ORIGINAL ARTICLE

Impact of Flip classroom on performance of MBBS Phase II Students

Gagan Deep Kaur[1], Varun Sisodia[2], Rashmi Bhujade[3], Deep Shikha[4], Pankaj Kumar Jain[5]

[1,3,5]Department of Community Medicine, Uttar Pradesh University of Medical Sciences, Saifai, Uttar Pradesh

[2]Department of CVTS, Uttar Pradesh University of Medical Sciences, Saifai, Uttar Pradesh

[4]Department of Community Medicine, Himalayan Institute of Medical Sciences, Swami Rama Himalayan University, Dehradun, Uttarakhand

CORRESPONDING AUTHOR

Dr Gagan Deep Kaur, Associate Professor, Department of Community Medicine, Uttar Pradesh University of Medical Sciences, Saifai, Etawah, Uttar Pradesh 206130

Email: dr_gagan9@yahoo.co.in

CITATION

Kaur GD, Sisodia V, Bhujade R, Shikha D, Jain PK. Impact of Flip classroom on performance of MBBS Phase II Students. Indian J Comm Health. 2025;37(5):673-678. https://doi.org/10.47203/IJCH.2025.v37i05.007

ARTICLE CYCLE

Received: 10/09/2025; Accepted: 15/10/2025; Published: 31/10/2025

ABSTRACT

The majority of Medical Schools are facing issues in providing competency-based education to students. Many students are unable to develop critical thinking and reasoning skills, which are the core of medical education. A flipped classroom is an engaging and modern teaching method. The objectives of the study were: to assess the effectiveness of the flipped classroom strategy towards strengthening knowledge acquisition and retention in community medicine among undergraduate medical students; and to enhance student engagement through active learning. **Methodology:** This study was conducted in a North Indian medical college among 150 undergraduate students, using a flipped classroom model for teaching the Universal Immunisation Programme (CM10.5)**. Results:** Flipped classroom teaching has aroused the interest of the students, as the attendance of 86.7% students is more than 90%. There is a marked increase in the mean test score of students of each batch after the implementation of the flipped classroom. Nearly 63% of students felt that they were more engaged as learners than in passive teaching. Few teachers (28.5%) believed that it gives extra load to the teachers and are not comfortable in teaching via the Flipped classroom model. **Conclusion**: Flipped classroom teaching was an effective active learning strategy; larger studies are needed to confirm its impact.

KEYWORDS

Flipped classroom; Medical education; MBBS students; Academic performance

INTRODUCTION

Traditional didactic lectures remain the most commonly used method for teaching the cognitive domain in medical schools (1). However, many students struggle to retain and apply the knowledge delivered through these passive learning approaches(2). In the existing system, learning often remains limited to lower levels of Bloom's taxonomy, with inadequate development of higher-order thinking skills such as analysis, reasoning, and problem solving(3). The flipped classroom model offers a promising alternative by building upon students' prior knowledge and promoting progression towards higher-order learning (4).

In a flipped classroom, learning resources such as notes, videos, and presentations are provided in advance, enabling students to prepare independently. Classroom time is then utilised for active learning through application-based activities, simulations, and case discussions facilitated by faculty. This approach shifts the focus from information delivery to meaningful engagement, encouraging critical thinking and deeper understanding(5-8).

With the introduction of competency-based medical education, there is a growing emphasis on

student-centred learning, self-directed study, and continuous assessment (9).

The objectives of the study were

- To assess the effectiveness of the flipped classroom strategy towards strengthening knowledge acquisition and retention in community medicine among undergraduate medical students
- Enhancement of student engagement through active learning.

MATERIAL & METHODS

Study Design: The study employed a quasi-experimental design with pre- and post-tests, including a retention assessment, to assess the effectiveness of the flipped classroom strategy in the facilitation of learning of MBBS Phase II students on the Universal Immunization Programme (competency CM10.5).

Study Setting: The present study was undertaken in the Department of Community Medicine of a medical school located in North India, with a total intake capacity of 150 undergraduate students. Phase II MBBS students were divided into six batches (A–F), each consisting of 25 students, and posted in Community Medicine for 4 weeks.

Intervention: After ethical approval from the Institutional Ethics Committee and written consent from the students, the students were oriented to the flipped classroom approach. Educational videos on the Universal Immunization Programme were shared via the respective batch WhatsApp groups 3 days and 1 day before the scheduled class. On the intervention day, students participated in an interactive flipped classroom session. Those absent were provided with compensatory sessions (either early morning or evening).

Outcome Variables: Primary Outcome: Knowledge gain and retention, measured through Scenario-based and Two-Tiered MCQ test scores.

Measurement: A structured questionnaire was administered at three time points:

Pre-test: Before the intervention.

Immediate post-test: Immediately after the flipped classroom session.

Retention test: At the end of 4 weeks of posting.

Data Analysis: Data analysis was done by using descriptive statistics, and knowledge gain was assessed by comparing mean scores across the three time points (pre-test, immediate post-test, retention test). One-way ANOVA was conducted to determine whether the observed changes in scores were statistically significant, adopting a threshold of $p < 0.05$.

Study Protocol: The present study was undertaken in the Department of Community Medicine of a medical school located in North India, with a total intake capacity of 150 undergraduate students. MBBS students of phase 2 were divided into 6 batches, i.e., from A to F, and each batch with 25 students was posted for 4 weeks. Each batch of posting in Community Medicine received the flipped classroom model on Universal Immunization Programme, listed in competency number CM10.5. The student's WhatsApp group received a video about the topic being taught in class. The video was shared 3 days and 1 day before the session. At the time of intervention, students were provided with a flipped classroom. Uniform delivery of information to each batch was ensured. Pretest, immediate post-test test and retention test at the end of 4 weeks posting were administered to check the performance of each student. Students who were absent on the day of intervention were addressed with an extra class in the evening or early morning to minimize the Attrition Bias. Selection Bias was minimized by including all students in posted Batches.

Knowledge enhancement and retention, considered the primary outcome, was measured by changes in test scores, with mean values collected at baseline, immediately post-intervention, and at a four-week follow-up (retention test). Test scores were calculated with the answer key by a third party with no intimation regarding the intervention.

RESULTS

The teaching with flipped classroom was appreciated by many students. A total of 150 students studying in Phase–II MBBS were enrolled in the study. The mean age of students was 21.12 years with a standard deviation of 2.98. Out of 150 students enrolled, 78 (52%) were male and 72 (48%) were female students. Flipped classroom teaching has aroused the interest of the students in the topic of immunization, as we can see in Table 1, that the attendance of 86.7% students is more than 90%.

Table-1. Attendance distribution of the study participants

Variables	Distribution	N	Percentage (%)
Attendance in classes	>90%	89	59.3
	80-90%	41	27.4
	70-80%	12	8.0
	<70%	8	5.3

As evident from the analysis chart of Table 2, the flipped classroom model proved to be appreciated

by many students. Perception of students towards flipped classroom teaching and towards the preparatory material was taken on 5-point Likert scale (1 = strongly agree to 5 = strongly disagree) for every variable (Table 2, Figure 1). Majority of the learner's appreciated the appropriateness of the selected topic and quality of the provided material. They felt that the provided material helped in improved comprehension of the topic. Among the 150 students enrolled for study, 62.6% of students felt that they were more engaged as a learner than passive teaching followed by 60.6% of students who were satisfied with this form of teaching learning method and also felt that they interacted with peers more and it helped them in learning. Though the acceptability of the method was good or the flipped classroom was well received but one-tenth of participants preferred conventional method over flipped classroom and 6.6% felt that flipped classroom added additional work to their hectic schedule.

Figure 1 -Learners' perceptions of the preparatory study material

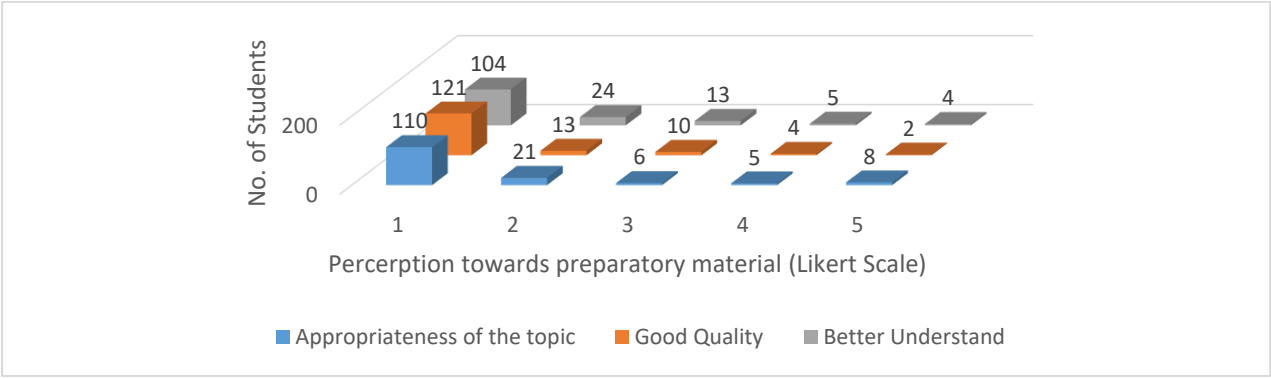


Table-2 Perception of students toward flipped classroom teaching (N=150)

Perception of students	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Greater contentment	91 (60.6)	18(12.1)	12 (8.1)	16 (10.6)	13 (8.6)
Increased Confidence	86 (57.3)	28 (18.6)	21(14.2)	07 (4.6)	08 (5.3)
Relevance	78 (52.2)	58 (38.6)	10 (6.6)	02 (1.3)	02 (1.3)
Increases attention in class	88 (58.6)	32 (21.3)	18 (12.2)	07(4.6)	05 (3.3)
Increase the workload on students	10 (6.6)	11 (7.3)	21(14.2)	44(29.3)	64 (42.6)
Can study at own pace	84 (56.0)	19 (12.6)	15 (10.2)	23 (15.3)	09 (5.9)
Stronger peer collaboration	91(60.6)	24 (16.2)	16 (10.6)	11 (7.3)	08 (5.3)
The earlier method of teaching was better	15 (10.0)	11 (7.3)	07 (4.6)	33 (22.0)	84 (56.0)
More engaged as a learner	94(62.6)	19(12.6)	14 (9.3)	14 (9.3)	09 (5.9)

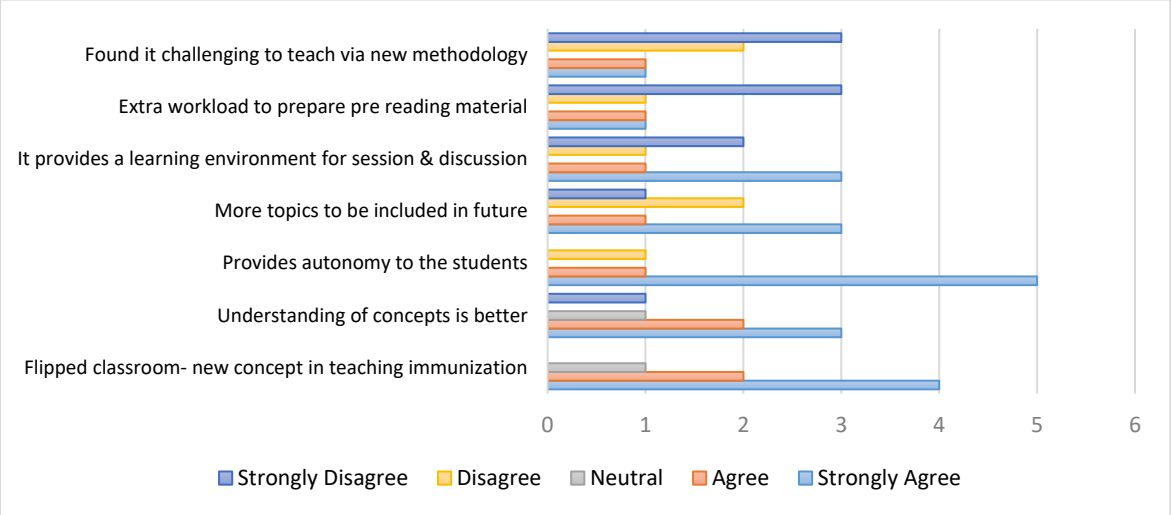
Knowledge enhancement, considered the primary outcome, was measured by changes in test scores, with mean values collected at baseline, immediately post-intervention, and at a four-week follow-up (retention test). It is clearly evident from Table 3 that there is a marked increase in the mean test score of students of each batch after the implementation of the Flipped classroom.

Table-3 Assessment of learning outcomes through pre, post & retention test analysis

Variable	Batch-A	Batch-B	Batch-C	Batch-D	Batch-E	Batch-F	One-Way ANNOVA Value of P
(Maximum Marks-20)	Mean (Standard Deviation)	Mean (Standard Deviation)	Mean (Standard Deviation)	Mean (Standard Deviation)	Mean (Standard Deviation)	Mean (Standard Deviation)	
Pre-test Score	8.2 -2.03	7.6 -1.08	8.9 -2.01	7.1 -1.09	5.9 -1.98	6.8 -1.8	0.0001
Immediate Post Test Score	18.5 -1.95	16.6 -1.84	17.4 -1.98	18.9 -2.01	17.8 -2.8	17.9 -1.95	0.015
Assessment score after 4 weeks	17.5 -1.45	15.9 -1.09	15.3 -2.04	14.9 -2.8	17.8 -1.02	15.9 -1.59	0.0001

Feedback from faculty members (Assistant Professor & above) who were involved in teaching was taken regarding their experience with flipped classroom teaching. The majority of the teachers were of the opinion that flipped classroom teaching makes understanding of the concepts better (71.4%) and provides autonomy to the students (85.7%). Few teachers (28.5%) believed that it gives extra load to the teachers and are not comfortable in teaching via the Flipped classroom model

Figure-2 Feedback of faculty members in the Department of Community Medicine regarding Flipped Classroom (N=7)



DISCUSSION

There has been a gradual but definite shift in medical education away from the traditional lecture approach toward approaches that encourage a higher hierarchy of learning in the cognitive, psychomotor, and affective domains. In the flipped classroom model, students engage with core concepts independently as assignment and subsequently participate in exercises in class, which fosters analytical thinking and practical application. (10). Despite its flexibility in implementation, the flipped classroom is frequently employed to maximize students' engagement in problem-solving tasks. (11). We also used the model of flipped classroom teaching to generate interest in students as active learners and to assess the impact of the intervention on student learning outcomes.

The mean age of students in the present study was 21.12 years with a Standard deviation of 2.98. Out of 150 students enrolled, 78 (52%) were male and 72 (48%) were female students. In a study conducted by Jalal Nouri (12) at Stockholm University in Sweden, the mean age of students was 25.12 years with a standard deviation of 4.01. Contrary to our study, the proportion of male students (68.3%) was more than female students (21.7%). Similar to our study, Yousef (13) in Jordan had more number of female participants (60.2%) as compared to male students. Out of 150 students enrolled for study, 130 students had attendance of more than 80 %. Similarly, in a study conducted by Sabale et al (2020) (9) at Seth GS Medical College & KEM Hospital in the Department of Community Medicine also demonstrated the attendance of 89.6% in flipped classroom Sessions.

While studying the perception of students toward flipped classroom teaching, 79.9% of students agreed that this method of teaching increases attention in the class, and 75.2% feel that they are more engaged as learners in the class. Similar findings are reported in a study conducted by Nair et al (2021) (10) in Pune, Maharashtra, where they reported that ninety percent of the students agreed that the flipped classroom approach promotes a better understanding of the topic and enhances the students' contribution to the class. The students found this method of teaching more captivating and thought-provoking as compared to instructor-led classroom teaching in research conducted by Angadi NB et al (2019)(4) at KLE University in Belagavi, Karnataka. Jalal Nouri et al (2016) also reported that the flipped classroom made students more active as learners, and they took more responsibility for their learning. A small proportion of students feel that the flipped classroom proposes extra work and traditional form of teaching was better. Similar findings are reported by Yousef (2019) (13) in Jordan, where a small proportion, with a mean of 3.80, reported that they had to do more work out of the classroom with this type of teaching methodology.

Knowledge enhancement, considered the primary outcome, was measured by changes in test scores,

with mean values collected at baseline, immediately post-intervention, and at a four-week follow-up (retention test). There was a marked increase in the mean test score of students of each batch after the implementation of the Flipped classroom. These findings are statistically significant, also. Similarly, Nair et al (2021) (10) also reported that there was a significant increase in MCQ performance, from an average pre-test score of 60% to a post-test score of 87.7% ($P \leq 0.001$). At KLE University, Belagavi, Karnataka, Angadi NB et al. (2019) (4) evaluated the pre- and post-test mean scores of the flipped classroom group for all topics and observed statistically significant improvements across all three topics ($P < 0.001$). Sabale et al (2020) (9) at Seth GS Medical College & KEM Hospital, Mumbai, stated that no significant difference was observed in pre-test performance between active and non-active participants of the flipped classroom, whereas post-test scores differed significantly, favoring the active participants ($P < 0.05$). From the above scenario, we can infer that flipped classroom teaching aids in knowledge gain and increases the performance of students.

Feedback from faculty members (Assistant Professor & above) who were involved in teaching was taken regarding their experience with Flipped classroom teaching. The majority of the teachers were of the opinion that Flipped classroom teaching makes understanding of the concepts better (71.4%) and provides autonomy to the students (85.7%). Few teachers (28.5%) believed that it gives extra load to the teachers and are not comfortable in teaching via the Flipped classroom model. Similar findings are reported by a study conducted by Abuhmaid A. (2020)(14) in Jordan to explore teachers' perspectives on the effects of flipped learning on student learning. Overall, teachers reported a positive impact of the flipped classroom on students' learning outcomes. Many teachers also observed that this approach helps maintain students' attention during class. Additional commonly noted benefits included increased student confidence due to prior exposure to foundational concepts and greater enjoyment of the learning process.

Conclusion

The flipped classroom represents a groundbreaking teaching method with considerable potential. It actively involves students in the learning process and encourages deeper engagement. Although implementing this approach on a large scale may require substantial time and resources, it has the potential to significantly enhance the learning experience in today's technology-driven educational environment. Further research involving larger student groups across multiple medical schools is warranted to evaluate the impact of flipped classroom strategies and to consider their integration into the standard curriculum at different levels.

Recommendation

- The flipped classroom can be continued as a teaching method in Community Medicine for learning.
- In the long term, this T-L method can be used for teaching all topics of clinical postings for the three phases of students posted in Community Medicine
- IMG with a habit of reading before performing any procedure on patients will be produced, which will fulfil the goal of a lifelong learner

Limitation of the Study

The study was conducted on a single competency in the subject of Community Medicine. Thereby, it limits the generalisability of results.

Authors Contribution

All authors have contributed equally.

Financial Support and Sponsorship

Nil

Conflict of Interest

There are no conflicts of interest.

Acknowledgement

I am thankful to the M.B.B.S. students of Phase-II who participated in the project. I am grateful to the faculty members of the department who helped me in designing pre-reading material and pre- & post-test questionnaires. I am thankful to the statistician, Mr. Ankur Kumar, for helping with the appropriate statistical test. Without their contribution project would not have been possible.

Declaration of Generative AI and AI Assisted Technologies in the Writing Process

The authors haven't used any generative AI/AI assisted technologies in the writing process.

References

1. Mehta NB, Hull AL, Young JB, Stoller JK. Just imagine: new paradigms for medical education. Academic Medicine. 2013 Oct 1; 88(10):1418-23.
2. Hawks SJ. The flipped classroom: now or never. AANA journal. 2014 Aug 1; 82(4).

3. Bishop J, Verleger MA. The flipped classroom: A survey of the research. In2013 ASEE Annual Conference & Exposition 2013 Jun 23 (pp. 23-1200).
4. Angadi NB, Kavi A, Shetty K, Hashilkar NK. Effectiveness of flipped classroom as a teaching–learning method among undergraduate medical students – An interventional study. J Edu Health Promot. 2019 Oct 24;8:211
5. Veeramani R, Madhugiri V.S, Chand P.Perception of MBBS students to "flipped class room" approach in neuroanatomy module. Anat Cell Biol 2015 June 26; 48(2):138-143.
6. 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(2):236-43.
7. Halasa S, Abusalim N, Rayyan M, Constantino RE, Nassar O, Amre H, Sharab M, Qadri I. Comparing student achievement in traditional learning with a combination of blended and flipped learning. Nurs Open. 2020 Mar 31;7(4):1129-1138.
8. Galway LP, Corbett KK, Takaro TK, Tairyan K, Frank E. A novel integration of online and flipped classroom instructional models in public health higher education. BMC Med Educ. 2014 Aug 29;14:181.
9. Sabale R V, Chowdary P. Flipped classroom – An innovative teaching model to train undergraduate medical students in community medicine. Educ Health.2019;32(3):116-121.
10. Nair A, Yadav AK. Use of flipped classroom for the teaching of postgraduate students: An experience. Medical Journal of Dr. DY Patil Vidyapeeth. 2021 Nov 1;14(6):652.
11. Chen F, Lui AM, Martinelli SM. A systematic review of the effectiveness of flipped classrooms in medical education. Medical education. 2017 Jun;51(6):585-97.
12. Nouri J. The flipped classroom: for active, effective and increased learning–especially for low achievers. International Journal of Educational Technology in Higher Education. 2016 Dec;13(1):1-0.
13. Aljaraideh Y. Students' perception of flipped classroom: A case study for private universities in Jordan. JOTSE: Journal of Technology and Science Education. 2019;9(3):368-77.
14. Abuhmaid A. Teachers' Perceptions on the Impact of Flipped Learning on Student Learning and Teachers' Role in Jordanian Schools. Univers. J. Educ. Res. 2020;8:1007-16.