



Review Article

Question banks in medical education – An overview

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ABSTRACT

In the era of Artificial intelligence and e learning it is a challenging task for medical educators to guide and educate students struggling to cope with the ever-expanding horizon of new discoveries and inventions in the medical field. In this context Question banks have come in a big way to supplement teaching and assessment and are main pillars of support in medical education. This article briefly describes the process of setting questions for a bank, advantages and disadvantages of using question banks as an educational tool.

Keywords: Questions, Multiple choice questions, Formative assessment, E-learning, Summative assessment

In the era of Artificial intelligence and e-learning, it is challenging for medical educators to guide and educate students struggling to cope with the ever-expanding horizon of discoveries and inventions in the medical field. In this context, question banks have come a long way to supplement teaching and assessment and are the main pillars of support in medical education.

WHAT ARE QUESTION BANKS?

Question banks are a collection of questions that are classified and organised subject-wise, topic-wise, section-wise, chapter-wise, etc.^[1] These banks also have questions, and correct answers, many with detailed explanations. The questions can be structured essay type, brief answer questions, short answer questions, problem-solving, multiple choice questions (MCQs). Most are MCQs of different types and at varying difficulty levels. Questions are carefully chosen after item-wise analysis to meet the bank's objective. Questions must address all levels of learning in Bloom's taxonomy. Question banks are available as books, online, and as software programs. Question banks are of different formats, e.g., for entrance exams, formative assessments, summative assessments, etc.

CHARACTERISTICS OF A GOOD QUESTION BANK

Creating question banks is a challenging task. The questions must be accurate and authentic. They should be worded to convey a clear and specific meaning to the responders, and there is no room for ambiguity.^[2] For example, instead of "What relevant test will you order for diagnosing typhoid fever", it can be worded "What test will you order on day 3 of fever in a suspected case of typhoid?". The questions should be from relevant and appropriate topics.

Question banks should include correct answers with detailed explanations in the key section. These should be properly referenced. References should be taken from the latest editions of standard textbooks followed by most Universities and mentioned with the chapter and page numbers in the key section. Feedback should be incorporated so the student learns from his

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mistake and doesn't make an error again. The banks should include questions assessing students' recall (lower-order thinking) and analytical (higher-order thinking) skills. The following examples will illustrate how it can be done.

Question 1 (recall)

What is the correct dose to treat vitamin A deficiency in a three-year-old child?

- 50,000 units
- 100,000 units
- 150,000 units
- 200,000 units

Question 2 (recall)

Which one of the following is due to vitamin A toxicity?

- Photophobia
- Pseudotumor cerebri
- Aseptic meningitis
- Hyperostosis

Question 3 (Analytical)

A 3-year-old child treated for poor vision at night has a history of headaches, vomiting, and convulsions. The most probable diagnosis in this child will be:

- Meningitis
- Seizure disorder
- Pseudotumor cerebri
- Intracranial space occupying lesion

Students these days prefer online learning tools. Question banks should, therefore, be user-friendly with an easy-to-use interface and link access. One must keep in mind the cost also. It must be within the reach of all the students. Most importantly, the question banks must be periodically upgraded and updated at least once in 3–5 years.

Setting up a Question bank-process

The questions that go into the bank must be prepared meticulously.^[2] Questions must be valid and appropriate to the intended purpose. Seven steps must be followed before choosing the questions that go into a question bank.

- Construct questions** must be created and reviewed carefully for the contents, structure clarity and expected response(s). In the case of MCQs, the stem, alternatives, and the key are scrutinised to avoid mislead and confuse the students. The questions should be such that they can

differentiate between those who have learned as opposed to those who have not.

- Blueprinting:** The questions must also conform to the desired format (blueprint), especially if they are meant for assessment.
- Pre-validate:** The questions must be prevalidated by a team of subject experts who will look for clarity, unambiguity, appropriateness of the questions and functionality of the distractors. Most importantly, the source of information must be given for checking and counterchecking.
- Administer:** After creating the questions, they must be administered to a group of students.
- Post-validate:** The questions are then item analysed, and the final set of questions is chosen after discarding the unsuitable and inappropriate ones.
- Create:** The bank is created in any mode – books, online software apps, etc.
- Update:** The questions are periodically reviewed, updated, and upgraded once in 3–5 years.

Advantages – Learner

The focus is on pedagogy question banks, which are powerful tools for students to learn at their own pace. Students participate actively in learning rather than passively listening or seeing educational videos. They are a precious supplement to conventional learning and teaching methods. With the availability and accessibility of a wide variety and formats of question banks, students can choose question banks according to their needs. For example, the choice of students preparing for an entrance exam will differ from those who want to use them for formative learning. They can repeatedly access and practice them to improve their performance. They can have a better comprehension of the subject with repeated practice. They can identify their weak points and focus on them. Practice makes a man perfect. It is an efficient way of learning. It helps in self-assessment and improves their professionalism. Case-based scenarios enable them to develop their analytical skills. Students are also exposed to a broad spectrum of questions and can pursue intelligence beyond the scope of their curriculum. This helps them to perform better in examinations. Students can also participate in generating question banks.^[3,4] They will become more involved in learning if they do so and will be valuable in places with a faculty shortage. A survey from 2 Australian Universities found that students preferred face-to-face lectures for learning new concepts but question banks for revising. Repeated self-assessment and testing help in retentive memory and improve performance. Surveys have shown that question banks are one of the students' most preferred revision methods.^[5] It was observed that the performance of students was better in USMLE step 1 when practice questions were used by them for preparation ^[6]

Advantages - Teachers/Educators

It is a humongous task for teachers to teach and assess students, especially when the training and the curriculum increase exponentially. Creating Question banks helps teachers focus on essential areas of a topic to be stressed while teaching. Preparing questions for a bank enhances their skill in reviewing and item writing. It also helps them to keep in touch with the current trends and changing perspectives in their field.

It aids in both formative and summative assessment of students. Feedback helps students overcome their weak points during constructive assessment by focusing more on them. Using Question banks in summative assessment makes the assessment more uniform, standardised, objective and consistent. It reduces the time and effort in conducting assessments. Several question papers can be set with jumbled-up questions from the same source. Analysing students' performance helps evaluate a program's success and make policy decisions. It enables educators to analyse the performance of a broad spectrum of students across different difficulty levels. Exposing students to other assessment formats helps them perform better in exams. Updated questions and answers also help educators keep current with current trends and perspectives.

DISADVANTAGES

Question banks have their disadvantages. It is a labour and a time-intensive process to set up good question banks. Students might use question banks as their only source of learning and stop reading textbooks. The contents of the bank might deviate from the curriculum. It is an arduous task for question banks to include all competencies; some may be left out. Students-generated questions cannot be checked for accuracy, authenticity and suitability. Moreover, they may be low-order learning activities only.

Despite its disadvantages, the role of question banks in furthering medical education cannot be undermined. It might occupy a more prominent role in future learning, teaching and assessment.

CONCLUSION

In conclusion, question banks have come to play an important role in all domains of medical education - learning, teaching, and assessment. Faculty development programs have to be held to train medical teachers in setting up good and effective question banks.

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Dr. Shanthi AK is on the Editorial Board of the Journal.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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