

## Evaluating Effectiveness of E-learning Module in Anatomy for First Year MBBS Students

Mangesh Lone<sup>1</sup>, Motiram Khandode<sup>2</sup>, Anshudeep Dodake<sup>3</sup>, Megha Khandode<sup>4</sup>

<sup>1</sup>Additional Associate Professor Department of Anatomy Lokmanaya Tilak Municipal Medical College and General Hospital Sion Mumbai 400022

<sup>2</sup>Associate Professor Mahatma Gandhi Mission Medical College Nerul 400706

<sup>3</sup>Assistant professor Department of Pharmacology Lokmanaya Tilak Municipal Medical College and General Hospital Sion Mumbai 400022

<sup>4</sup>Associate Professor Department of Biochemistry Lokmanaya Tilak Municipal Medical College and General Hospital Sion Mumbai 400022

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Corresponding author: Dr. Mangesh Lone<sup>1</sup>

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### Abstract

**Background:** The National Medical Commission's Graduate Medical Education Regulations 2018 emphasize self-directed, learner-centric approaches and the adoption of contemporary educational technologies, including e-learning. First-year MBBS Medical students often have limited classroom time for gross anatomy, and e-learning may enhance their understanding through flexible access to structured material. The COVID-19 pandemic further highlighted the need for effective online learning modalities.

**Aim:** To develop and introduce an e-learning module in gross anatomy and evaluate its effectiveness and Medical students' perceptions.

**Materials and Methods:** A prospective interventional study was conducted among 150 first-year MBBS students, among them 119 consented to participate. The anatomy of the heart was divided into two topics: one taught through traditional didactic lecture and the other through an e-learning module uploaded on Google Groups. Both topics were followed by online MCQ (Multiple Choice Question) assessments. The second topic was later taught again via didactic lecture, after which student perceptions of e-learning were collected through an online feedback questionnaire. Quantitative and qualitative data were analysed using Microsoft Excel.

**Results:** A total of 47 students completed both MCQ assessments. Mean scores for Topic 1 (traditional lecture) and Topic 2 (e-learning) were  $8.60 \pm 3.08$  and  $8.57 \pm 3.70$ , respectively ( $p = 0.97$ ), indicating no significant difference in performance of the two groups as  $p$  is  $> 0.05$ . More than 80% of students found the e-learning module easy to access, navigate, and useful in enhancing understanding. Over 50% felt it promoted interaction, could replace some lectures, and should be continued in future teaching. However, 22% preferred traditional learning methods.

**Conclusion:** Although learning outcomes did not significantly differ between traditional and e-learning methods, student feedback demonstrated high acceptance and satisfaction with the e-learning module. E-learning served as a valuable complement to conventional teaching, supporting its continued integration into the MBBS curriculum

**Keywords:** E-learning; Gross Anatomy; Didactic lecture; First MBBS students; Medical education; Student perception.

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### Introduction

National medical commission in its preamble have proposed Graduate Medical Education Regulations, 2018 where it have given emphasis on self-directed learning and focus upon encouragement of learner centric approaches and adoption of contemporary education technologies which includes E-learning. Ease of access, greater interactivity and learning apart from scheduled teaching hours are some of

the benefits experienced by students/learners in the process of E-learning<sup>1</sup>. First MBBS students have limited timeframe for learning anatomy in the classroom; E-learning will provide them a chance to understand Anatomy in depth by providing organized learning material and availability of facilitator outside college timings. [2,3,4] The COVID 19 pandemic restricted gatherings and

movements of people which posed a great challenge for the medical education [5,6,7,8]. The traditional methods of teaching learning were not possible. The teaching learning process became online.9, [10,11].

**Aims & Objectives**

The aim of the study was to develop and introduce E-learning module in anatomy and to evaluate its effectiveness and perception of students.

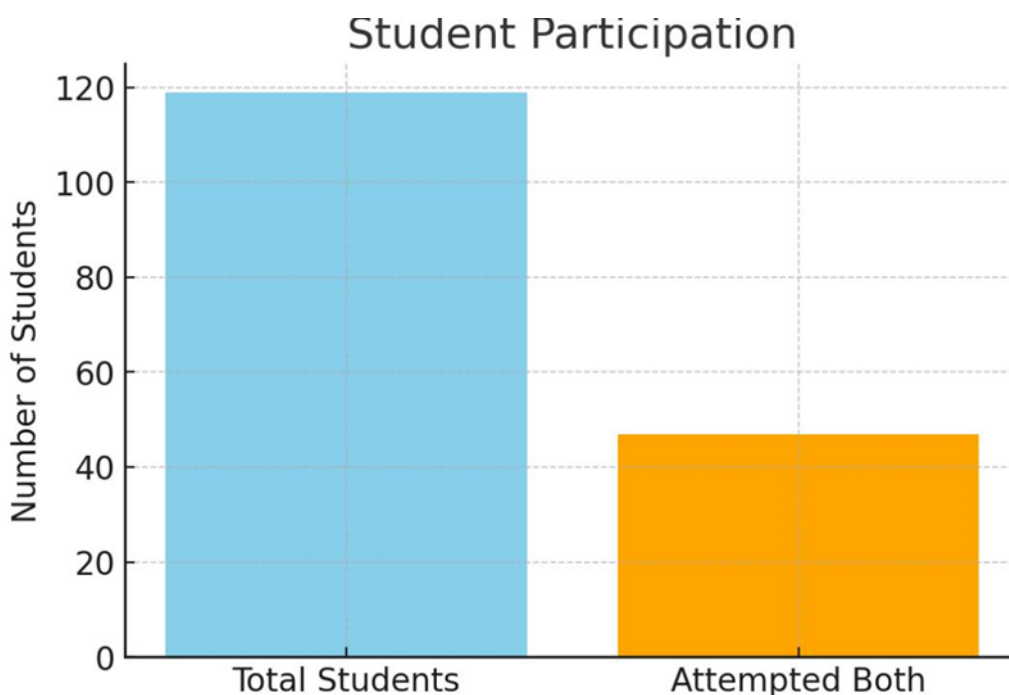
**Methodology**

A prospective interventional study was planned. The project was sent to ethics committee approval.

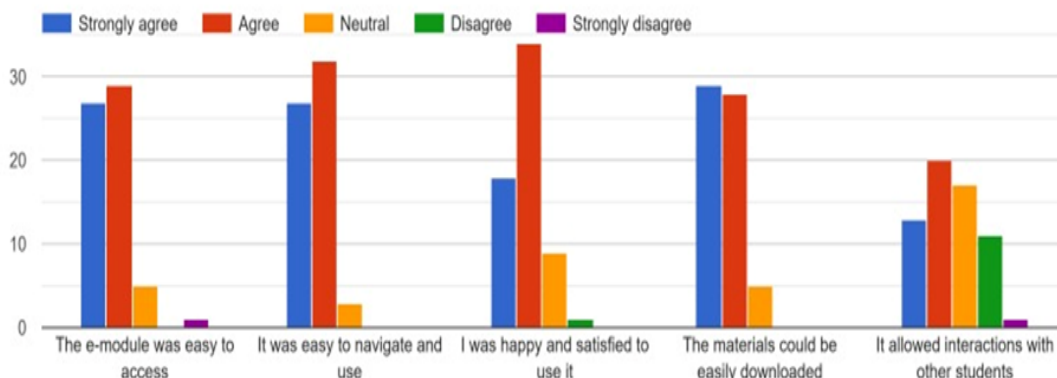
The 150 First MBBS students were informed of the project details. The participation was voluntary. A

total of 119 students consented to participate. The study consisted of module on anatomy of heart divided into two topics. One topic was delivered by traditional didactic lecture followed by online multiple choice questions test (Google forms) and the second topic by e-learning (intervention) where the material was uploaded on Google groups and followed by online multiple choice questions test (Google forms). The second topic then was also covered as traditional didactic lecture at the end of which perceptions of the students were recorded by online feedback questionnaire (Google forms). The statistical analysis was done of the quantitative and qualitative data generated during the study by using EXCEL software.

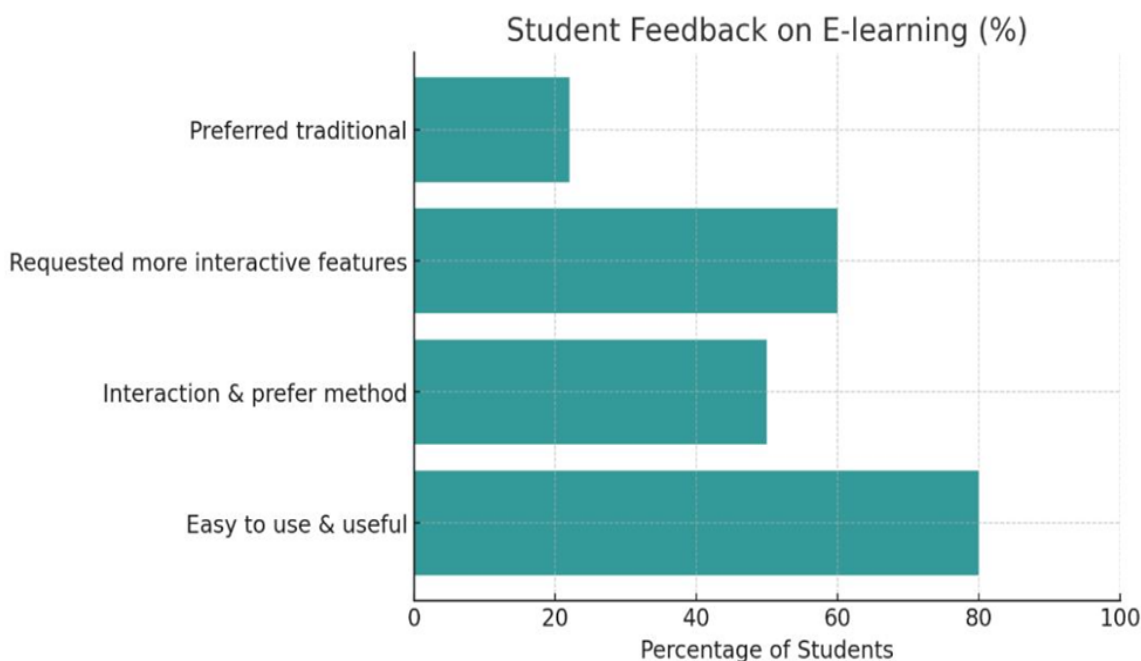
**Observation**



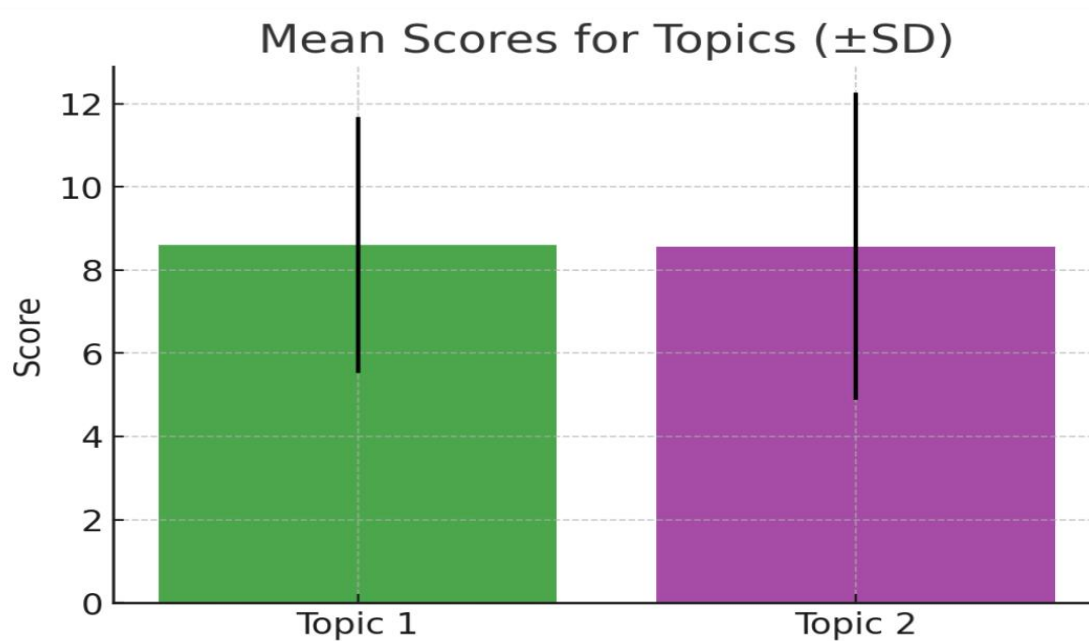
Graph 1: Showing Comparison of Total Students and Those Attempted Both Tasks



Graph 2: Showing Students Perceptions of the E-Module



Graph 3: Showing Student Opinions on E-Learning Features and Preferences



Graph 4: Showing Mean score comparison Topic 1 (Traditional Teaching) and Topic 2 (E-Learning)

**Results**

A total of 47 students out of the 119 attempted the online multiple choice questions for both the topics and were included in the study. The mean of score points for the topics 1 and topic 2 are 8.60 and 8.57 with Standard Deviations of 3.08 and 3.70 respectively. The ‘p’ value is 0.97, indicating no significant difference in performance of the two groups as p value is > 0.05.

More than 80% of the respondents agree that the module was easy to access, navigate, use & download and they were happy to use it and found

the material relevant, appropriate and useful and further their understanding and complemented traditional teaching through didactic lectures. More than 50% students said that it allowed interaction with the teacher and other students; they also felt that they prefer to learn by this method as it could replace some lectures; they also recommended to continue e-learning as a modality of imparting lectures in the future by all the departments of the MBBS course. Many of them also requested for more interactive online platforms and to add more contents in the form of video links, narrations and links to further reading and online exams. A 22%

of respondents preferred traditional method of learning.

### Discussion

The current study aimed to evaluate the effectiveness and student perceptions of an e-learning module integrated into the MBBS curriculum. Out of 119 students, only 47 attempted the multiple-choice assessments for both topics and were thus included in the analysis. The performance scores for Topic 1 (mean = 8.60, SD = 3.08) and Topic 2 (mean = 8.57, SD = 3.70) were remarkably similar, and the p-value of 0.97 indicates that there was no statistically significant difference in student performance between the two topics. This suggests that the content across both topics was uniformly understood, and the platform delivered the material with consistent effectiveness.

From the feedback, more than 80% of students responded positively to various aspects of the e-learning module, including accessibility, ease of navigation, user interface, and relevance of content. This high level of satisfaction indicates that the digital platform was well-designed and user-friendly, which likely contributed to student engagement and learning.

Importantly, a majority (>50%) of students felt that the module fostered interaction with faculty and peers, and many indicated a preference for this method of learning. They believed e-learning could replace some traditional lectures, showing a strong inclination towards adopting technology-enhanced learning as a supplement or partial replacement for didactic methods. This aligns with global trends in medical education where blended learning models are becoming increasingly prevalent due to their flexibility, scalability, and interactive potential.

In addition, students provided constructive suggestions for improvement, including the integration of more interactive elements, such as video lectures, narrated content, links for further reading, and online assessments. These suggestions underscore a growing expectation among learners for multimodal and engaging content, which can enhance knowledge retention and application. Despite the positive feedback, a notable 22% of students still preferred traditional methods of instruction. This highlights the need to adopt a blended learning approach that accommodates diverse learning preferences. Some students may benefit more from face-to-face instruction, particularly in subjects that require hands-on experience or where real-time clarification is essential.

### Comparison with Other Studies

The findings of the present study, which demonstrate a high level of student satisfaction and

acceptance of e-learning modalities, are consistent with trends observed in several studies conducted in medical education settings.

For instance, a study by Ruiz et al. (2006) [12] emphasized the effectiveness of e-learning in medical education, reporting that students found it to be more flexible and engaging compared to traditional classroom-based learning. Similar to our findings, students in their study appreciated the ability to learn at their own pace and access materials conveniently, which likely contributed to the high satisfaction scores observed in both studies.

In another study by Ellaway and Masters (2008) [13], it was found that medical students rated e-learning platforms highly in terms of accessibility, relevance, and integration with traditional content delivery. This mirrors the >80% positive feedback seen in our study regarding ease of use and the complementary nature of the e-module alongside traditional lectures.

A study conducted by Chumley-Jones et al. (2002) [14] further supports our findings. They found that when properly designed, e-learning tools could achieve equivalent or better academic outcomes compared to conventional lectures, particularly when enhanced with multimedia content. This aligns with the feedback from our students requesting more interactive features, such as videos, narrated presentations, and linked resources.

Conversely, the preference for traditional methods expressed by 22% of our participants is also reflected in the literature. For example, McCutcheon et al. (2015) [15], in a review of blended learning in health professions education, found that although most students appreciated online learning, a subset remained more comfortable with face-to-face instruction due to factors such as perceived lack of interaction or difficulty in maintaining motivation. This underscores the need for a blended learning approach, as also supported by George et al. (2014) [16], who concluded that combining online and face-to-face methods yielded the most consistent learning gains across diverse student populations.

Asharani SK et al. (2022) [17], The COVID-19 pandemic led to widespread closure of educational institutions, forcing a rapid shift from conventional face-to-face teaching to online learning platforms such as Google Meet, Zoom, and Microsoft Teams. This questionnaire-based study was conducted among 150 first-year MBBS students at Adichunchanagiri Institute of Medical Sciences, Karnataka, to evaluate their perceptions of online teaching during lockdown. The findings showed that although online classes ensured academic

continuity and safety, students largely preferred traditional classroom teaching due to challenges such as reduced teacher-student interaction, social isolation, and technical issues like poor internet connectivity. The study concludes that while e-learning is a useful alternative in crisis situations, improvements in digital pedagogy and institutional support are essential to enhance learning outcomes and student satisfaction.

Finally, it is worth noting that studies like Cook et al. (2010) [18] have emphasized the importance of instructional design over the mode of delivery. In this context, the comparable performance scores for both topics in our study (with a non-significant p-value of 0.97) further support the idea that the quality and clarity of the material rather than the delivery method alone are critical in determining learning outcomes.

#### Summary:

The results of the current study were in strong agreement with the broader literature, which supports the integration of e-learning in medical education as an effective, accepted by students of the Medical College, and flexible tool. However, consistent with findings from other studies, it also highlights that e-learning may not fully replace traditional methods and that blended learning remains the most inclusive and pedagogically sound approach in Medical students.

**Limitations:** The study did not assess long-term knowledge retention or the impact on clinical skills.

#### Conclusion:

The statistical analysis did not show significant difference in the learning outcomes of the two teaching methods. But the students understood the e-learning better and were satisfied and therefore effect of that found e-learning increased their interest & understanding. So, majority of the students had suggested continuing the e-learning as modality of learning in the future.

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