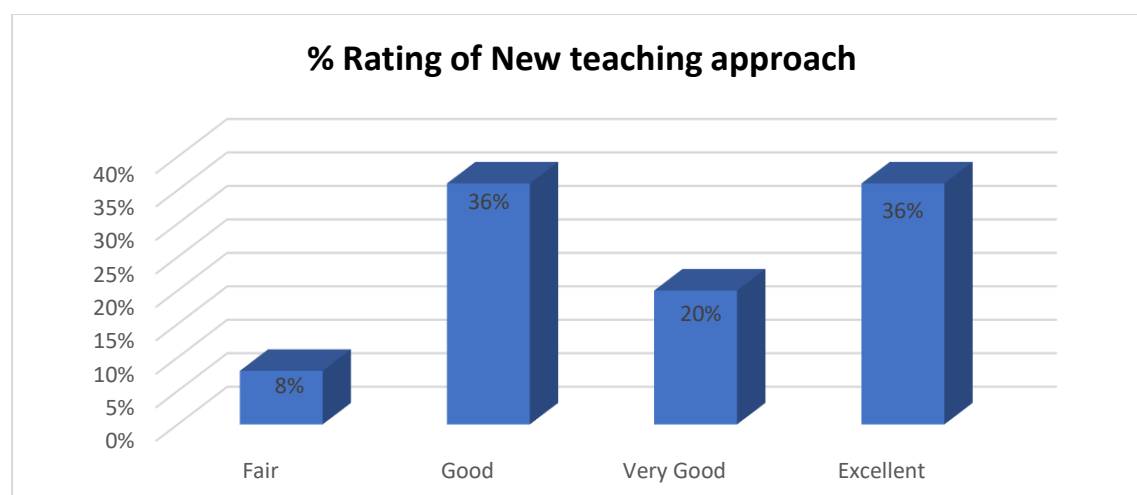


Figure 1

Out of 92 students who liked the new approach over conventional older method felt that the conventional lectures are long & boring (40.90%) and Monotonous (36.4%) . There was less scope for doubt clearing and discussion (4.60%). (Figure 2)

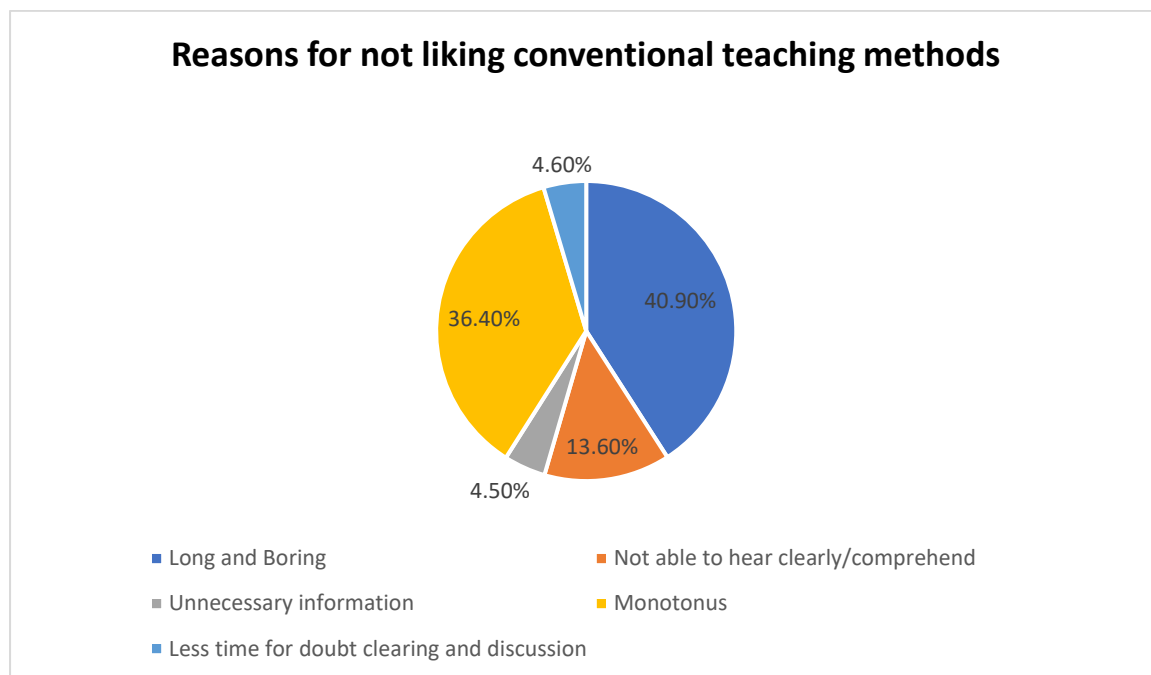


Figure 2

Out of 92 students who liked the new approach over conventional older method gave reasons for liking the new approach as active participation (41.7%) and more clinically relevant application of knowledge(25%).(Figure 3)



Figure 3

Out of 8 students who were in favor of conventional method over the new approach, 5 students (62.5%) gave reason for liking didactic lectures that all ready-made information was made available to students by teacher and no preparation is required.

However in the tests conducted after the conventional teaching in some competencies and tests after flipped classroom approach in selected competencies the difference in outcome showed no statistical significance (p value =0.3105). Table 1

TABLE:1

| Topics covered | Type of teaching methodology | Mean+/-SD | Unpaired T test (DF=1) | P value | Interpretation |
|---|------------------------------|---------------|------------------------|---------|------------------------|
| Test-1(Respiratory & Cardiovascular System) | Conventional Teaching Method | 26.5 +/- 7.85 | 0.6772 | 0.3105 | Not significant |
| Test-2(Central nervous system & Genitourinary system) | Flipped classroom teaching | 25.9 +/-8.59 | | | |

The teachers in their feedback observed that students were alert and enthusiastic during the new teaching learning method. They actively participated in group discussion and presented their case.

In our study we did not observed significant difference in student outcome due to few major drawbacks like majority of students did not prepare the topic before their flipped classroom sessions. Few students did not participate in the discussions on their own and needed encouragement by the teachers to speak.

It took more effort from teachers to facilitate and conduct the sessions than a conventional teaching.

In the second phase of MBBS curriculum although students are exposed to clinical set up, the exposure to clinical cases of infectious disease is inadequate. They are still learning some of the clinical terminologies and signs and symptoms only in theory. Understandably, they are not able to do any differential diagnosis or fully comprehend the problem case at this stage. In our opinion the students of this phase should also attend the two or three case presentations by the ID/medicine residents during their clinical posting.

Workers have emphasized the need of longitudinal studies to evaluate the long term retention in flipped classroom approach. This method is still evolving and there is lot of room for further innovation and refinement for more focused and defined format.(19,20,21) In our study we did not find significant difference in the outcomes of conventional and flipped classroom method.

Discussion

Teachers all over the world have been researching their curriculum with different teaching learning methods to improve the learning outcome, optimize classroom teaching and best use of the limited teaching time

The current study was carried out at rural based tertiary care medical institute, Vadodara for a period of 6 months in which 149 students of the current batch in second MBBS participated.

Out of total 149 second year MBBS students who participated in flipped classroom session 100 students completed feedback. Out of 100 students, 92 students liked this teaching method while 8 students were in favor of didactic lectures.

Out of 92 students who liked the new approach over conventional older method gave reasons for liking the new approach as active participation (41.7%) and more clinically relevant application of knowledge(25%).

However in the tests conducted after the conventional teaching in some competencies and tests after flipped classroom approach in selected competencies the difference in outcome showed no statistical significance (p value =0.3105).

Our conclusion was similar to Susan Ann Harington et al (7) where they demonstrated no statistically significant differences between novel approach of a flipped method and conventional teaching method.

The result of our study is similar to study conducted by Tahseen Chaudhary and Halima Khan et al(8) in which feedback scores of flipped classroom were higher than lectures. 81.3% students preferred flipped classroom.

In our study we did not find significant difference in the outcomes of conventional and flipped classroom method and further innovation and refinement is required for effective implementation of these new teaching approach. Our findings are similar to systematic review study conducted by Lundin M, Rensfeldt A et al (9) on Flipped classroom research where they concluded that effectiveness of the flipped classroom approach based on long-term or empirical validation is lacking and that better indicators for student engagement and conceptual use are needed.

In a study carried out by Mehta NB et al (10) ,they stated that Flipped classroom is an effective teaching modality which enables learners to be independent. Students do take ownership of what they learn and tutors are also satisfied with what their learners acquire The benefits of FC are robust and likely to augment the learning abilities of the students as well as supplementing the learning course content; group events can deliver added benefits too.

In conclusion Ramananan CJ (11) highlighted that medical students have expressed strong satisfaction with early applications of the FC to undergraduate medical education, and generally prefer this method to lecture-based instruction.

In a systematic review Chen F et al (12) concluded that the flipped classroom is a promising teaching approach to increase learners' motivation and engagement.

Our study finding's are in contradictory to Cheng et al (13) study where they found that the group of students who underwent flipped classroom performed significantly better than the group who were administered didactic lectures.

Flipped classroom method was applied to Drug literature evaluation course to the first-year pharmacy students by Guiliano Moser et al (14) They found that average examination scores increased from 75.6% to 86.1%.

Conclusion

Flipped classroom teaching offers better use of classroom time as more topics can be accommodated in one session. With increased number of students and reduction in course time this pedagogical method can be better than conventional methods in selected topics.

Students interest is held for longer time and they actively participate in discussion.

Teachers can observe students due to small groups and help cementing the gaps.

But in our study there was no significant difference in the student's performance after conventional lectures and Flipped classroom in the tests conducted.

Flipped classroom is promising but improved format and Longitudinal studies are needed to further evaluate this pedagogical method.

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