

First Phase MBBS Students' Perception Of Implementation Of Flipped Classroom In Teaching Gross Anatomy.

Dr Nilima Patil, Dr Sunita Vagha

Asso. Prof. Anatomy SRTRGMCH Ambajogai, MUHS Nashik, India
Prof & HOD Pathology & Controller Of Examination DMIHER Sawangi (M), Wardha. India.

Abstract

Introduction: In a flipped classroom, students engage with lectures and foundational material either print, audio, or video before arriving for class. This pre-class learning then enables class sessions to become interactive, problem-solving, and case-based learning, maximizing direct teacher support for deeper comprehension. This study is aimed to assess perceptions of implementation of flipped classroom in teaching anatomy to first phase MBBS students.

Methodology: For the 2022–2023 academic year, 147 First MBBS students participated in a study where a flipped classroom was implemented in teaching the subject of anatomy for five flipped classroom sessions distributed over a period of one and half months schedule. Data was gathered from these students at the end of last activity as responses to the survey questions with five point likert scale and one open ended question to describe students experience about the flipped classroom activity.

Result: The implementation of flipped classroom for teaching gross anatomy was viewed positively. They particularly valued the flexibility it offered, allowing them to learn at their own speed and providing the valuable in-class time for interactive learning activities.

Keywords: Flipped classroom, First phase MBBS, preclass, Interactive in-class.

Date of Submission: 27-05-2025

Date of Acceptance: 07-06-2025

I. Introduction

Undergraduate medical education in India shown reform with the implementation of CBME curriculum focused on achievement of competencies as per the GMER guidelines 2019^[1] It recommends innovative instructional methods to be used so as to increase active participation of students in the learning process. Traditional lectures mostly covers the cognitive domain competencies which was considered as a teacher centred strategy. Traditional lectures involve passive participation of students in learning. In contrast active learning strategies are not only supported by adult learning theories but GMER 2019 guidelines also demands achievement of communication skill and lifelong learning skills as important roles to be performed by an Indian Medical Graduate.^[1,2]

It has been proposed that blended learning can help escalate instructor ability to increase student participation, to reach more students, and to increase retention rates.^[3] Flipped classroom has gained popularity as an blended learning methodology in the last few years.

The flipped classroom implementation involve two important parts , pre-class activities and in-class activities. According to Hamdan, McKnight and Arfstrom students are provided with the teaching material as preclass activity before coming to class in the form of online video, audio recordings of lectures, internet resources and slide presentations with audio narratives.^[4] In-class activities generally include the case-study teaching method followed by a discussion^[5,6] team-based learning practice in order to apply in depth learning of the subject^[7] think-pair-share activities as teaching strategy^[8] and quizzes as a part of the discussion^[9].

All these TL methods create student-centred learning environment where teachers utilize the classroom time to guide students in solving problems and provide an interactive classroom .

Hamdan and others offer a definition for flipped classroom as “In the Flipped Learning model, teachers shift direct learning out of the large group learning space and move it into the individual learning space, with the help of one of several technologies”^[10]

Limited data is available on the effectiveness of the flipped classroom to determine if students are engaged more in a flipped classroom environment^[11] So first it is important to understand the medical undergraduate students' perceptions of implementation of flipped classroom. Through this research project we aimed to collect and analyse data to assess the perceptions of first phase medical students towards flipped

classroom teaching in Anatomy to optimize flipped classroom activity implementation in undergraduate medical education. We aimed to assess the students' perceptions of flipped classroom implementation in the subject of gross anatomy. With the objectives 1. To assess Students' perception towards execution of flipped Classroom

2. To assess the Students' perception towards time management in flipped classroom. 3. To assess the Students' perception towards social media usefulness in flipped classroom 4. To assess Students' perception towards facilitation of active learning in flipped classroom

II. Material And Methods

The study was conducted in the department of anatomy and the participants were the students from JNMC Sawangi (M) admitted to first phase MBBS course during the academic year 2022-23. Participants were in range of age 18-21 YRS. 88 female and 59 male students out of total 147 students attended the flipped classroom activity.

All students who were willing to participate in the project, required to give a written consent for the same. Five topics from gross anatomy were selected to be conducted by flipped classroom activity. For all these topics pre-class reading material as well as prerecorded lecture videos were provided to the students one week prior to the scheduled flipped class session. The class time was dedicated to interactive discussion of the topic followed by objective written assignment.

Five gross anatomy classes were conducted as a flipped classroom project over a period of one and a half month. During this time students had opportunities to develop their own perceptions about flipped Classroom activity. Survey questionnaire response from the students were recorded on the day next to last flipped classroom activity.

The data was collected by following methods.

Quantitative data: The questionnaire focused on four major parts including specific questions related to execution of Flipped Classroom, social media usefulness, time management, and facilitation of active learning. The survey consisted of five-point Likert Scale from 1-5 points with Strongly disagree(1), disagree(2), Neutral(3), Agree(4), Strongly agree(5) respectively for each item which supplied the quantitative data for the study.

Qualitative Data: In addition to quantitative data it was also important that the study include an understanding of the students' perceptions of the Flipped Classroom in their own words.

Only one open-ended written question at the end of the survey provided students with the opportunity to describe their own experiences regarding flipped classroom which is used for qualitative data collection.

Data Analysis:

Quantitative data:

The data for each of the questions will be presented in a bar graph and the percentage of students selecting each response will also be analyzed.

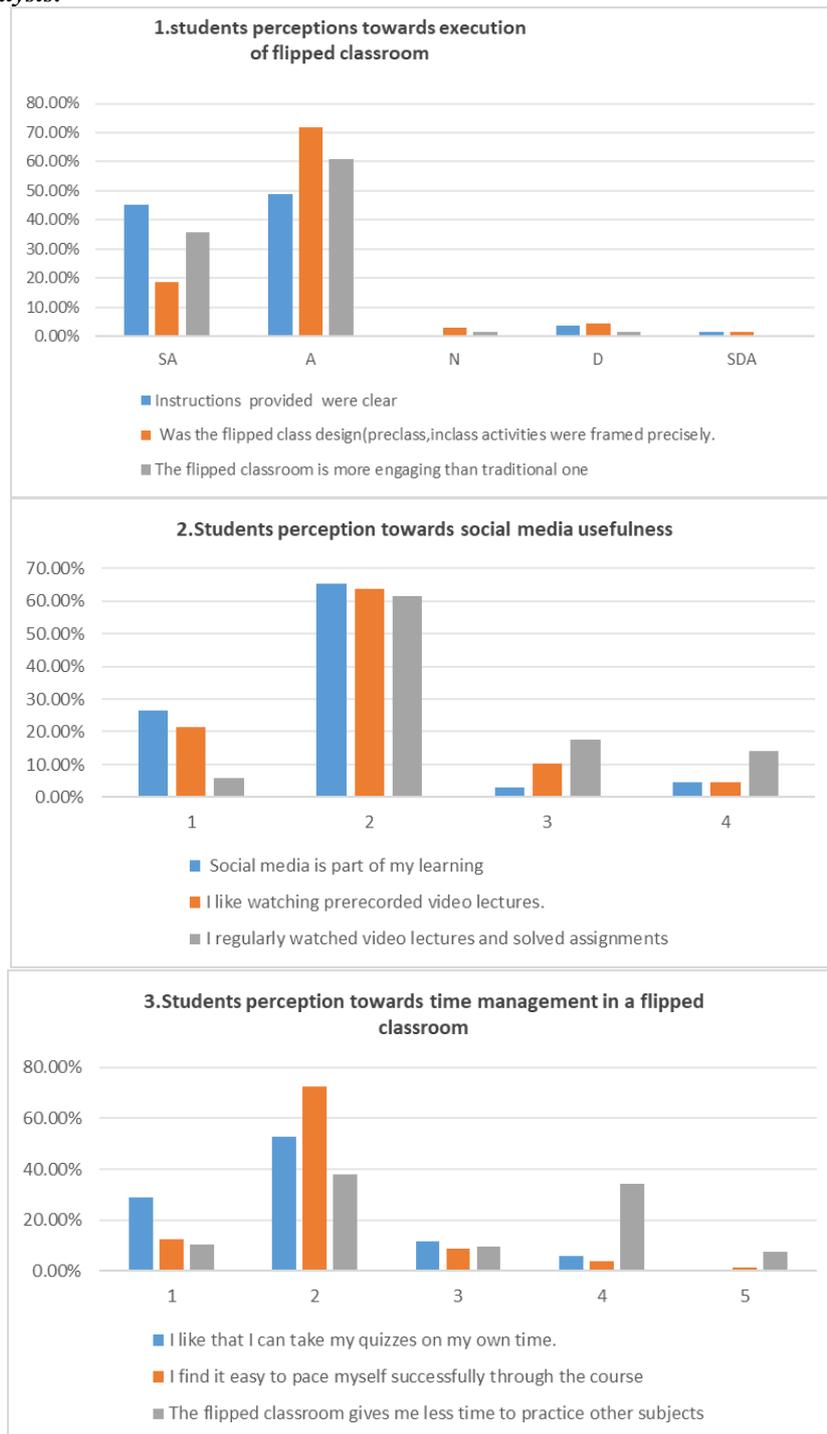
Qualitative data:

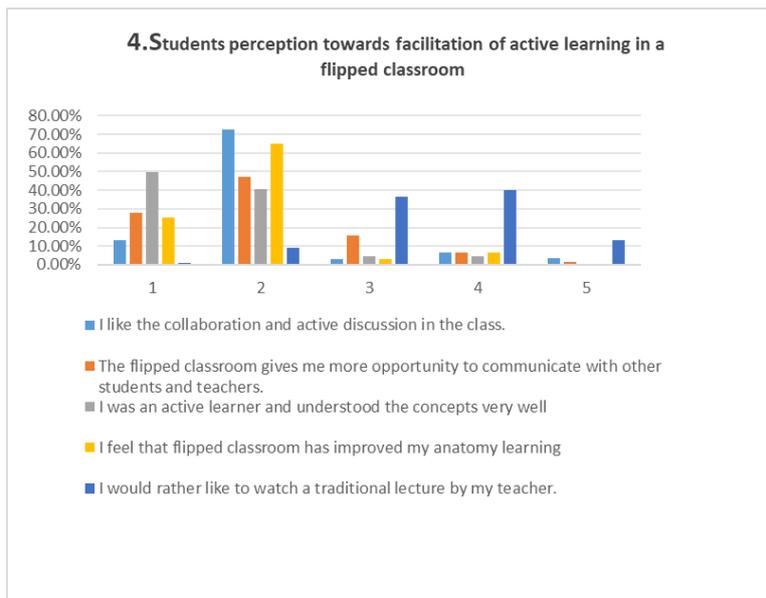
All student's responses were coded into common themes that emerged through the response to open-ended question. From this data analysis observations and results were discussed.

III. Observation And Results

All 147 students responded to the questionnaire. Quantitative data collected from the questionnaire is arranged in graphical representation and analyzed, whereas qualitative data collected from the open-ended question is analyzed by thematic analysis.

Quantitative analysis:





Qualitative analysis: In conducting the thematic analysis, four main themes were identified when we coded the data collected from the inputs of students to open ended question at the end of the survey questionnaire. These thematic categories are:

1. Advantages of flipped classroom
2. Disadvantages of flipped classroom
3. Improvements in conducting flipped classroom
4. Miscellaneous

Table 1: The qualitative data that is coded under each theme identified is as follows

Sr No.	Theme	Codes
1.	Advantages of flipped classroom	Better understanding
		Self pace
		Clinical focus
		Interactive
		Interesting
		Easy to learn anatomy
2.	Disadvantages of flipped classroom	Time constraints
		Phobia for communication
		Preclass materials should be precise
		If preclass preparation missed ...
3.	Improvements in implementation of flipped classroom	Other subjects preparation time reduced
		Models and specimens to be used in in-class session and to be revised in practical hours.
		Encourage group discussion
4.	Miscellaneous	More elaborate videos should be provided as preclass material
		More time to be given for preclass activities
		Important topics must be covered by flipped classroom
		Flipped classroom should be considered for other subjects also

Table-2: Remarkable comments from students on flipped classroom implementation in Anatomy

Themes	Student Comments
Advantage	<p>“Preclass preparation of the topic allowed me to get more time to focus on clinical anatomy of the topic during in-class activity of flipped classroom”</p> <p>“flipped classroom improved my confidence due to in class interactive sessions”</p> <p>“flipped classroom helped me to overcome fear of learning anatomy”</p> <p>“In class assignments were very interesting and may be helpful for exam preparation”</p>

Disadvantage	"It is time consuming"(Most common disadvantage mentioned) "If preclass activity of flipped classroom was missed,I was completely disoriented in class activity and it made me nervous"
Improvements	"More time to be given for preclass activity" "Care should be taken not to overlap flipped classroom activity of one subject with that of other subject as time management for preclass activity is very difficult to manage"
Miscellaneous	"Maximum topics in anatomy should be covered by flipped classroom activity" "I enjoyed learning anatomy with flipped classroom " "flipped classroom should be followed for all topics of Embryology."

IV. Discussion

As per GMER 2019 guidelines from MCI, CBME was implemented in Indian Undergraduate Medical education. Along with the subject related competencies the curriculum also expect the Indian Medical Graduate to perform the role as a lifelong learner^[1]. The doubling rate of medical sciences is reducing day by day and it is not possible to teach this fast evolving medical knowledge in a fixed time span of undergraduate training period. Making the students self directed learners may help to tackle it. The self directedness of the students will be achieved only by making active participation of the students in the learning process. Traditional didactic lectures which is used to cover substantial amount of study material in medical sciences does not allow the students to interact freely with peers and teachers so restricting development of selfdirectedness for lifelong learning.

Flipped classrooms are forming part of blended learning in curriculum delivery which includes delivery of digital content as preclass sessions^[12,13,14]. In class time is devoted to face to face sessions involving discussions, group activities and problem solving.

We conducted this study to know in detail about students perceptions about implementation of flipped classroom in the subject of Anatomy.

The results of our study were supporting flipped classroom implementation as an effective way of learning anatomy. When we analyzed students perceptions towards execution of flipped classroom we noticed that 71.85% of students were agreed & 18.51 % strongly agreed that the flipped classroom design preclass and in-class activities were framed precisely which were helpful to them to learn anatomy actively. 35.55% strongly agree & 60.74% agreed that flipped classroom was more engaging than traditional one. Supporting our study results previous studies also show that increased interest facilitates learning and can lead to good performance in a course^[15]

The quantitative analysis about social media usefulness in flipped classroom implementation showed that 26.66% students strongly agree and 65.18% agreed that social media is part of their learning with 21.48% strongly agreed and 63.70% agreed that they like to watch prerecorded videos as a preclass activity. They preferred solving assignments regularly by watching videos agreed by 61.48% of the students. This finding in our research study is similar to previous studies which mentions that in flipped classroom preclass study material that was provided, students preferred accessing video resources more than other sources.^[16]

When we analyzed the time management by the students for flipped classroom we found that 72.59% of students agreed that they find it easy to pace themselves successfully through the course. 52.59% of the students agreed that they liked it to take their quizzes on their own time. But along with these advantages we cannot neglect the 37.77% of students who were indicating towards getting less time to practice other subjects.

72.59 % of students agreed that they liked the collaboration and active discussion in the class. 49.62% of the students strongly agreed that they were the active learner and understood the concepts very well. 47.40% of the students agreed and 28.14% students strongly agreed that during in class interactive session that were conducted in flipped classroom gives them more opportunity to communicate with peers and teachers too! 25.18% strongly agreed and 65.18 % students agreed that flipped class room helped them improve their learning of anatomy through flipped classroom. Supporting our study one of the previous study in which 73.88% students strongly agreed that active-learning strategies helped them to learn better in human anatomy and physiology^[17].

In various studies on flipped classroom implementation it was observed that medical students appreciate the interactive learning methods in in class sessions boost their motivation ,involvement and interest in the subject^[18,19]. When students were surveyed about whether they would like to watch a traditional lecture rather than a flipped classroom ,40% strongly disagreed and 35% of the students disagreed to attend a traditional lecture over a flipped classroom and supported with the similar findings in other studies^[20]

In qualitative analysis students commented that "If preclass activity of flipped classroom was missed,I was completely disoriented in class activity and it made me nervous" this comment is unique one in that it highlights a critical concern regarding the implementation of preclass activities in a flipped classroom model.

This feedback indicates the essential nature of well-defined and thoughtfully structured preclass assignments and the necessity of ensuring their timely completion by students to facilitate meaningful engagement and comprehension during in-class activities. Similarly few previous studies also listed regarding the per-session phase that medical students have expressed concern over the time-intensiveness of some of the material provided for content orientation^[19,20]. These findings lead us to reflect on the appropriate amount of preclass activity content to assign, such that the students can effectively engage with it within the allotted time frame for each subject.

Similar to our findings, studies cultivating a similar teaching method to teach medical sciences reported that students found flipped classroom as a superior mode of teaching in their setup as well^[23]

From the students perspective in this study, the implementation of flipped classroom for teaching gross anatomy was viewed positively. They particularly valued the flexibility it offered, allowing them to learn at their own speed and providing the valuable in-class time for interactive learning activities. However, medical educators face a significant challenge in the considerable time investment required to develop self explanatory concise preclass study material tailored to the specific topic which is often seen an obstacle in adopting this approach^[24]. It is evident from this study that students understand and grasp the basic anatomical concepts as well as develop a higher order thinking skills during well planned active in-class activities

References

- [1] India, National Medical Commission UGMEB Regulations On Graduate Medical Education (Amendment) No. MCI-34(41)/2019-Med./161726 Dated The 4th November 2019
- [2] Taylor DC, Hamdy H. Adult Learning Theories: Implications For Learning And Teaching In Medical Education: AMEE Guide No. 83. *Med Teach.* 2013;35(11):E1561–E1572.
- [3] Echo360.(2012)Blended .Blended Learning Technology: Connecting With The Online-All-The-Time Student. [Http://Echo360.Com/Sites/All/Themes/Echo360/Files/2012_Student_Survey_WP_FINAL.Pdf](http://Echo360.Com/Sites/All/Themes/Echo360/Files/2012_Student_Survey_WP_FINAL.Pdf).
- [4] Hamdan, N., Mcknight, P. E., Mcknight, K., & Arfstrom, K. M. (2013). A White Paper Based On The Literature Review: A Review Of Flipped Learning. Retrieved 10/08/2017, From [Http://Netboardme.S3.Amazonaws.Com/Published/1663/Files/3ae28432fa9c50c4dd1a1a02a22a1b06.Pdf](http://Netboardme.S3.Amazonaws.Com/Published/1663/Files/3ae28432fa9c50c4dd1a1a02a22a1b06.Pdf).
- [5] Bouwmeester, R. A., De Kleijn, R. A., Ten Cate, O. T. J., Van Rijen, H. V., & Westerveld, H. E. (2016). How Do Medical Students Prepare For Flipped Classrooms? *Medical Science Educator*, 26 (1), 53-60.
- [6] Deruisseau, L. R. (2016). The Flipped Classroom Allows For More Class Time Devoted To Critical Thinking. *Advances In Physiology Education*, 40 (4), 522-528.,
- [7] Mclaughlin, J. E., Roth, M. T., Glatt, D. M., Gharkholonarehe, N., Davidson, C. A., Griffin, L. M., Esserman, D. A., & Mumper, R. J. (2014). The Flipped Classroom: A Course Redesign To Foster Learning And Engagement In A Health Professions School. *Academic Medicine*, 89 (2), 236-243..
- [8] Morton, D. A., & Colbert - Getz, J. M. (2017). Measuring The Impact Of The Flipped Anatomy Classroom: The Importance Of Categorizing An Assessment By Bloom's Taxonomy. *Anatomical Sciences Education*, 10 (2), 170-175
- [9] Tune, J. D., Sturek, M., & Basile, D. P. (2013). Flipped Classroom Model Improves Graduate Student Performance In Cardiovascular, Respiratory, And Renal Physiology. *Advances In Physiology Education*, 37 (4), 316-320.
- [10] 10.Hamdan N, Mcknight P, Mcknight K, Arfstrom KM (2013). A Review Of Flipped Learning: Flipped Learning Network, Pearson Education, And George Mason University. [Www.Flippedlearning.Org/Cms/Lib07/VA01923112/Centricity/Domain/41/Litreview_Flippedlearning.Pdf?Utm_Source=Hootsuite&Utm_Campaign=Hootsuite](http://www.Flippedlearning.Org/Cms/Lib07/VA01923112/Centricity/Domain/41/Litreview_Flippedlearning.Pdf?Utm_Source=Hootsuite&Utm_Campaign=Hootsuite) (Accessed 15 July 2013)
- [11] Memon S, Goswami P, Iqbal AI, Baloch S. Second Year MBBS Students Veiw About Flipped Classroom Practise In Neuroanatomy Course. *J Postgrad Med Inst.* 2016;30(3).
- [12] Tucker B. 2012. The Flipped Classroom: Online Instruction At Home Frees Class Time For Learning. *Education Next* 12:82–83..
- [13] Cheng X, Ka Ho Lee K, Chang EY, Yang X. 2017. The 'Flipped Classroom' Approach: Stimulating Positive Learning Attitudes And Improving Mastery Of Histology Among Medical Students. *Anat Sci Educ* 10:317-327.
- [14] Koteeswaran R, Simpson P, Bartle E, Smith D, Bhutada E, Ayre J, Lakhani SR. 2017. Flipping Pathology: Our Experience At An Australian Medical School. *Med Sci Educ (In Press)*; Doi: 10.1007/S40670-017-0406-4. Krahenbuhl
- [15] Sviniki, M.D. (2004). Learning And Motivation In Postsecondary Classroom. Bolton, MA. Anker, Pub Co
- [16] Evans KH, Thompson AC, O'Brien C, Et Al. An Innovative Blended Preclinical Curriculum In Clinical Epidemiology And Biostatistics: Impact On Student Satisfaction And Performance. *Acad Med.* 2016;91(5):(696–700.)
- [17] Maria Entezari1 & Mohammad Javdan2 Active Learning And Flipped Classroom, Hand In Hand Approach To Improve Students Learning In Human Anatomy And Physiology *International Journal Of Higher Education* 2016 Vol. 5, No. 4; Pp222-231
- [18] Whelan A, Leddy JJ, Mindra S, Matthew Hughes JD, El-Bialy S, Ramnanan CJ. Student Perceptions Of Independent Versus Facilitated Small Group Learning Approaches To Compressed Medical Anatomy Education. *Anat Sci Educ.* 2016;9(1):40–51.
- [19] Bosner S, Pickert J, Stibane T. Teaching Differential Diagnosis In Primary Care Using An Inverted Classroom Approach: Student Satisfaction And Gain In Skills And Knowledge. *BMC Med Educ.* 2015;15:63.
- [20] O'Connor EE, Fried J, McNulty N, Et Al. Flipping Radiology Education Right Side Up. *Acad Radiol.* 2016;23(7):810–822.36.
- [21] De Fátima Wardenski R, De Espindola MB, Struchiner M, Giannella TR. Blended Learning In Biochemistry Education: Analysis Of Medical Students' Perceptions. *Biochem Mol Biol Educ.* 2012;40(4):222–228.
- [22] Evans KH, Thompson AC, O'Brien C, Et Al. An Innovative Blended Preclinical Curriculum In Clinical Epidemiology And Biostatistics: Impact On Student Satisfaction And Performance. *Acad Med.* 2016;91(5): 696–700.
- [23] Fatima SS, Arain FM, Enam SA. Flipped Classroom Instructional Approach In Undergraduate Medical Education. *Pak J Med Sci.* 2017;33(6):1424-1428. Doi: <https://doi.org/10.12669/Pjms.336.13699>.
- [24] Moffett J. Twelve Tips For "Flipping" The Classroom. *Med Teach.* 2015;37(4):331–336.