

RESEARCH ARTICLE

“Flipped Classroom” teaching-learning method in medical biochemistry 1st professional MBBS students

Jatin D Patel¹, Anil Gamit¹, Avanish Miahra¹, Kirankumar Chauhan²

¹Department of Biochemistry, GMERS Medical College, Valsad, Gujarat, India, ²Department of Biochemistry, GMERS Medical College, Gandhinagar, Gujarat, India

Correspondence to: Kirankumar Chauhan, E-mail: keiranchauhan@gmail.com

Received: May 27, 2022; Accepted: June 20, 2022

ABSTRACT


Background: The flipped classroom is an educational model in which the standard lecture and homework elements of a course are “reversed” or “flipped.” In the current scenario, the new teaching-learning (T-L) method like flipped classroom is an essential requirement due to shifting in medical education from teacher-centric to student-centric as a consequence of the recent changes in medical education called “Competency-Based Medical Education.” The advantage of this teaching-learning method is to motivate students for self-directed learning and provides an opportunity for students to read/view course-related material at their own pace and on their own time before the actual class. Change in T-L method in medical biochemistry is extremely important since 1st Professional MBBS students considered it as tiresome and boring subject and give it least priority in all the subjects of 1st Professional MBBS course. **Aim and Objectives:** The main objective of this study is to introduce “Flipped Classroom” as an innovative teaching-learning method in medical biochemistry. **Materials and Methods:** For this study, 76 students were in-rolled and randomly divided them into two equal groups. Two topics from the medical biochemistry were selected, each group given an equal chance to learn by each method, at the end of teaching-learning the MCQ test was conducted and feedback from the student was collected. **Results:** In topics, the group learned the topic by flipped classroom scored more marks than the other group. The mean score of students, after the didactic lecture and flipped-classroom irrespective of the topic, were 4.43 and 5.39 marks, respectively ($P < 0.001$). **Conclusion:** The flipped-classroom method was found useful to improve the score of the 1st Professional MBBS students in medical biochemistry subject and facilitate them to understand the topic more clearly than the didactic lecture.

KEY WORDS: Flipped Classroom; Self-directed Learning; Competency-based Medical Education

INTRODUCTION

Recently in August 2019, competency-based medical education curriculum was introduced in the medical education system to improve the efficiency of the Indian

medical graduates (IMG) by improving the effectiveness of medical teaching in medical colleges for MBBS students. The IMG teaching program is redesigned to create IMGs to acquire the necessary knowledge, attitude, skill, responsiveness, and values so that IMG is competent to be the physician of first contact who is capable of looking after the preventive, promotive, curative, and rehabilitative aspects of medicine.^[1] To become a competent IMG, a medical student must acquire the necessary basic knowledge and skills from 1st Professional MBBS. In the 1-year duration of the first Professional MBBS, half of the time is allotted to Human Anatomy and the rest is for medical physiology and

Access this article online	
Website: www.njppp.com	Quick Response code 
DOI: 10.5455/njppp.2023.13.0629620220062022	

National Journal of Physiology, Pharmacy and Pharmacology Online 2023. © 2023 Kirankumar Chauhan, *et al.* This is an Open Access article distributed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), allowing third parties to copy and redistribute the material in any medium or format and to remix, transform, and build upon the material for any purpose, even commercially, provided the original work is properly cited and states its license.

biochemistry. On the other hand, medical biochemistry is a rapidly expanding branch, which concerns clinical and applied aspects and not just merely the subject of pathways and cycles. However, medical biochemistry is overlooked by first MBBS students just because of changes in teaching-learning methods from pedagogy to andragogy, time constraint, and no motivation for self-directed learning. Therefore, students are unable to learn medical biochemistry. To defeat this issue it is felt appropriate to adopt new teaching-learning (T-L) methods. One of the new T-L methods is “Flipped Classroom.” The flipped classroom is an education method in which the classical lecture and homework elements of a course are “reversed” or “flipped.”^[2,3] In this method, students view pre-recorded lecture videos or read a textbook or perform assignments before attending class and during class time, students are kept engaged in student-centered learning activities such as discussion, group work, and problem-solving.^[4] The teacher plays the role of facilitator and can manage time effectively for enhancing the learning skills of students by addressing the needs of students, focusing on identifying and resolving misconceptions, encouraging teamwork, and development of problem-solving skills among students by increasing their active involvement. A facilitator takes on the role of tutor or coach to help students in areas where they have trouble in the application of concepts.^[5,6] The goal of the application of the flipped classroom is to provide an opportunity for students to read/view course-related material at their own pace and on their own time before the actual class.^[7]

The study by Young *et al.* on medical residents’ confirmed the first choice for the flipped classroom over the traditional didactic lecture method.^[8]

Another study by Gubbiyappa *et al.* and others on students of other disciplines also showed the encouraging result for the flipped classroom.^[9-11] Several studies have been done on students of different disciplines, but as far as our knowledge, not even a single study was conducted on 1st professional MBBS student, particularly biochemistry subject, so we have conducted this study.

The main objectives of this study are

- To introduce “flipped classroom” as an innovative teaching-learning method in medical biochemistry
- To compare this T-L method with the traditional didactic lecture method
- To evaluate the impact of this method on learners and faculty members in comparison with traditional didactic lecture method
- Motivated for self-directed learning.

MATERIALS AND METHODS

The study procedure is described in Figure 1.

RESULTS

We have observed that Group-B learned topic-I by flipped-classroom scored more marks compare to Group-A, the mean score of the group is 5.64 and 4.03, respectively [Figure 2]. A similar result was observed for topic II, in this topic Group-A taught by flipped-classroom scored more marks than Group B, the marks are 5.14 and 4.83, respectively [Figure 2]. If we compare the teaching-learning method irrespective of groups then the mean score of the students who learned the topic by flipped-classroom scored more marks than the didactic lecture, the mean marks are 5.39 and 4.43, respectively [Figure 3].

The students who learned the topic in flipped classroom scored 0.96 marks more than in the conventional didactic lecture. $P < 0.001$, which shows the significant difference in marks obtained by different teaching-learning methods [Table 1].

The feedback from the students was collected through the Likert scale, in which 1-strongly disagree, 2-disagree, 3-can-not say, 4-agree, and 5-strongly agree. The majority of the students strongly agreed that the flipped classroom was more engaging, arouse interest in the topic, helped in clarifying the droughts, the material given for the flipped classroom

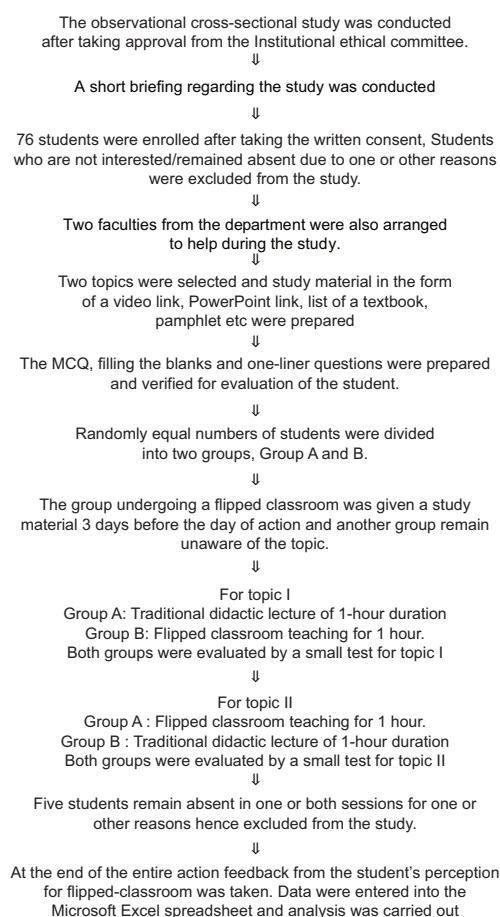


Figure 1: Study flow-chart

was appropriate and they like other topics to be covered by flipped classroom method [Table 2].

DISCUSSION

The 1st Professional MBBS students generally consider biochemistry as a dry subject and generally avoid clarifying doubtful and touching the clinical aspect of biochemistry which is the heart of medical biochemistry subject. They just read it and mug it up for passing the 1st Professional MBBS. But our result indicates that the new teaching-learning method, flipped classroom can increase the attention of

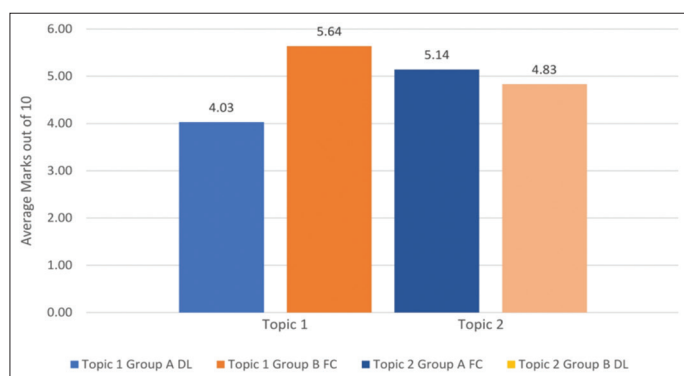


Figure 2: Average marks in each topic by each group after the didactic lecture and flipped classroom

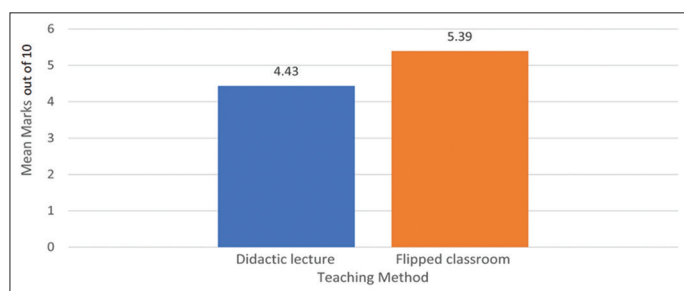


Figure 3: Mean score after the didactic lecture and flipped classroom

the student, actively involve them in the class, clarify their doubts, and help in effectively learning the subject. By all these, the flipped classroom has the potential to be an effective and beneficial method of medical education to produce IMG with desirable knowledge, attitude, skill, responsiveness, and values. The success of flipped classrooms is because of the material provided to students before the actual class, which they have learned at their own time and pace by self-directed learning. In addition to these, they have the liberty to check other videos, PDFs, books, etc., of their choice on the same topic. The exercise of the teacher to prepare the video, PowerPoint, pamphlet, etc., and self-learning this material by students, can provide more time during the teacher-student interaction. This time is utilized to cover the unexplored area and they can clear the misconception, doubts, or any queries related to a topic. In addition to these, the teacher also gets an opportunity to encourage students for teamwork, and development of problem-solving skills among students by increasing their active involvement in class.

Feedbacks from the students are also very encouraging. According to them, this new method is very engaging, arose interest in biochemistry and they want more topics to be covered by this method. The study by other authors such as Litzinger *et al.* and Olds *et al.* also confirmed that students showed a high preference for the flipped classroom over the traditional didactic lecture method.^[12,13]

Although there are many advantages of the flipped classroom, it also has some limitations like a large number of students cannot be covered at the same time, larger classrooms are required, the technological facility should be available to both students and teacher, time required maybe more, initially students may show resistance for a new technique, increased workload of a teacher as they have to spend more time and efforts in preparation of pre-class and in-class activities.^[14]

Table 1: Statistical analysis

Teaching-learning Method	Mean test Score (10 Marks)	Difference in mean Marks	Z-Score	P-value
Didactic lecture	4.43	0.96	4.12	<0.001
flipped-classroom	5.39			

Table 2: Students perception after flipped classroom

Question	Likert 5-point scaling				
	Strongly Disagree (1)	Disagree (2)	Cannot Say (3)	Agree (4)	Strongly Agree (5)
Flipped classroom method is more engaging than traditional classroom teaching	0	3	2	6	60
Flipped classroom aroused interest in the topic	1	2	4	9	55
Flipped classroom helped in clarifying the doubts in the topic	2	2	8	6	53
Study material given for flipped classroom was appropriate	0	3	0	6	62
I would like other topics to be covered using the same method	1	6	1	7	56

Limitation

Farther study on larger scale is required.

CONCLUSION

Our research concluded that the students who learned the topic in flipped classroom performed significantly better and scored better marks in medical biochemistry and they also showed a positive approach toward the new teaching-learning method.

REFERENCES

1. Graduate Medical Education Regulations, 1997. Available from: <https://www.nmc.org.in/.graduate-medical-educationregulations-1997> [Last accessed on 2022 Jun 15].
2. Ruffini MF. Screencasting to Engage Learning. Educause Review; 2012. Available from: <https://www.educause.edu/ero/article/screencastingengage-learning>. [Last accessed on 2021 Dec 20].
3. Strayer JF. How learning in an inverted classroom influences cooperation, innovation and task orientation. *Learn Environ Res* 2012;15:171-93.
4. Butt A. Students' views on the use of a flipped-classroom approach: Evidence from Australia. *Bus Educ Accred* 2014;6:33-44.
5. Veeramani R, Madhugiri VS, Chand P. Perception of MBBS students to “flipped class room” approach in neuroanatomy module. *Anat Cell Biol* 2015;48:138-43.
6. Alvarez B. Flipping the Classroom: Homework in Class, Lessons at Home. United States: National Education Association; 2018. Available from: <https://www.neaprioritieschools.org/successfulstudents/flippingtheclassroomhomeworkinclasslessonsathome2> [Last accessed on 2018 Dec 02].
7. Fulton K. Upside down and inside out: Flip your classroom to improve student learning. *Learn Lead Technol* 2012;39:12-7.
8. Young TP, Bailey CJ, Guptill M, Thorp AW, Thomas TL. The flipped classroom: A modality for mixed asynchronous and synchronous learning in a residency program. *West J Emerg Med* 2014;15:938-44.
9. Gubbiyappa KS, Barua A, Das B, Vasudeva Murthy CR, Baloch HZ. Effectiveness of flipped classroom with poll everywhere as a teaching-learning method for pharmacy students. *Indian J Pharmacol* 2016;48:S41-6.
10. Koo CL, Demps EL, Farris C, Bowman JD, Panahi L, Boyle P. Impact of flipped classroom design on student performance and perceptions in a pharmacotherapy course. *Am J Pharm Educ* 2016;80:33.
11. McLaughlin JE, Roth MT, Glatt DM, Gharkholonarehe N, Davidson CA, Griffin LM, *et al.* The flipped classroom: A course redesign to foster learning and engagement in a health professions school. *Acad Med* 2014;89:236-43.
12. Litzinger TA, Lattuca LR, Hadgraft RG, Newsletter WC. Engineering education and the development of expertise. *J Eng Educ* 2011;100:12350.
13. Olds B, Johri A. Situated engineering learning: Bridging engineering education research and the learning sciences. *J Eng Educ* 2011;100:15185.
14. Bhatnaga M, Bhatnagar P. Flipped classroom-an innovative approach. *J Xi Univ Architecture Technol* 2020;12:403-13.

How to cite this article: Patel JD, Gamit A, Miahra A, Chauhan K. “Flipped Classroom” teaching-learning method in medical biochemistry 1st professional MBBS students. *Natl J Physiol Pharm Pharmacol* 2023;13(02):274-277.

Source of Support: Nil, **Conflicts of Interest:** None declared.

© 2023. This work is published under
<https://creativecommons.org/licenses/by-nc-sa/4.0/>(the “License”).
Notwithstanding the ProQuest Terms and Conditions, you may use this
content in accordance with the terms of the License.