

# Revolutionizing Medical Education via Electronic Question Banks

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## Abstract

Assessments in medical education play an indispensable role in the making of competent medical graduates, who are knowledgeable and skilled enough to meet the changing needs of the healthcare practice. For the assessment of the cognitive domain in medical education, paper-based assessments have been used for generations together, but these assessments have their own set of limitations, and we must look for alternative options to overcome these limitations. Electronic question banks (EQBs) have been linked with multiple benefits for medical students, beginning with easy accessibility, that too at their times of convenience. The process of initiating an EQB in a medical college has its challenges and we must adopt a comprehensive approach to overcome these challenges. In conclusion, electronic question banks can ensure that medical education is delivered in an innovative manner, which in turn becomes crucial in developing competent healthcare professionals. The need of the hour is to overcome the hurdles that can impact the implementation of EQBs, and thereby augment the benefits to medical students.

**Keywords:** Electronic Question Banks, Technology, Medical Education

## Background

Assessments in medical education play an indispensable role in fostering competent medical graduates, who are knowledgeable and skilled enough to meet the changing needs of the healthcare practice (1). In fact, based on the performance of medical students in assessments, teachers gain in-depth insights about how much students have learned, how they have learned, in which topics students have performed better, and what areas need more attention to help students attain the intended learning objectives (2). Paper-based assessments have been used for generations to assess students' cognitive performance in different subject areas taught to them during their training in medical schools, but these types of assessment have their own set of limitations, such as limited scope for interaction, being time-consuming, subjective scoring, questions' lack of modifiability once printed, paper wastage, concerns pertaining to storage and archiving of papers, and security concerns (1-3).

This calls for alternative options to overcome these limitations (1-3). The purpose of the current article was to

explore the scope and merits of electronic question banks, identify their potential challenges in the implementation phase, and offer strategies to overcome them.

### Electronic Question Banks: Benefits for Students

Electronic question banks (EQBs) offer multiple benefits for medical students, beginning with easy accessibility at convenient times (4). This means that the learning process does not remain restricted to within the four walls of lecture halls, rather students can take their individual calls and decide when to learn and how to learn (supporting the principle of adult learning). Further, EQBs ensure that students are exposed to a wide range and types of questions of varying difficulty levels, which in turn can fulfill the needs of students with different learning styles, promoting inclusivity (5, 6). As students can have access to EQBs at any time, this becomes a source for the continuous reinforcement and gradual improvement of their knowledge on the subject (7).

Depending on their performance in these assessments, students become motivated to practice self-directed learning, which happens to be a crucial attribute of medical graduates (7).

Because EQBs are conducted using electronic platforms, students are acquainted with digital platforms often used in national entrance exams or certification assessments (4). This would eventually reduce students' anxiety, which is often attributed to high-stakes assessments (6). At the same time, students even become well-primed and learn the art of managing their time and approach during exams. Moreover, EQBs can be regularly updated, ensuring that students remain in touch with recent developments (8). Further, we can develop a mechanism to provide immediate feedback to

students about their performance, helping them strengthen their positives and repair their shortcomings (9). Finally, EQBs help students gradually boost their technological literacy and remain at par with their counterparts across the world (5, 6).

**Challenges of EQBs and Potential Solutions (Table1)**

Establishing an EQB in a medical college faces some challenges requiring a comprehensive approach to be addressed (2). These challenges can be technological, wherein users may lack access to appropriate technology devices or technical assistance precluding them from using EQBs (4).

**Table 1.** Challenges and Potential Solutions of Developing EQBs

Challenges	Potential solutions
Resistance to change	Elucidating to both faculty members and students the scope and merits of EQBs
	Sharing successful experiences of other institutions and how they have transformed the learning process by the implementation of EQBs
	Creating an open platform, where people can raise their queries-cum-clarifications
Content maintenance	From each department, 1-2 persons should be designated to manage and regularly update the content of EQBs
	Formulating a schedule and communicating it to all experts in advance to review the content periodically
Preference for only specific types of questions	Involving teachers in the process of developing EQBs
	Reaching consensus at the institutional level with regard to the type of questions, difficulty levels, etc., and accordingly instructing departments to set limits on the frequency of specific types of questions
	Regularly communicating with educators to ascertain the difficulty level and make suitable modifications
Lack of quality assurance	Establishing a robust peer-review process, wherein experts check and validate the accuracy and relevance of questions and their answers
	Receiving regular feedback from students regarding the relevance and clarity of questions, and modifying them accordingly
	Involving external experts to check for the alignment of questions with the curriculum
Variable learning curves	Organizing periodic refresher training to help students and teachers become familiar with different aspects of EQBs
	Designing and distributing user guides, frequently asked questions, and video tutorials to clarify common problems
	Creating helpdesk services to promptly address queries
Lack of student engagement	Periodically introducing new features, question formats, or challenges to keep the platform dynamic and engaging
	Obtaining feedback from students on the platform's usability and considering their views on EQB improvement processes
	Exploring the possibility of introducing gamification elements (like leaderboards and achievement badges) to motivate students
Lack of standardization	Encouraging the implementation of standard formats of EQBs across different medical colleges
	Prompting colleges to share their best practices and accordingly move towards standardization
Limited inclusivity	Obtaining feedback from students to ascertain the potential barriers that limit the usage of EQBs
	Introducing features like screen reader compatibility and adjustable font sizes
Security concerns	Implementing secure authentication systems to safeguard the accounts of both students and teachers
	Encouraging the use of encryption protocols to safeguard data transmission and storage
	Regularly updating security protocols
	Liaising with cybersecurity personnel to conduct regular audits and proactively address potential threats
Technological barriers	Training both students and teachers on the features, roles, and responsibilities while using EQBs
	Students should be given access to computer labs or dedicated study spaces with reliable Internet services
	Developing mobile-friendly versions of EQBs to help students who don't have access to laptops or desktop
Limited technical support	Appointing a trained team of personnel or educating technical personnel on different features of EQBs
	Creating helpdesk services to promptly address queries
Financial burden	Clarifying the benefits of EQB to administrators and managers
	Cooperating with other medical colleges to pool resources (if required)

From the student's perspective, resistance to change, variability in the learning curve of different students, and lack of student engagement could be other noteworthy concerns (9). Similarly, even teachers can express their reluctance to shift from conventional assessments to EQBs, expressing security and privacy concerns over the content of EQBs or students' information (10).

Further, with regard to the content of EQBs, concerns include imbalanced questions (both in terms of a tendency toward a specific type of questions like MCQs or in terms of complexity, like a greater number of recall types rather than problem-solving questions), maintenance of the content, especially in the sense of alignment between the questions and recent developments (2, 4, 6). There have been concerns about the lack of measures to sustain quality assurance in EQBs, especially with regard to the accuracy of answers, as well as the relevance and framing of questions (2). There may also be issues such as a lack of standardization of EQBs across different institutions, leading to considerable variations in implementation and processes (7, 8). Finally, the initial setup and infrastructure will warrant lots of financial expenses, and we must think and plan along those lines to ensure that EQBs are effectively implemented (2, 4). There is an immense need to overcome these challenges, and this important task demands a multipronged approach to help educators optimize EQBs (2, 4-7, 9).

### Conclusion

In conclusion, EQBs can ensure that medical education is delivered in an innovative manner, which in turn can lead to the graduation of competent healthcare professionals. The need of the hour is to overcome the hurdles interfering with the implementation of EQBs to expand the benefits of this approach for medical students.

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