

## Review Article

# Flipped Classroom Approach in Anatomy Teaching and Learning in Undergraduate Medical Education in Bangladesh

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### ABSTRACT

*Adoption of the flipped classroom approach in teaching and learning in medical education has been gaining much more popularity gradually in recent years across the globe. In Bangladesh, medical education has very little or no experience of flipped classroom teaching. Since the very beginning, most of our teaching and learning processes have been going through teacher-led didactic approach. In a traditional classroom, students often do not have the opportunity to discuss their ideas and misconceptions and there is very little interaction between students and their peers and teacher/instructor. It is assumed that this deficit is one of the main reasons for attrition in Phase-I courses (1st and 2nd Year MBBS) in anatomy, which later gives rise to failing, or dropping out exams or courses. However, in flipped classroom approach, students have opportunities to participate, self-direct, and engage in their own learning, which supports adult learning theories, and seems beneficial to long-term learning and the development of self-directed learning skills. In this review paper, we have discussed our flipped classroom approach in anatomy teaching and learning as well as its prospects and challenges in the Phase-I of MBBS curriculum in Bangladesh.*

**Keywords:** *Flipped classroom, anatomy teaching and learning, medical education, Bangladesh*

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### INTRODUCTION

Adoption of the flipped classroom approach in teaching and learning (sometimes called the 'inverted classroom') in medical education has been gaining much more popularity gradually in recent years.<sup>1-3</sup> Flipped classroom is a "pedagogical approach in which direct instruction moves from the group learning space to the individual learning space, and the resulting group space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter".<sup>1</sup> Being popularized in the United States<sup>4</sup>, flipped classroom approach has replaced teacher-led in-class instructions with individual homework or group activities and is being adopted for decades across the globe.<sup>3,5</sup> In recent years, the flipped classroom approach has made inroads into health professions education, and has even been touted "a new paradigm" in medical education.<sup>3</sup> In Bangladesh,

medical education has a little or no experience of flipped classroom teaching. Since the very beginning, most of our teaching and learning processes have been going through teacher-led didactic approach. In traditional pedagogy, a substantial amount of material can be covered in lecture; however, students are often “overwhelmed by the content”.<sup>3</sup> They struggle to make connections among the facts and to build upon their previous knowledge. Those classroom lectures can be considered teacher-centered strategies that are conducive to passive learning on behalf of learners.<sup>3,5-7</sup> Moreover, students often do not have the opportunity to discuss their ideas and misconceptions and there is very little interaction between students and their peers and teacher/instructor.<sup>3,6-8</sup> It is assumed that this deficit is one of the main reasons for attrition in Phase I courses (1st and 2nd Year MBBS) in anatomy, which later gives rise to failing, or dropping out exams or courses and causes frustrations and despair among students about the Department of Anatomy in general. In contrast, active learning strategies (i.e. opportunities for students to participate, self-direct, and engage in their own learning) are not only supported by adult learning theories but have also been shown to be beneficial to long-term learning and the development of self-directed learning skills.<sup>2,9</sup> Moreover, accreditation standards now formally demand that medical programs include opportunities for medical students to work in active learning environments, so that they can develop lifelong learning skills (independent identification, appraisal, analysis, and synthesis of knowledge) desirable of modern physicians.<sup>10,11</sup> Given the pedagogical and accreditation considerations in undergraduate medical education, we have recently started now applying elements of the flipped classroom to our anatomy teaching. In this review, we have discussed our flipped classroom approach in anatomy teaching and learning as well as its prospects and challenges in the Phase-I of MBBS curriculum in Bangladesh.

#### **FLIPPED CLASSROOM APPROACH IN ANATOMY TEACHING AND LEARNING**

The Flipped Learning Network (FLN) demonstrates what effective flipped learning looks like. It is a baseline or a roadmap that contains the principles of flipped learning.” FLN’s Four Pillars (**F-L-I-P**) are the following:<sup>12</sup>

*Flexible Environment:* Educators can create flexible spaces in which students choose when and where they learn. Furthermore, educators who flip their classes are flexible in their expectations of student timelines for learning and in their assessments of student learning.

*Learning Culture:* The Flipped Learning model deliberately shifts instruction to a learner-centered approach where class time is dedicated to exploring topics in greater depth and creating rich learning opportunities. Students are actively involved in knowledge construction as they participate in and evaluate their learning in a manner that is personally meaningful.

*Intentional Content:* Educators continually think about how they can use the Flipped Learning model to help students develop conceptual understanding and procedural fluency. Educators use intentional content to maximize class time in order to adopt methods of student-centered, active learning strategies.

*Professional Educator:* Professional educators continually observe their students, providing them with feedback relevant in the moment and assessing their work. Professional educators are reflective in their practice, connect with each other to improve their instruction, accept constructive criticism and tolerate controlled chaos in their classrooms.

In the Phase-I of MBBS programme, we have started re-designing our courses in human anatomy, e.g., gross anatomy, histology, embryology etc. In the flipped classroom approach, medical students (of 1st and 2nd Year) have been given some course materials like reading texts, recorded lectures, tutorial videos, animations, and podcasts in advance. The teacher/instructor also have used online tools to host a short video and create the comment space with the students. The students need to register and identify themselves on the site that has monitored their activities. After that, during the anatomy class, the students were separated into small groups to answer an online questionnaire having some objective questions on their smartphones with a time limit, followed by discussions of the topic with its clinical relevance. This approach gives more flexibility to the teachers/instructors to devote the scheduled class time to ensure student engagement through active learning activities, problem solving through discussion and collaborative work, and feedback. This

methodology is focused to students' learning needs placing them at the center. During the scheduled class time, they get the opportunity to discuss their ideas, ask questions, and clarify their misconceptions. They became more independent, both online and in-person and in the discussion of the proposed theme. We have taken this strategy instead of traditional didactic lecture based teaching, where students seem to be more passive in learning by absorbing the information transmitted by their teachers/instructors. The inversion of the classroom (i.e., 'flipping the classroom') has changed our teaching practice, allowing the teacher/instructor to assume a much more accessible role in front of the students.

The flipped classroom, a blended model of teaching and learning, might be different in various classrooms in various disciplines in a medical college depending on the teacher, content, the use of digital resources, tools, and technology. It is now a growing pedagogical strategy embraced by many of the disciplines in medical and allied health professions education.<sup>13-22</sup> However, the educators who teach the courses often do not recognize that flipping classrooms means something more than offering only asynchronous video resources or podcasts to the students.<sup>3,5,23-25</sup> Besides, the computer interaction alone is not sufficient for measuring the effectiveness of the flipped teaching methods.<sup>3,5,23</sup> Hence, designing the structure of the flipped classroom should focus on improving the student's problem solving, analyzing and evaluating information skills, which are crucial to overall learning environment inside the classroom or laboratory.<sup>3,8,9,23</sup> Faculty also need to put efforts to improve strategy based on personal experience, evidence and student feedback.<sup>3,8,23,26</sup> Therefore, faculty as well as institution should further investigate the efficacy of implementing flipped classroom for different courses/training and populations of students (e.g. undergraduate and postgraduate) in medical education.<sup>9,26,27</sup>

## HOW TO FLIP THE CLASS TO TEACH ANATOMY IN MEDICAL COLLEGES

### Some Practical Ideas<sup>3,6,8,17,24</sup>

1. Students may participate in pre-class, in-class and post class activities surrounding the lecture on the anatomical terminology and anatomical planes of human body. They may have some pre-class readings and videos. Then they come to class, discuss, show different anatomical planes

in their own bodies and discuss anatomical terminologies and take a post class quiz to test their knowledge of the information gained during the flipped classroom.

2. An upper limb dissection video may be given in advance instead regular dissection room sessions. The video is again played by an anatomy instructor during class. The instructor provided comments on the videos, guided the students, and answered their questions. The students. Then the students may engage themselves in cadaver dissection and anatomical drawing of the structure of forearm, arm and hand in groups.
3. For human embryology teaching, each of the modules can be designed as having learning objectives, a core lesson, clinical correlations, textbook references, videos, YouTube links, summaries, timelines, and practice and graded quizzes. For each topic, students are assigned a module to review in the days prior to the in-class clinical cases session. Each regular class session may include a review of the key materials from the module, application of basic and clinical content to 2-3 cases with open- and closed-ended students' response questions, while offering time for questions and answers throughout the session. Meanwhile, students may engage themselves in integrating those clinical cases with other disciplines (e.g., pathology, radiology, medicine, surgery, gynaecology etc.) and clarify their misconceptions through peer-learning or help from the instructor.
4. In histology teaching, similar can be done by posting advance videos, reading texts, animations. While being in laboratory, students may come up with questions and discussions among them and engage in drawing what they have seen in the videos previously and under the microscope in the class, compare any discrepancy or disruption, identify the causes and correlate normal histological structures with the abnormal one (histopathology). Later, they may sit for quizzes or short answer questions on that specific topic.

## PROSPECTS

Many advantages of the flipped classroom have been covered throughout the recent literature in medical

education and elsewhere. Researchers proposed some radical changes in medical education, e.g., moving away from teaching decontextualized knowledge, integration of active learning in the classroom, improving clinical reasoning skills.<sup>9,10</sup> New and innovative instructional strategies must be integrated within medical education to achieve these goals.<sup>10</sup> Evidence showed that flipped classroom pedagogy increases students' competence, autonomy, and relatedness which improves intrinsic and extrinsic motivation.<sup>2,3,6,11,13-29</sup> Besides, it has particular benefit to those students whose personality types and preferred learning styles impair their performance in traditional educational environment. It helps engage with peers and reduce the frustration levels while taking medical courses.<sup>2,3,6,11,13-25,30</sup> For the teachers/instructors, this approach helps to work closely with the students in the classroom, improve student motivation and attitude, and students' ability to solve open-ended problems, gaining a better understanding of students' difficulties, accommodation of a range of different learning styles during in-class activities, progression of students at different paces and using class time in innovation and critical thinking.<sup>11,26-30</sup>

### CHALLENGES

Of course, as with anything, there are also some challenges to the flipped classroom approach in teaching. Teachers are not all familiar with the methods and technologically challenged to implement flipped learning in their institutions.<sup>9,10,21,26</sup> Students from resource-strained background may not have the ability to possess the computers/tablets and the internet facilities to avail the materials of teaching that the flipped classroom mostly requires.<sup>9,10,21,26</sup> While teaching in a large scale, the development of the flipped classroom needs a multi-disciplinary cooperation learning ecology that the flipped classroom method requires additional skills, provided by photographer, videographer, instructional designers and many more, unlike the traditional classroom method. Moreover, the effectiveness of flipped classroom and active learning is not universal among different courses and different populations of students.<sup>26</sup> Some disappointing results could be attributed to the diversity of the student population or the instructors' inexperience.<sup>26</sup> Last but not the least, the negative attitude of teachers/instructors towards flipped learning is huge challenge, as they are habituated with traditional

teaching method for decades and hardly want to switch.<sup>8,9</sup>

### CONCLUSION

We advocate changes to transform the anatomy classroom from teaching centered to learning centered, which might not come out as great as we imagine in all situations. Still, we would like to argue that the principles and skills we use to guide our work in quest of science in experiments in dissection rooms or histology laboratories are the same ones needed to guide our activities in the classrooms, as described in the book titled 'Scientific Teaching'.<sup>31,32</sup> Human anatomy is a gateway into any of the healthcare careers in all over the country. It is very important for students to acquire required knowledge, skills and confidence in anatomy so that they can advance in their studies, succeed in the professional examinations, and be well-prepared for their future education and careers. Flipped learning helps them gain better insights into that direction. Moreover, faculty members in Anatomy also need to consider under which condition such flipped classroom approach could be the most effective strategy in teaching and learning.

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