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Perspectives of Faculty and Students on Technology-Enhanced Learning at a Private Medical College: Implementation, Benefits, Challenges, and Factors Influencing Adoption of and Engagement with Lecturio in Medical and Nursing Education

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ABSTRACT

As technology-enhanced learning (TEL) has become essential in medical and health profession education, Batterjee Medical College implemented the Lecturio platform across its medicine and nursing programmes to enhance teaching effectiveness, student engagement, and learning flexibility. Limited evidence exists on how faculty and students adopt such platforms and discipline-specific differences regarding digital readiness and engagement in Middle Eastern institutions. This study evaluated the implementation of TEL, focusing on its impact, benefits, challenges, and factors influencing adoption and engagement. A cross-sectional survey and supplementary qualitative feedback were conducted among 200 students and 26 faculty members. The quantitative data were analysed using descriptive and inferential statistics; the qualitative feedback was examined thematically. Faculty reported high confidence in using Lecturio and valued its ease of use, with a rating of 4.1 out of 5; 92% of medicine and 100% of nursing faculty supported the comprehensive content, particularly the question bank (81%) and video lectures (65%). Students, especially those in the medicine programme with a top-performing cumulative grade point average (CGPA) of 4–5, favoured hybrid or online learning models and recognised Lecturio's role in supporting clinical readiness and independent study ($p < 0.001$). The qualitative data revealed challenges, including limited alignment with existing curricula and workload concerns. Nursing students, despite higher usage, had greater difficulty adapting due to lower digital readiness. Faculty and students recommended improved content mapping, increased interactivity, and targeted training. Addressing curriculum alignment and technical gaps and providing structured faculty and student onboarding will maximise TEL's long-term impact on health professions education.

Keywords: *Technology-enhanced learning, Digital platforms, Medical education, Nursing education, Curriculum alignment*

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INTRODUCTION

Technology-enhanced learning (TEL) has become an integral component of modern medical and health profession education, aiming to enhance engagement, accessibility, and personalised learning. However, the challenges of student engagement with TEL remain uncertain. Moreover, a decline in student engagement has been observed in medical education, with decreasing attendance in both undergraduate and continuing education programmes (1). Even when students attend, they often appear disengaged, distracted, or minimally interactive regardless of the teaching method used. This decline has been attributed to multiple factors, including the impersonal nature of large lectures, increased reliance on digital resources, generational differences in learning preferences, and evolving attitudes towards formal education and authority. Traditional engagement strategies may no longer be effective, necessitating the exploration of alternative approaches, such as TEL, to optimise student participation and learning outcomes (2, 3). In parallel, according to self-determination theory, if the learning environment supports competence, autonomy, and engagement, TEL should promote these aspects by addressing disengagement (4). The balance between cognition, teaching, and social presence is important for TEL engagement (5). Furthermore, according to the community of enquiry framework, disengagement remains in medical education despite various efforts (6). Interpersonal contact and active participation result in meaningful engagement, according to constructivist learning theory, and TEL was created to support these methods (7).

Digital platforms offer interactive and personalised learning experiences that cater to diverse student needs and provide greater flexibility in knowledge acquisition (3, 8). The shift towards digital education is part of a broader transformation in higher education, driven by technological advancements, an increasingly diverse student body, rising workforce demands, and the need for lifelong learning opportunities (9). Despite its advantages, online learning remains an evolving field in medical education, with limited research on its long-term impact on student engagement and academic performance (3). Studies have shown that first-year medical students demonstrate varying levels of emotional, cognitive, and behavioural engagement in online learning, with some struggling to actively participate in discussion forums due to the structured nature of written communication (10, 11). While online platforms offer flexibility, concerns persist regarding student isolation and reduced interaction with peers and faculty, raising the challenge of integrating digital resources while maintaining meaningful educational and social engagement (3).

In alignment with its commitment to progressive education and digital transformation, Batterjee Medical College (BMC) introduced Lecturio, a digital learning platform, in its schools of medicine and nursing in autumn 2024 to enhance course delivery and student engagement. Lecturio was selected for its comprehensive medical and nursing curriculum, integrated question bank, and analytics features that align with BMC's needs. These extensive features, combined with prior successful use in medical education, made it the preferred choice.

Previous research suggests that the successful integration of digital resources in medical education can improve student commitment and knowledge retention (12, 13). Significant growth has been observed in the adoption of TEL platforms in health education globally, whereas limited evidence exists on how these platforms are adopted by faculty and students, as well as on discipline-specific differences in digital readiness and engagement in Middle Eastern institutions. To identify how faculty and students accept and adopt TEL platforms, the current study was directed by the Technology Acceptance Model (TAM), a

broadly recognised theoretical framework for evaluating technology use in education (14), along with institutional support and alignment with curricular goals, which play a significant role in the sustained adoption of such platforms (15). TAM theorises that acceptance of a technology is principally influenced by its perceived usefulness and ease of use, which shape the user's attitude towards continued use and acceptance. In this study, Lecturio's adoption was examined through these TAM constructs. This model also helps interpret engagement differences across disciplines and by educational level in terms of digital readiness (16). By conducting the evaluation within the TAM framework, this study aimed to identify key factors influencing the successful integration of Lecturio into health professions education and to recommend future implementation strategies. The study also aimed to identify factors influencing adoption, engagement, and learning outcomes, and to provide recommendations to optimise TEL integration in medical and nursing education. By examining the perspectives of both educators and learners, the findings can inform strategies to improve digital platform utilisation and enhance teaching and learning experiences at BMC and similar institutions.

METHODS

Study Design

This cross-sectional survey design, with supplementary qualitative feedback, was conducted at BMC to assess the implementation of the Lecturio digital learning platform in the schools of medicine and nursing after its first semester of adoption. Open-ended responses were collected as supplementary qualitative feedback to further enrich the quantitative findings without a formal qualitative design or analysis. This approach was selected to evaluate faculty and student perceptions, engagement levels, and platform effectiveness. The TAM and a validated framework guided the data collection and analysis (17).

Participant Selection and Description

The study included 26 faculty members (13 medicine, 13 nursing) and 200 students (129 medicine, 71 nursing) from BMC. To ensure a diverse sample, all faculty members who had used Lecturio in their teaching were invited to participate, with no restrictions based on academic rank or experience. The student survey targeted cohorts in which Lecturio had been integrated: first- and third-year nursing students, and fourth- and fifth-year medicine students. A purposive sampling strategy with voluntary participation was employed. Participants were recruited through institutional emails and class announcements without randomisation. Participation was voluntary and based on eligibility criteria that included active enrolment or employment at BMC, direct use of Lecturio, and provision of informed consent. Individuals who had not used the platform for at least four consecutive weeks prior to the survey were excluded.

Data Collection Instruments (Questionnaire Validation) and Procedure

Data were collected using a structured, validated questionnaire adapted from the TAM and prior TEL studies. Subject matter experts reviewed the questionnaire to ensure content validity, subject relevance, clarity, and alignment with the TAM constructs. Based on their feedback, minor corrections were made to improve the phrasing, and the questionnaire was distributed electronically via Lecturio's platform in January 2025.

The instrument included both quantitative (Likert-scale and multiple-choice) and qualitative (open-ended) items. The questions related to frequency of use, navigation, and interaction with Lecturio's key features, as well as perceived effectiveness, satisfaction, suggested improvements, and reported challenges (e.g., technical issues, curriculum alignment, and workload).

To establish the reliability and internal consistency of the questionnaire, Cronbach's alpha was calculated for perceived usefulness and perceived ease of use. These scales demonstrated strong reliability ($\alpha > 0.8$), indicating acceptable psychometric properties and supporting the credibility of the findings.

Statistical Analysis

The data were analysed using IBM SPSS Statistics v.26 (IBM Corp., Armonk, NY, USA). Descriptive statistics, including means, standard deviations, and percentages, were used to characterise the platform's usage and satisfaction patterns. Chi-square tests (χ^2) were conducted to examine differences between categorical variables, particularly students' preferences for online versus traditional learning. Independent-samples t-tests were performed to compare engagement levels between medical and nursing students. Levene's test for equality of variances was conducted before running t-tests to verify assumptions of normality and homogeneity of variance. Significance thresholds were applied as follows: $p \leq 0.05$ (significant), $p \leq 0.01$ (highly significant), $p \leq 0.001$ (very highly significant), and $p \leq 0.0001$ (extremely significant) (18).

Analysis of Open-Ended Responses

Open-ended responses were analysed using descriptive statistics to identify key trends, concerns, and suggestions regarding Lecturio's functionality. Recurring themes, including technical issues, curriculum alignment challenges, and workload concerns, were systematically coded to supplement the numerical findings. This study complied with the principles of the Declaration of Helsinki (19).

RESULTS

Faculty Survey

The faculty survey received responses from 26 faculty members (13 medicine and 13 nursing), representing a range of academic ranks and specialities. Over one-third (38.5%) had completed their highest degree more than 20 years ago, and a similar proportion had 10–15 years of teaching experience (19.2% had over 20 years). Faculty generally embraced technology in teaching and reported strong confidence in using Lecturio and other digital tools. The average self-rated score for Lecturio's ease of use and usefulness was 4.1 out of 5. Most faculty used Lecturio 1–2 days per week, primarily to access the question bank (81%) and video lectures (65%). While faculty described themselves as technically adept and motivated (with adequate institutional support for using technology), a few noted difficulties in troubleshooting technical issues or were unfamiliar with certain platform features.

Faculty recognised Lecturio's educational benefits but also noted several challenges. Key issues included limited alignment of Lecturio content with the existing curriculum, insufficient analytics to monitor student performance, and a need for better mapping of platform content to course learning objectives. Many faculty members advocated adding more interactive components to the platform to foster greater student engagement. They also suggested specific improvements: nearly all nursing faculty (and most medical faculty) wanted additional content tailored to continuing professional development. Respondents across both programmes emphasised the importance of maintaining student access to the platform beyond individual courses. Nursing faculty expressed a higher demand for improved curriculum alignment features than their medical counterparts. Despite these challenges, overall enthusiasm for Lecturio was high, with 92% of medicine faculty and 100% of nursing faculty recommending that it continue to be used in their teaching.

Student Survey

A total of 200 students participated in the survey (129 from medicine and 71 from nursing). These respondents were drawn from cohorts in which Lecturio had been introduced as a learning tool (fourth- and fifth-year medicine students and first- and third-year nursing students). Approximately 68% of the student respondents were female, reflecting the college's overall gender distribution. The proportion of female students was slightly higher in the 2024–2025 cohort (69.3%) than in the 2023–2024 cohort (67.3%). Academically, most students had a cumulative grade point average (CGPA) above 3.0 on a 5.0 scale. The CGPA distribution was slightly higher in the 2024–2025 cohort (42.9% in the 3.0–4.0 range) compared to approximately 42% of students in the same range in the 2023–2024 cohort. There was a statistically significant difference in CGPA distribution between the two academic-year cohorts, driven by an increase in the proportion of top-performing students with CGPAs between 4.0 and 5.0 in the 2024–2025 cohort ($p < 0.001$), while the lower-CGPA groups remained similar (Table 1).

Table 1: Student survey respondents (medicine vs nursing programmes)

Category	Medicine (n = 129)	Nursing (n = 71)	Total
Female (%)	~66%	~72%	68% (overall)
Academic level (programme)	fourth- and fifth- year	first- and third- year	–
Mean cumulative GPA (CGPA)	3.2	3.0	–

Note: Medicine respondents were drawn from fourth- and fifth-year classes, nursing respondents from first- and third-year classes. The female percentage is an approximation, illustrating that most respondents in both groups were female. Mean CGPA is an approximate average self-reported CGPA for each subgroup (on a 5.0 scale).

Clear differences emerged in learning preferences and digital readiness between medicine and nursing students. Medical students predominantly preferred hybrid (approximately 39%) or fully online (36%) learning formats, whereas nearly half of nursing students (49.3%) favoured traditional face-to-face instruction – a statistically significant difference ($\chi^2 = 12.34$, $p = 0.0021$). Consistent with these preferences, prior exposure to online learning was much higher among medical students (91.5% had prior digital learning experience) than among nursing students (35.2%), indicating a disparity in digital readiness between the two groups.

Student engagement with the Lecturio platform varied in frequency and duration. About one-third of all students (32%) reported using Lecturio several times per week, while 14% used it nearly every day. Session lengths ranged from brief to extensive: roughly one-quarter (24.5%) of students spent under 30 minutes per session, while 17.5% spent over

2 hours; the largest group (36.5%) spent 30–60 minutes per session. Notably, nursing students tended to use Lecturio more often and for longer periods than their medicine counterparts. For example, 40.8% of nursing students reported using Lecturio either frequently or daily, compared with about 27% of medicine students (frequently) and only 5.4% (daily). Similarly, 40.8% of nursing students typically spent more than two hours per session on the platform, whereas only 4.7% of medicine students did so. These patterns suggest that nursing students may be investing more time in the platform and could benefit from additional support to maximise the efficiency and effectiveness of their study time with Lecturio (Tables 2 and 3).

Table 2: Key group comparisons

Comparison	Statistical test and value	p-value	Significance
Learning preference (online vs in-person): medical vs nursing students	$\chi^2 = 12.34$	$p = 0.002$	Significant
High academic performance (CGPA 4.0–5.0): 2024–2025 vs 2023–2024 cohort	$t = -4.307$	$p < 0.0001$	Extremely significant
Low academic performance (CGPA < 2.0): 2024–2025 vs 2023–2024	Not specified	$p > 0.4$	Not significant
Gender differences in engagement: male vs female students	Not specified	$p > 0.5$	Not significant

Note: This table summarises the significant differences observed between the groups. Cohort refers to the academic year groups of students (2024–2025 vs 2023–2024), as defined in this study. Detailed statistical results for all comparisons are available upon request. The above includes the most relevant findings: a significant association between programme (medicine/nursing) and preferred learning modality, and significant differences in the distribution of academic performance between the two student cohorts.

Table 3: Frequency and duration of Lecturio usage

Frequency of use of Lecturio	Medicine (n = 129)	Nursing (n = 71)	Total
Never (did not use the platform)	5 (3.9)	5 (7.0)	10 (5.0)
Rarely (1–3 times in the entire month)	40 (31.0)	3 (4.2)	43 (21.5)
Occasionally (1–2 days/week)	42 (32.6)	13 (18.3)	55 (27.5)
Several times a week (3–5 days/week)	35 (27.1)	29 (40.8)	64 (32.0)
Daily (6–7 days/week)	7 (5.4)	21 (29.6)	28 (14.0)
Time per session			
< 30 minutes	41 (31.8)	8 (11.3)	49 (24.5)
30–60 minutes	55 (42.6)	18 (25.4)	73 (36.5)
1–2 hours	27 (20.9)	16 (22.5)	43 (21.5)
> 2 hours	6 (4.7)	29 (40.8)	35 (17.5)

Students' perceptions of Lecturio's impact on learning were generally positive. Most regarded Lecturio as an essential aid for their studies, valuing its efficiency and its contributions to critical thinking, clinical knowledge, and practical readiness. Medical students tended to give the platform higher effectiveness ratings: they more frequently reported that Lecturio improved their readiness for exams and clinical practice, saved them time, and supported their learning. In contrast, some nursing students struggled to adapt to the platform, which may reflect their limited prior experience with online learning. In addition, some students (across both programmes) felt overwhelmed by the additional workload introduced by Lecturio assignments. Connectivity issues and occasional synchronisation errors were also reported, highlighting the technical barriers that affected the student experience.

Overall, both faculty and students were supportive of integrating the Lecturio platform into the curriculum; however, their feedback underscored the need for refinements to enhance its effectiveness. Addressing misalignment with curricula, balancing platform-related workload, and improving technical support and training were recommended to further improve user satisfaction. Participants suggested that revising the scope of assignments, refining curriculum mapping, and providing additional training or onboarding resources (such as targeted orientation videos for different user groups) would help optimise the Lecturio experience for educators and learners.

The findings show that the adoption of Lecturio was influenced by various factors, such as perceived usefulness, ease of use, prior digital experience, and institutional support. Faculty and students clearly outlined the benefits, including improved engagement, clinical preparedness, and study efficiency, along with the barriers, namely curriculum misalignment and workload concerns.

Discipline-Specific Differences

Medical students demonstrated greater adaptability to hybrid and online learning formats, while nursing students expressed a stronger preference for face-to-face instruction (Table 4). These differences were reflected in the statistically significant association between academic year and learning preferences. Furthermore, variations in CGPA were evident, with a significant difference in the 2.0–4.0 range ($t = -2.108$, $p = 0.035$) and an even stronger association among high-achieving students in the 4.0–5.0 range ($t = -4.307$, $p < 0.0001$). These findings suggest a potential link between academic performance and digital learning engagement, reinforcing the need to tailor TEL approaches to students' backgrounds and academic levels.

Table 4: Online teaching experience and teaching mode

Description	Medicine	Nursing	Total
Primary mode of teaching			
Hybrid	7	6	13
Traditional in-person	6	7	13
Previous experience with digital platforms			
No	1	5	6
Yes	12	8	20

DISCUSSION

Overview and Alignment with the Technology Acceptance Model

This study focused on understanding the impact, benefits, challenges, and adoption factors of Lecturio. The findings showed that Lecturio was well received, and its effectiveness depended on user readiness, platform usability, and curricular integration. This study focused on medicine and nursing programmes in relation to the core elements of TAM. In this regard, the study's findings align with existing research on TEL in health profession education, emphasising its role in improving student engagement and offering flexible access to educational resources (8, 12). The increasing adoption of blended and hybrid

learning models reflects their ability to accommodate diverse learning styles and schedules (20). However, the effectiveness of TEL depends on several critical factors, including faculty preparedness, curriculum integration, technical support, and student readiness.

Perceived Benefits of Lecturio

Faculty endorsement of Lecturio in this study mirrors previous research, suggesting that faculty engagement is a key driver of successful TEL implementation (21, 22). The challenge of aligning digital content with curricula remains a common obstacle that can be addressed through structured curriculum mapping (23). Additionally, technical barriers, including connectivity issues, have been highlighted in previous studies as a significant concern for both students and faculty (21). The preference for face-to-face learning among nursing students in this study aligns with previous findings suggesting that digital literacy gaps can influence e-learning adoption, necessitating strategic training initiatives (22). Furthermore, Lecturio implementation resulted in improved clinical reasoning and efficient time management. The statistical analysis showed significant results in choosing online learning ($p = 0.002$; high-performing students $p < 0.0001$).

Actionable Recommendations for TEL Integration

The findings of this study highlight several actionable features for enhancing Lecturio's effectiveness at BMC. The first recommendation is curriculum integration, ensuring that Lecturio's resources align with course objectives to support key competencies (23). Collaborative workshops with faculty and Lecturio representatives could facilitate this process. Second, robust technical support is essential to enhance reliability, including prioritising stable internet connections and accessible troubleshooting services (13). Third, workload balance remains critical; prior research has shown that excessive digital assignments can contribute to 'digital fatigue', negatively impacting student engagement (24). Balancing online coursework with traditional instruction can optimise engagement and satisfaction (25). Fourth, faculty and student development initiatives, such as targeted workshops and mentoring programmes, may further increase confidence in digital learning tools (3). Finally, ongoing evaluation of academic performance and TEL user experience across multiple semesters would provide valuable insights into the long-term impact of Lecturio and digital literacy progression within the institution (8).

A major insight from this study is the variation in student engagement with Lecturio across academic years. A significant difference was observed among academic year groups ($t = -3.104$, $p = 0.00196$), suggesting that students' experiences with TEL change as they advance in their studies.

While medical students reported positive attitudes towards digital learning, nursing students exhibited a more varied response, suggesting that prior digital exposure plays a key role in acceptance and engagement. As a result, structured onboarding sessions and continued technical support may be necessary to bridge this gap. Additionally, ensuring that TEL tools are fully aligned with course expectations and assessments may help mitigate student resistance and encourage broader adoption. The variation in time spent on Lecturio between medical and nursing students also highlights the importance of workload optimisation (Figure 1). A discipline-specific approach that considers unique study habits and digital readiness could improve Lecturio's effectiveness and enhance overall student satisfaction. Differentiated instructional design should be employed to tailor content and learning

activities to each discipline's context. For example, medical students might engage more deeply with TEL modules that integrate complex case-based scenarios linking basic science to clinical reasoning, whereas nursing students may benefit from interactive simulations that emphasise patient-centred care and team-based decision-making. Furthermore, aligning TEL assessments with discipline-specific competencies and evaluation frameworks would enhance both relevance and learner engagement.

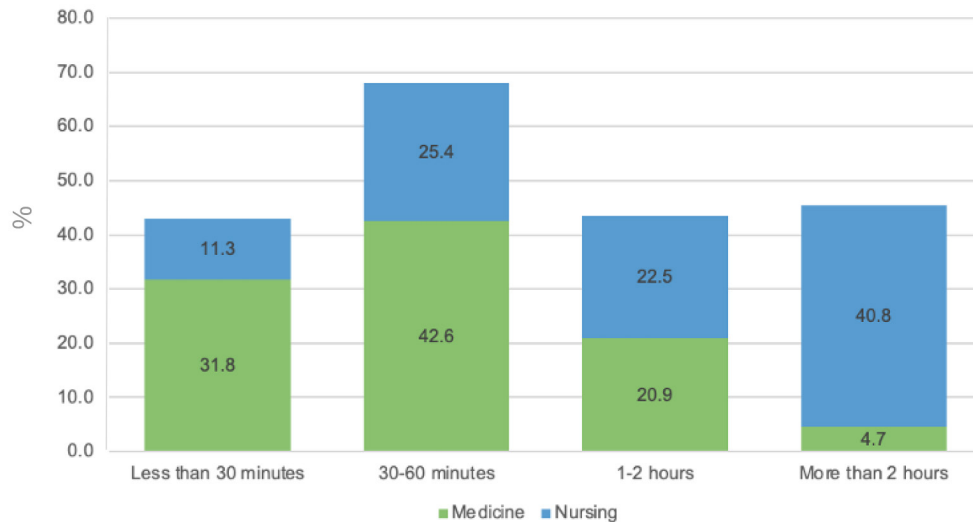


Figure 1: Time spent per session (%).

The findings from the faculty survey also offer important insights. Some 92% of medical faculty had prior digital learning experience, compared with 62% of nursing faculty, which aligns with their higher adoption of hybrid teaching methods (54% vs 46%). A mixed-methods study by Duterte et al. (26, 27), involving 309 students and 26 educators, found that TEL increased motivation by 75% and led to a 10% increase in academic performance. Similarly, our study found that 71.5% of students had prior digital learning experience, with medical students (91.5%) being significantly more familiar with TEL than nursing students (35.2%). While 38.8% of medical students preferred hybrid learning, 49.3% of nursing students favoured in-person instruction, reinforcing the influence of prior exposure on TEL acceptance and engagement. The qualitative responses further supported these findings, as both students and faculty emphasised the value of interactive learning features (Figure 2), such as gamified quizzes and virtual simulations, in promoting deeper learning experiences (27).

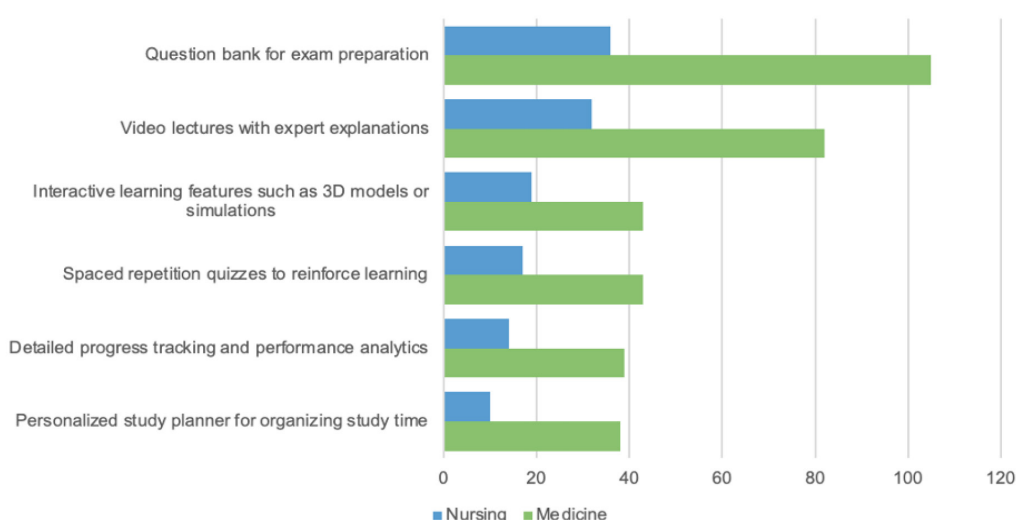


Figure 2: Features reported as most valuable.

Directions for Future Implementation

Future implementation should incorporate these nuanced learner profiles into TEL planning. Additionally, institutions should consider investing in localised faculty development programmes to improve TEL delivery across different disciplines, ensuring alignment with national education and workforce goals.

Despite Lecturio's positive reception, this study identified key areas for improvement, particularly regarding content alignment and technical challenges. Faculty and students acknowledged that while Lecturio provides high-quality educational materials, some topics could be better structured to align with existing curricula. Addressing this issue through structured curriculum mapping and integration could reduce redundancy and enhance the learning experience. Technical challenges, such as connectivity issues and assignment synchronisation errors, were identified as common barriers. Institutions can mitigate these obstacles by enhancing IT infrastructure, ensuring seamless platform integration, and offering dedicated technical support. Yan et al. (28) emphasised the importance of faculty–student collaboration in TEL, suggesting that educators focus on student engagement and academic rigour.

Limitations

This study has several limitations. First, the student sample was unevenly distributed, with 129 participants from medicine and 71 from nursing, which may have introduced a bias towards the perspectives of medical students. This likely reflects differences in cohort size or platform engagement but limits the generalisability of student-related findings to the nursing programme. Future studies should aim for more balanced sampling or apply weighting methods to ensure equitable representation.

Second, the study was conducted at a single institution using a specific TEL platform. The unique context of BMC and the characteristics of Lecturio may limit the applicability of the findings to other institutions or platforms. Broader research across diverse settings and TEL tools is recommended to validate these findings.

Recommendations for Enhancing TEL Integration

While Lecturio was well received, several improvements are needed to maximise its impact. The following areas are recommended for institutional action:

- a. Curriculum alignment: Conduct workshops to better align Lecturio content with course learning objectives and outcomes.
- b. Technical support: Enhance information technology infrastructure and connectivity to ensure uninterrupted access.
- c. Digital literacy and workload management training: Provide training for students and faculty on efficient platform use and academic workload management.
- d. Continuous feedback: Establish feedback mechanisms between faculty and students to guide iterative improvements to the platform.

Addressing these areas will strengthen platform integration, support instructional goals, and improve the overall TEL experience.

CONCLUSION

The integration of Lecturio at BMC was positively received by faculty and students, offering improved access, engagement, and flexibility in learning. It supported self-directed and blended learning approaches, particularly in clinical and preclinical education. However, challenges in curriculum alignment, technical infrastructure, and student workload must be addressed to fully realise the benefits of the platform. Future research should evaluate Lecturio's long-term effects on academic performance, clinical readiness, and digital literacy. Optimising training, refining content alignment, and strengthening support systems are critical for sustaining the platform's impact and informing broader TEL strategies in healthcare education.

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ETHICAL APPROVAL

This study involved voluntary survey participation and informed consent by faculty and students, and did not collect any personally identifiable information. As the research did not involve any intervention or sensitive data, and participant responses were anonymous, it was determined to be exempt from ethical review by the Batterjee Medical College Institutional Review Board (Exemption no.: 142-6).

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