ORIGINAL ARTICLE

Utilization and Challenges of Mobile learning (m-Learning) in Medical Education – Insights from MBBS Students

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ABSTRACT

Background: The National Medical Commission's (NMC) competency based medical education (CBME) curriculum places a strong emphasis on lifelong learning and self-directed study. Mobile learning provides the adaptability and accessibility needed to facilitate these learner centred strategies This study explores MBBS students' usage patterns and challenges associated with Mobile learning. **Methodology**: A pre-tested, self-administered questionnaire was used to collect data .400 MBBS students from different academic phases participated in a descriptive cross-sectional study. Convenience sampling was used. SPSS software version 22 was used for the analysis. **Results** :60% of respondents were female, and the majority (66.5%) were between the ages of 21 and 23. 92.5% of students were aware of m-learning apps, and 62.2% of them used them frequently throughout the day. Only 21.5% of respondents said they primarily used mobile for educational purposes, despite 88% agreeing that it had a positive impact on learning. Practical sessions ranked highest among preferred learning methods. Distractions (35.5%), internet dependence (21.5%), and decreased practical exposure (55.2%) were the main challenges faced by MBBS students during m learning. **Conclusion**: Traditional and hands-on learning approaches continue to be the most popular, despite the fact that m-Learning is well-liked by MBBS students. By combining m-Learning with didactic and practical elements, a blended approach can overcome technological obstacles and maximize educational effectiveness.

KEYWORDS

Mobile learning, Medical Education, Medical Undergraduate, Learning

INTRODUCTION

There has been rapid growth in novel pedagogical methodologies and educational materials, along with major progress in electronic and mobile resources. Mobile technologies have emerged as valuable tools in medical education, offering greater accessibility and interactive learning experiences.(1) The integration of digital technologies into traditional teaching is transforming medical education in India. During the COVID-19 pandemic, institutions were compelled to adopt innovative strategies to overcome disruptions to conventional teaching.(2) Mobile learning (m-Learning), defined as the use of smartphones, tablets, and other wireless technologies to access educational content, has gained prominence.

Current mobile device technology shows significant potential as an educational instrument due to its user-friendly nature and widespread use. M-learning aligns well with learner-centred educational frameworks and can enhance both educators' and learners' abilities to adapt to innovative teaching methodologies.(3) The Competency-Based Medical Education (CBME) framework by the National Medical Commission emphasizes lifelong, self-directed learning. Mobile learning supports this by offering adaptability, accessibility, and the ability for students to study at their own pace.(4) Despite these advantages, the

integration of m-Learning remains uneven and mostly informal.

The objectives of the study were

1. To assess the usage patterns and perceptions of mobile learning (m-Learning) among MBBS students.
2. To identify the key facilitators and barriers influencing the adoption of m-Learning in medical education.
3. To understand students' preferences for mobile-based learning compared to traditional learning methods.

MATERIAL & METHODS

Study Design: Descriptive cross-sectional study

Study Setting and Population: The study was conducted among Undergraduate medical students enrolled in Phase 1, Phase 2, and Phase 3 in a Private Medical University in Lucknow, Uttar Pradesh.

Inclusion criteria: Students who own a smartphone, tablet, or both devices were included in the study.

Exclusion criteria: Students who did not own a smartphone or tablet, or unwilling to provide consent for participation, were excluded.

Sample Size Calculation: Sample size is estimated by using the formula:

$n = (Z)^2 \times p \times q) / E^2$ Where, n = Sample size

Z represents Standard Normal Variate(SNV) statistics: for the confidence level of 95%, Z value is 1.96.

According to the study conducted by Sharma P et **al**, the proportion emphasizing the importance of m-learning among participants was reported as **76.6%**. **(5)**

p = 76.6%; q = 100 – p (%); E = margin of error was set at 10% of the estimated proportion p to achieve power of study 90%. The calculated sample size is approximately 370. Considering rounding and to improve the precision of estimates, we decided to enroll 400 participants.

Sampling Method: Non-Probability Convenience sampling technique

Data Collection Tools and Procedure: Data collected was done using a structured, online, self-administered questionnaire which was pre-validated and pre-tested comprising of multiple-choice questions, closed-ended questions, and Likert scale questions to assess perceived advantages and disadvantages of m-learning. Internal reliability of questionnaire was assessed using Cronbach's alpha= 0.90 which was found to be high. Informed consent was taken before participation.

Ethical Clearance: Ethical clearance has been obtained from the Institutional ethics committee vide letter no ELMC&H/R-cell/2025/481.

Statistical Analysis: Data was analyzed utilizing the Statistical Package for Social Sciences (SPSS) software version 22. Frequency distributions were used for categorical variables to determine the most common responses. Stacked Bar graphs were employed to visually interpret the data.

RESULTS

Out of total 450 students enrolled in various phases **;**400 MBBS students participated in the study. 66.5% (n = 266) of students belonged to the age group of 21-23 years and 33.5% (n =134) of students belonged to the age group of 18-20 years. Out of the 400 participants, the gender distribution was 60% females (n=240) and 40% males (n=160).55 % (n=220) students possessed both a tablet, and a mobile phone, while 45% (n=180) had only mobile device. (Table 1)

Table 1: Distribution of MBBS Students participating in the study (n=400)

Variable	Categories	Frequency (n)	Percentage (%)
Age Group (Years)	18-20	134	33.5
	21-23	266	66.5
Gender	Male	160	40
	Female	240	60
MBBS Year	Phase 1	134	33.5
	Phase 2	126	31.5
	Phase 3	140	35
Device Ownership	Mobile	180	45
	Both (Tablet & Mobile)	220	55

The mobile phone usage pattern indicated that almost half of the students (51%, n=204) used their mobile phones for >4 hours/day followed by 40.5% (n=162) who utilized 2-4 hours/day. 78.5% (n=314) of students used mobile phones mainly for non-educational activities such as entertainment, social media, gaming and calling purpose. Only 21.5% (n=86) of the students reported educational use as their chief mobile phone activity. When it comes to awareness of mobile learning applications, majority

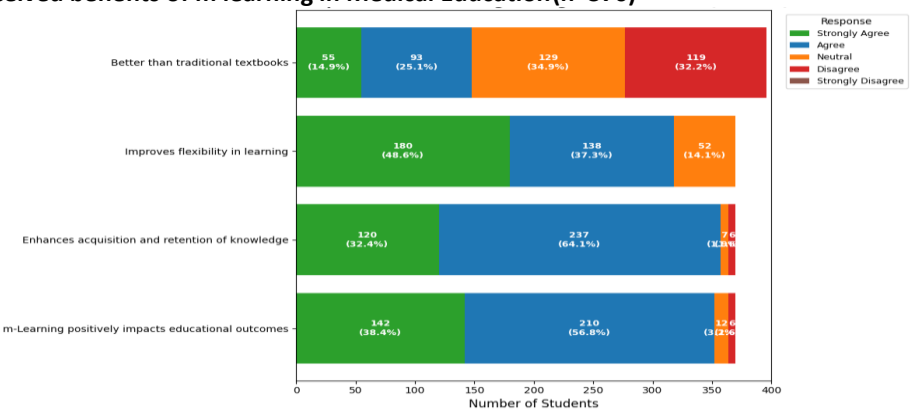
of students (92.5%, n=370) reported that they were aware of such applications. 62.2% (n=249) were using mobile phones form for the learning purpose multiple times in a day. (Table 2)

Table 2: Utilization of Mobile Learning Among MBBS Students(n=400)

Variable	Categories	Frequency (n)	Percentage (%)
Daily mobile usage (hours)	<2 hours	34	8.5
	2-4 hours	162	40.5
	>4 hours	204	51
Primary mobile activity	Educational	86	21.5
	Non-Educational	314	78.5
Awareness of m-learning apps	Yes	370	92.5
	No	30	7.5
Frequency of m-learning usage	Multiple times a day	249	62.2
	Once a day	79	19.8
	2-3 times a week	42	10.5
	Rarely/Never	30	7.5

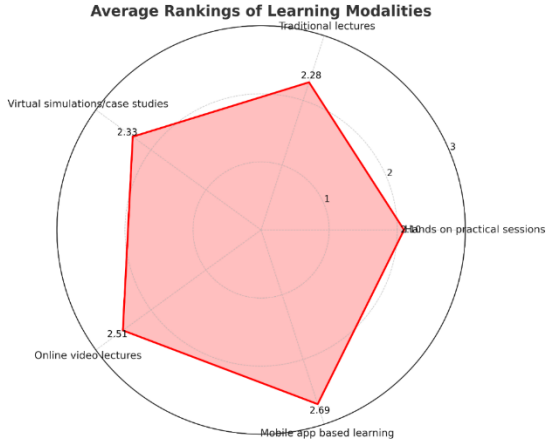
Most students felt that m-Learning was beneficial for their medical education; 95.2% (n = 352; 142, 38.4% strongly agree; 210, 56.8% agree) thought that m-Learning improves educational outcomes .Similarly, 95.9% (n = 357; 120, 32.4% strongly agree; 237, 64.1% agree) thought that m-Learning enhances the acquisition and retention of medical knowledge. However, opinions were more divided when comparing m-Learning to traditional learning from medical textbooks, with only 38.0% agreeing that m-Learning is better (55, 14.9% strongly agree; 93, 25.1% agree), and 119 (32.2%) disagreeing and 129 (34.9%) being neutral. (Figure 1)

Figure 1: Perceived benefits of m learning in Medical Education(n=370)



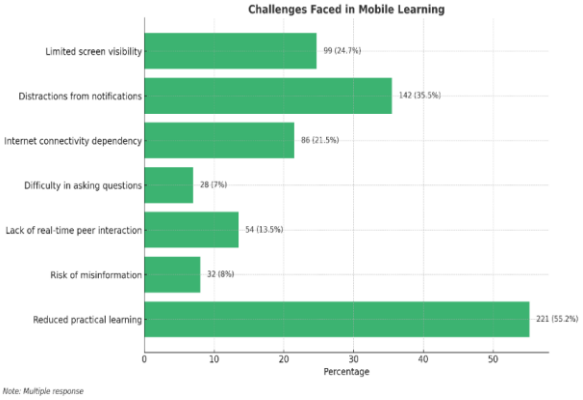
A radar chart of mean ranking was used in the study to evaluate MBBS students' preferences for different medical education learning modalities. The preference for practical sessions (Rank ~2.10) highlights the importance of experiential learning and learning by doing in medical education. Traditional lectures (Rank ~2.28) were still highly preferred, indicating their ongoing importance in systematic knowledge transfer. Simulations and virtual case studies (Rank ~2.33) were also well-liked, validating their use in clinical skills teaching in a secure setting. Online video lectures (Rank ~2.51) were moderately liked, indicating their usefulness but also have drawbacks, such as less interaction and no immediate feedback. The least popular was mobile app learning (Rank ~2.69). (Figure 2)

Figure 2: MBBS students' preferences for different learning modalities in medical education.



Students faced numerous challenges in accessing mobile learning platform. The most frequent change reported was less practical learning by 55.2%(n=221) of the respondents .Further 35.5%(n=142) of the reported distraction from notification and 24.7%(n=99) reported less screen visibility as a challenge .Internet connectivity dependency was a barrier for 21.5%(n=86) of the students .Lack of real time peer interaction was reported by 13.5%(n=54) and 8%(n=32) reported potential misinformation**.** (Figure 3)

Figure 3: Challenges faced by students in Mobile learning



DISCUSSION

Multiple studies have indicated that between 56%–93% of students utilize smartphones for academic activities and nearly 80% believe that smartphones should be formally integrated into the medical education curriculum .(5-8)In our study ,92.5% of students were aware of mobile learning – a significantly higher percentage compared to a study conducted in Jaipur, India where only 54.51% of students had knowledge about m learning .(5)

Preksha Sharma et in their study found that 89.8% of respondents used mobile phones for educational purposes out of which only 54.51% had a clear understanding of the concept of m learning. (5) In contrast, our study reveals that only 21.5% of students used mobile phones primarily for educational purposes. Latif et al showed that 62.7% of students primarily used mobile phones for education,81.7% for communication and 82.5% for recreation (9). Similar study by Thakre SS found that 56.41% of students utilized mobile phones for academic purpose while 20.83% used them for entertainment. (10,11)

The results of the present study indicate that most students perceived m-Learning as beneficial in medical education, with 88% affirming that it had a positive impact on their learning outcomes. Concordant findings were found in another study where 69% of respondents felt m-Learning made studying more interesting and convenient, allowing them to learn anytime and anywhere using portable devices.(5) Basu et al. in their study which was conducted in Delhi also highlighted positive perceptions of m-Learning, with participants strongly agreeing that it can supplement traditional teaching methods, is reliable for personal use, and contributes to improving the quality of lessons.(11)A study conducted by K Singh et al revealed that 89.1% of students believed smartphones could enhance their learning experience .84.8% considered them beneficial for faculty teaching and 50.9% felt they could be integrated more effectively in medical education.(12)

In the present study practical sessions were most preferred, highlighting the significance of learning by doing in medical training whereas Mobile app learning was least liked because of limitations like unstructured content, distraction, or technology issues. Similar results were obtained by Kabita Barua in their study where undergraduate medical students favoured a blended learning approach as e-learning alone posed difficulties in acquiring clinical skills. (13). Patil et al. observed that students engaged in m-learning demonstrated deeper conceptual knowledge and learning rather than surface learning. (14) Another study conducted in Tamil Nadu, India, revealed that the majority of students preferred demonstration (81.2%) as their teaching method of choice, followed interactive lectures (77.2%). (15)

In the present study, the most frequently reported challenge associated with mobile learning was reduced practical learning, cited by 55.2% of the respondents. Poor internet connectivity and unresolved technical issues as reported as key barriers that hinder the effective implementation of e-learning by another study. (13) Supporting this, Chase TJG et al. noted that lack of universal internet access was a significant limitation to the use of digital learning devices. (16)

CONCLUSION

The study highlighted a positive perception of mobile learning (m learning) among MBBS students. Although the majority acknowledged the benefits of m learning, it was evident that traditional teaching methods and hands on practical sessions still hold greater preference and importance in medical education .m learning should complement and not substitute classroom teaching and clinical skill training. These findings emphasize the need for blended approach that integrates the strength of m learning with conventional pedagogical techniques to maximize its effectiveness while mitigating its limitations.

RECOMMENDATION

Ongoing feedback from both students and faculty can help to refine m learning strategies. Faculty are advised to use a blended learning approach that combines mobile tools with conventional techniques in order to improve understanding of concepts. For a deeper and more comprehensive insights, future research should consider multi-centric and longitudinal study designs.

LIMITATION OF THE STUDY

The results may not be as broadly applicable as this study was restricted to one private medical university in Lucknow. Convenience sampling may have introduced selection bias. Furthermore, deeper understanding of students' experiences with mobile learning was hindered by the lack of qualitative data.

RELEVANCE OF THE STUDY

The study offers timely insights into mobile learning usage among MBBS students and supports integration of blended learning with in the CBME framework and provide region specific evidence.

AUTHORS CONTRIBUTION

All authors have contributed equally.

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Nil

CONFLICT OF INTEREST

There are no conflicts of interest

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DECLARATION OF GENERATIVE AI AND AI ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

The authors haven't used any generative AI/AI assisted technologies in the writing process

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