

How Students Learn: Perspective of Medical Graduates about Teaching-Learning and Academic Performance

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Abstract:

Introduction: This study investigates medical students' perceptions of teaching-learning experiences across ten medical colleges affiliated with the Maharashtra University of Health Sciences (MUHS), focusing on high resource colleges (HRCs) and low resource colleges (LRCs). **Objectives:** To assess the perceived quality of teaching-learning experiences among undergraduate medical students in HRCs and LRCs affiliated with MUHS, and to examine the association between these perceptions, self-reported academic performance, and compliance with teaching schedules. **Methods:** A cross-sectional study was conducted among 1,024 undergraduate students selected from 10 out of 62 MUHS-affiliated medical colleges, using purposive sampling based on resource availability (5 HRCs, 5 LRCs). Data were collected via a validated 24-item questionnaire administered online. The sampling technique was convenience-based, and the response rate was approximately 14.6%. Statistical analysis included Chi-square tests to compare categorical variables. **Results:** Statistically significant differences were observed in compliance with planned teaching schedules and perceived quality of education between HRCs and LRCs ($p < 0.05$). HRC students reported higher prevalence of $>80\%$ self-reported attendance (53.7%) compared to LRC students (38.1%). Students from HRCs reported higher mean scores for perceived quality of education (4.2 ± 0.5) compared to LRCs (3.5 ± 0.7). Both groups favoured hybrid learning methods, but LRC students cited infrastructure deficiencies as barriers. **Conclusions:** The study underscores that resource availability correlates with student perceptions of teaching quality and schedule adherence.

Keywords: Academic Performance, Learning, Medical Graduates, Medical Students, Teaching

Introduction:

The medical education landscape in India is witnessing revolution with changing roles of teachers and learners, stakeholder expectations, community needs and advancing educational technologies. In Competency Based Medical Education (CBME), the

outcome in terms of Competent Indian Medical Graduate (IMG) is explicitly defined with the mandatory certifiable skills and outcomes.^[1] Students' academic performance is one of the most important aspects of assessing how well the curriculum is being delivered. Medical students are stakeholders who participate first-

Quick Response Code	Access this article online	How to cite this article :
	Website : www.healthlinejournal.org	Dhakne-Palwe S, Kadu S, Baxi G, Kaushik S, Patil M, Kanitkar M. How Students Learn: Perspective of Medical Graduates About Teaching-Learning and Academic Performance. Healthline. 2025;16(2): 84-91
	DOI : 10.51957/Healthline_698_2025	

Received : 20-02-2025

Accepted : 28-05-2025

Published : 30-06-2025

hand in the instruction provided by faculty. They experience first-hand how the process of learning is taking place. As a result, using student perceptions to evaluate the learning process can provide important information for evaluating academic processes.^[2] The feedback and feed-forward interplay has a pivotal role in shaping the curriculum delivery.

Assessing the learning process by student perception can give valuable input to predict the academic achievement. Faculty's capacity and integrated modules are the most influential factors in medical students' academic performance, with learning experience being a key factor.^[3] Medical students' opinions of instruction and training provide a solid foundation for improving and modifying medical education.^[4] In India, medical education faces challenges including shortages of adequately trained faculty and issues with preparedness, as highlighted in a study conducted by Ananthakrishnan N.^[5] The NITI Aayog, Govt. of India report 2023 by SahaManthran Pvt. Ltd. highlights challenges in faculty recruitment and preparedness in Indian medical colleges, emphasizing the need for systemic improvements.^[6]

A previous study conducted by Hira R et al^[7] in 2009 highlighted that medical students in Maharashtra viewed the medical education system as stagnant. Satisfaction level of student respondents for quality of teaching was 37.8%, while 92% students stated that the fundamental problem was the inability of the system to attract good, quality teachers. The reasons stated were low salaries, low level of job satisfaction, high level of bureaucracy, and high workload.^[7]

Alongside the National Medical Commission, the role of health sciences universities is crucial in closely monitoring the availability of teaching learning resources, infrastructure, qualified and trained faculty, to ensure an effective and meaningful curricular delivery. The Maharashtra University of Health Sciences, Nashik (MUHS) oversees the educational standards of over 600 health sciences institutions, including around 62 medical colleges in the state of Maharashtra. For example, regular inspections of affiliated colleges are conducted at medical colleges, to ensure that the minimum standard

regulation with respect to teaching learning activities, faculty availability, resources and infrastructure are readily available at colleges.^[8] Robust assessment processes including blueprinting, online question paper setting and assessment have been introduced by MUHS to ensure transparency and efficiency of results.^[9,10]

Participating in faculty development programs has been made mandatory by the NMC as well as MUHS for all medical teachers. It is necessary to explore whether these policies have made any impact on teaching and learning at grass root level. Therefore, the present study was carried out primarily to assess the perceived quality of teaching-learning experiences among undergraduate medical students in High Resource Colleges (HRCs) and Low Resource Colleges (LRCs) affiliated with MUHS and a secondary objective to examine the association between these perceptions, self-reported academic performance, and compliance with teaching schedules.

Methods:

The present study was conducted among 10 affiliated medical colleges of MUHS, Nashik during November 2024- January 2025. Out of all affiliated medical colleges of MUHS, 5 colleges which fulfil the criteria for the faculty availability and teaching learning resources perfectly as per the National Medical Commissions Minimum Standard Requirements^[11] based on the routine inspection records of MUHS were included as the high resource colleges and 5 lowest performers as per the MSR were included as the low resource colleges. Resources and infrastructure availability at the medical colleges is a dynamic process. The classification as HRCs or LRCs was done based on the prevailing recent inspection reports. The data on students performance in the final University exams from these 10 identified colleges was collected from examination department of MUHS. Ethics committee approval was obtained for the present study (MUHS/EC/58/2024 dated 22/10/2024) based on the location of the investigators team. A questionnaire exploring the perceptions of medical students and the actual practices being followed at colleges was created and peer-validated by experts who have completed the Advanced Course in Medical Education, (ACME) or the

FAIMER Fellowship. The Google form consisted of 24 closed and open-ended questions which were to be rated on a 5-point Likert scale. Participation of students was voluntary. Informed consent was collected before conduction of the study and anonymity of students maintained. Questions were based on timetable, communication and compliance to subject-wise teaching learning schedule, student attendance, preferred TL methods and implementation of various elements of competency based medical education (CBME).

The student general secretaries of the above 10 colleges were contacted and a primary zoom meeting was conducted with them to inform them regarding the purpose of the survey. The identity of the respondents was not collected to ensure that genuine responses are received. Through these student general secretaries, the

questionnaire was circulated as a Google form among all undergraduate students of the identified 10 colleges. Data collected was analysed using appropriate statistical methods.

Results:

In the present exploratory study, 1024 students responded out of an estimated 7000 undergraduate students across the ten selected colleges. The response rate was low possibly due to the voluntary nature of the participation. Amongst these, 554 responses were received from 5 High Resource Colleges (HRCs) (n1= 3800 students, response rate = 14.58 %) and 470 responses were received from 5 Low Resource Colleges (LRCs) (n2= 3200 students, response rate = 14.69 %). The Median NEET rank of the respondents from HRCs was 10,091 and that of LRCs was 38,200.

Figure 1: Perceived Reasons for Non-compliance to Teaching Learning Schedules by students (n = 1024)

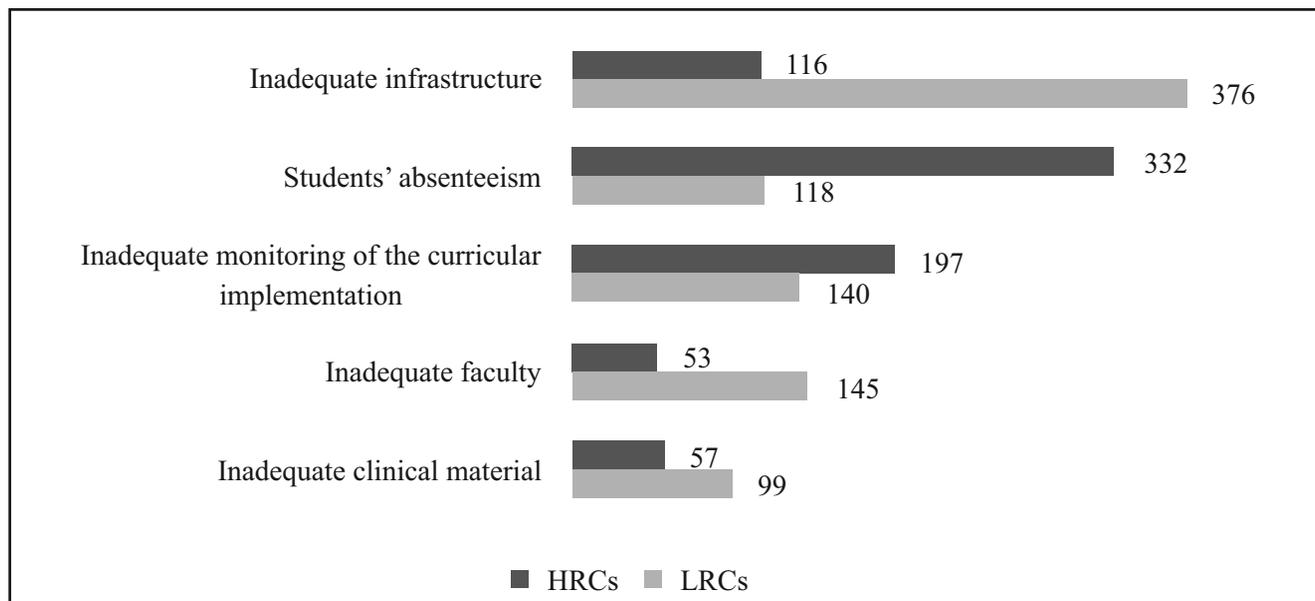


Table 1: Distributions of the LRCs and HRCs students according to preferred mode of learning for theoretical concepts (n = 1024)

Preferred mode of learning for theoretical concepts	LRCs (%) n = 470	HRCs (%) n = 554	Chi-square test
Hybrid	285 (60.54%)	395 (71.28%)	Chi Square = 13.0 p=0.0015
Offline	93 (19.82%)	82 (14.89%)	
Online	92 (19.64%)	77 (13.83%)	
Total	470	554	

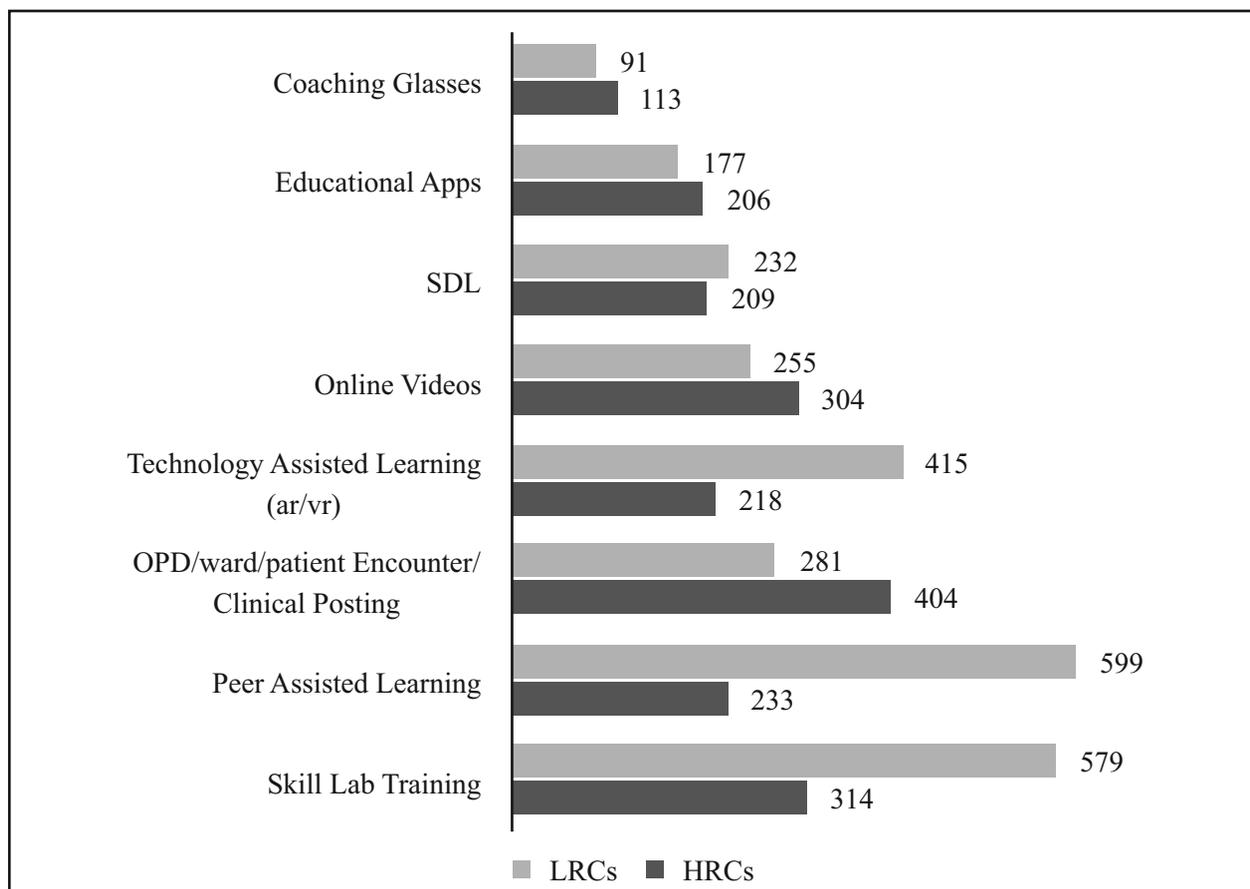
A total of 404 (72.92%) of HRC students and 333 (70.85%) LRC students stated that the annual academic calendar was displayed on the college website. Regarding compliance to TL schedule, students reported maximum compliance to planned TL schedules for the Pre-clinical subjects, Community Medicine, Pharmacology, Forensic Medicine and Toxicology, Pathology, Microbiology followed by the clinical subjects. The top reasons stated by the students for non-compliance to TL schedule (Fig. 1) were inadequate infrastructure, faculty availability and limited clinical resources for the LRCs and student absenteeism for the HRCs. This was contrary to the self-reported attendance of >80% by the students of HRCs. Information on students self-reported attendance was solicited for the past 6 months of the data collection. Around 53.69% students of HRCs self-reported their approximate attendance > 80% as compared to 38.09% of the LRCs students (Standard Error of difference = 3.128, Z = 4.987, p<0.0001).

Preferred mode of Teaching-Learning

Upon enquiry on the preferred mode of learning for theoretical concepts- between online/ offline/ hybrid mode, maximum students from LRCs and HRCs preferred a hybrid mode. The proportion of students opting for hybrid mode from HRCs were significantly higher than those from the LRCs. (Table 1). The online media utilized by students included online lectures/videos -99 (17.87%) in the HRCs and 76 (16.17%) in the LRCs, Educational apps -13 (2.35%) in HRCs and 9 (1.62%) in LRCs. Augmented reality visuals 5 (0.9%) in HRCs and 4 (0.85%) in LRCs

Regarding the most interesting TL method that students would like to learn from, there was a significant difference in the responses of students from HRCs and LRCs. Students from the LRCs stated that they would like to learn by skill lab training, peer assisted learning and technology assisted learning AR/VR. While the students from HRCs stated clinical teaching encounters

Figure 2: Teaching Learning method which interests students the most (n = 1024)



like OPD, ward, clinical posting, followed by skill lab training and online videos as their preferred TL methods. (Figure 2). (Chi Square = 252.5, p=0.000).

Overall quality of teaching and learning

The students were asked to rate the overall quality of teaching and learning at their respective institute, on an ordinal scale from poor to excellent.

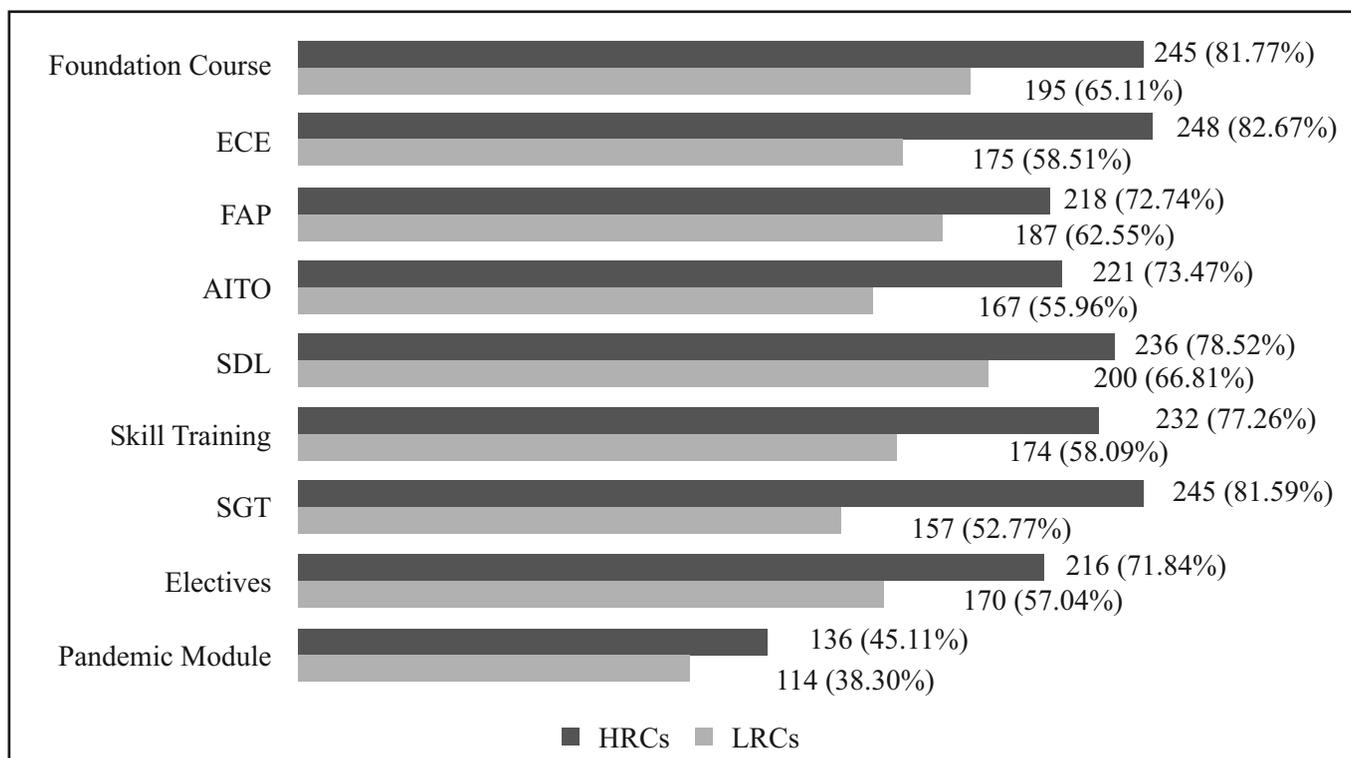
Around 312 (56.22%) of the HRCs students reported the TL quality as Excellent or Very good as compared to 186 (20.64%) of the LRCs. Average or Poor TL quality was reported by 378 (42.13%) students of the LRCs and 87 (15.68%) students of the HRCs. (Chi Square = 154.8029, p = 0.0000)

Perceived quality of implementation of CBME Components were assessed. On a 5-point Likert scale > 75% of HRCs students responded, Strongly agree and Agree for elements like Foundation course, early clinical exposure, self-directed learning, skill training and Small group teaching. The difference between the responses of

HRC and LRC students was not statistically significant, (Chi-square=6.9014, p=0.5473) The most adverse response regarding the CBME implementation was pertaining to the pandemic module.

Students were asked regarding the improvements to further improve the teaching learning environment of their institute. For students from the LRCs, >2/3rd inputs were pertaining to improvements needed in the Infrastructure such as TL facilities, library, skill lab, practical labs, availability of instruments, equipment, cadavers, etc. Few students suggested that the practical classes should be time-relevant; e.g., Sahlis Hb estimation/ manual cell count should be replaced with current methods. The suggestions from the students of the HRCs were- Lecture/ Theory component should be conducted online, more time should be spared for self-study, SGT sessions should be more than lectures, guidance for SDL should be provided. Skill lab training, AR/ VR, Research exposure were also suggested by the HRC students.

Figure 3: Perceived quality implementation of CBME components (n = 1024)
 (% of students who 'Strongly agree + Agree')



*ECE: Early Clinical Exposure, FAP: Family Adoption Program, AITO: Alignment and Integration Topics, SDL: Self-Directed Learning, SGT: Small Group Teaching

Discussion:

This study explored the perceptions of medical students regarding their teaching-learning experiences, and comparing those from high resource colleges (HRCs) and low-resource colleges (LRCs). The data, gathered from 1,024 respondents across 10 medical colleges, shed light on differences in compliance with teaching-learning (TL) schedules, preferred teaching methods, attendance, and the overall quality of education. These findings provide valuable insights into how institutional factors and students preferences impact academic outcomes.

Factors Affecting Compliance with Teaching-Learning Schedules

Compliance with planned TL schedules varied significantly between pre-clinical, para-clinical, and clinical departments. Pre-clinical subjects demonstrated the highest compliance rates, which may be due to more structured and predictable course content. However, reasons for non-compliance differed between HRCs and LRCs. LRCs cited inadequate infrastructure, faculty, and clinical material as major barriers, highlighting disparities in resources between institutions. These findings resonate with a study by Hamdy et al^[13], which emphasized the role of adequate infrastructure in maintaining consistency in academic activities. Conversely, students in HRCs felt that student absenteeism is a significant issue. This Suggests that despite resource availability, student engagement remains a challenge in these institutions.

Attendance Patterns and Self-reported Data

A noteworthy discrepancy was observed between self-reported attendance and actual compliance to TL schedules. For instance, 53.69% of students from HRCs reported attendance levels above 80%, compared to 38.09% in LRCs. This difference may reflect varying levels of motivation and academic discipline between the groups. Previous studies have similarly noted that higher-performing students tend to exhibit more regular attendance, which positively influences academic success.^[14] This indicates that promoting consistent class

attendance could be an area of focus for enhancing performance, especially in LRCs.

Preferred Teaching-Learning Methods

Students from both HRCs and LRCs expressed a preference for hybrid learning methods for theoretical concepts, with 71.28% of HRC students and 60.54% of LRC students favouring this approach. Hybrid methods, which combine online and in-person instruction, have been shown to support diverse learning styles and enhance engagement.^[15]

For learning complex concepts, students across both groups favoured online videos, group study, self-directed learning (SDL), and hands-on training. The popularity of interactive and visual aids like animations, 3D images, and augmented reality (AR) suggests a shift towards more immersive learning experiences. Such preferences mirror the findings of a previous which reported that technology-enhanced learning tools significantly aid in understanding difficult medical concepts.^[16] Medical schools, especially LRCs, could benefit from integrating such resources to improve students' comprehension and engagement.

Quality of Teaching-Learning Environment

A stark difference was noted in the perceived quality of the TL environment between HRCs and LRCs. While 56.22% of HRC students rated their TL quality as excellent or very good, only 20.64% of LRC students did so. This difference underscores the role of institutional support and resource allocation in shaping students' academic experiences. The high proportion of LRC students reporting average or poor quality (42.13%) points to gaps in teaching methods and infrastructure. These findings are consistent with studies by Haris et al^[12] and Bauzon et al^[17], which highlighted how disparities in educational resources can influence student satisfaction and performance.

The suggestions from LRC students predominantly focused on improving infrastructure, such as better TL facilities, libraries, and practical labs. On the other hand, HRC students emphasized the need for more self-directed and small-group learning sessions (SGT) and

guidance in SDL. This variation in feedback suggests that while LPCs need to address basic resource challenges, HRCs can focus on enhancing existing learning methods for greater student autonomy and engagement.

Conclusions:

This study provides a comprehensive view of the perceptions of medical students regarding their teaching-learning experiences, highlighting differences between high- and low-resources colleges. Students in high-resource colleges (HRCs) reported better teaching-learning (TL) experiences, higher attendance, and more compliance with TL schedules compared to low-resource colleges (LRCs). This underscores the role of infrastructure, faculty availability, and institutional resources in shaping positive academic experiences. Both HRC and LRC students preferred hybrid modes of learning. Resource disparities have a profound effect on medical students' academic experiences, shaping everything from their perceptions of teaching quality to their ability to comply with schedules.

Limitations and Future Research:

This study's findings should be interpreted in light of its limitations. The study was conducted among a limited number of colleges affiliated to the MUHS. The study used a convenience sampling method, which could limit the representativeness of the sample population and introduce selection bias. Certain groups of students may have been overrepresented or underrepresented owing to voluntary participation. Low response rate further challenges the generalizability of the results.

Self-reported data may have introduced biases where students might have chosen responses, they deemed favourable rather than their genuine opinions. Factors like students prior exposure to CBME, institutional teaching methodologies, variability in the NEET ranks at admission, parallel means of learning like online or coaching classes, presence versus absence of post-graduate residents assisting in undergraduate teaching, availability of clinical material could be potential sources of bias.

Future research could include a broader range of institutions to assess regional variations in student perceptions. Inclusion of faculty perceptions may be included further. Additionally, longitudinal studies could explore the long-term impact of specific interventions aimed at improving academic performance in different institutional contexts.

Declaration:

Funding: Nil

Conflict of Interest: Nil

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