



The Role of Faculty in Assessment: Traditional vs. Competency-Based Medical Education in Toxicology Learning

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Abstract

Toxicology is a very important subject in medical science which deals with the study of poisons and their effects in all aspects. Teaching of toxicology in medical school must be evaluated and assessed effectively to know the actual delivery of content and understanding of students. Faculty plays a critical role in the assessment of toxicology education, influencing the effectiveness and outcomes of both traditional and Competency-Based Medical Education (CBME) models. This article compares the roles and responsibilities of faculty in traditional and CBME frameworks within toxicology learning. It highlights specific examples of assessments and discusses various types of faculty training required to excel in these educational models. The analysis underscores the need for faculty development to adapt to the evolving demands of toxicology education. In Indian medical colleges, CBME has already been adopted and now it is time to create an excellent faculty development program to enhance assessment levels, particularly in the field of toxicology.

Keywords: Toxicology; Education; CBME; Traditional

Abbreviations

CBME: Competency-Based Medical Education; DOPS: Direct Observation of Practical Skills; EPAs: Entrustable Professional Activities.

Introduction

Toxicology is a very important but a bit neglected subject in the field of medical school education programs until now in the Indian context. Toxicology education aims to equip students with the knowledge, skills, and competencies necessary for their professional roles to serve as better toxicologists in the society. The faculty's role in assessing student performance is pivotal, shaping the learning experience and outcomes. Traditional educational

models and Competency-Based Medical Education (CBME) [1] represent two distinct approaches to assessment in toxicology learning. Traditional learning usually assesses a superficial level of knowledge while CBME can assess deeper aspects of each domain if the assessment is planned successfully. This article examines the role of faculty in both models, providing examples of assessment methods and discussing the training required to support effective faculty development.

Traditional vs. Competency-Based Medical Education (CBME)

Traditional education in toxicology often relies on standardized testing, lectures, and rote memorization.



Traditional assessment is usually restricted to recall types of questions and not much focused on the assessment of skills or assessing higher levels of the domain. In contrast, CBME focuses on the acquisition and demonstration of competencies through practical, real-world tasks and continuous assessment [2]. Assessment in CBME is more focused on assessment of skills, higher level of cognitive, psychomotor and affective domain.

Role of Faculty in Traditional Toxicology Learning

In traditional models, faculty responsibilities primarily include delivering lectures, creating and grading exams, and providing feedback based on test results.

Example Scenario: A toxicology professor gives a series of lectures on various poisons, its fatal dose, fatal period, clinical and analytical toxicology, clinical features, treatment aspects followed by a midterm and final exam consisting of multiple-choice and short-answer questions. Faculty grades the exams and offer office hours for students to discuss their results [3,4]. Such types of questions are not able to assess actual practical understanding of the students.

Role of Faculty in CBME Toxicology Learning

In CBME, faculty roles extend beyond traditional teaching to include mentoring, continuous assessment, and providing individualized feedback based on students' performance in real-world scenarios [5-7].

Example Scenario: A toxicology instructor guides students through hands-on activities such as crime scene analysis of poisoning case, evidence collection in poisoning case, management of poisoning cases, medico-legal aspects of poisoning cases, and laboratory work in various toxicology cases. Assessments include direct observation, practical exams, and reflective journals. The instructor provides ongoing feedback, emphasizing skill development and professional growth. Such types of multiple forms of assessment are more powerful for assessing actual understanding and practical knowledge as well as skills of the students. If the assessment pattern is planned properly then students automatically learn the subject as per the concept of assessment leads to learning.

Assessment Methods in Traditional vs. CBME Models

Traditional Assessment Methods

- **Written Exams:** Multiple-choice, short-answer, and essay questions that assess theoretical knowledge without

focusing of analysis or synthesize type of questions.

- **Practical Exams:** Lab-based tests where students demonstrate technical skills in controlled settings which may or may not be under direct supervision.
- **Oral Exams:** Faculty assesses students' understanding through direct questioning on specific topics.

CBME Assessment Methods

- **Direct Observation:** Faculty observes students in real-time, assessing their ability to perform toxicology tasks. Direct Observation of Practical Skills (DOPS) and few others are validated assessment tools which can be adopted as per the need of local setting.
- **Simulated Scenarios:** Students participate in mock crime scenes of poisoning cases and courtroom presentations of evidence in toxicology, evaluated by faculty on their practical skills and decision-making in clinical toxicology. Methods of CPR or other life saving skills can be performed on simulator which can be assessed by examiners via standard check list.
- **Portfolios:** Compilation of students' work over time, including case reports, reflective essays, and peer evaluations, reviewed by faculty to assess competency development. 360 degree feedback and e portfolio can also be a very important tool for the assessment.
- **Entrustable Professional Activities (EPAs):** Faculty determines when students can perform specific toxicology tasks independently based on demonstrated competence [8-12]. In the Indian context, EPAs are not yet developed by a statutory body like the National Medical Commission. The development of EPA must be given priority to meet the actual success of the CBME curriculum.

Types of Faculty Training for Effective Assessment

Training for Traditional Assessment

- **Workshops on Exam Design:** Training faculty to create reliable and valid written and practical exams. The concept of blueprinting of question paper and model answers are very much essential for effective assessment by multiple assessors.
- **Grading Standardization Sessions:** Ensuring consistency and fairness in grading practices across different faculty members. Continuous faculty development programs are necessary on how to frame a question paper and its evaluation.
- **Student Feedback Techniques:** Developing skills to provide constructive and actionable feedback based on exam performance. Even today in Indian medical schools, the concept of feedback is a bit neglected subject and not

delivered in a proper effective way.

Training for CBME Assessment

- **Competency-Based Curriculum Design:** Educating faculty on designing curricula that integrate competencies and EPAs. Well-defined EPA, competencies related to it, teaching-learning methods, and assessment methods are required for effective curriculum delivery.
- **Direct Observation Skills:** Training on how to effectively observe and assess students during practical tasks and simulated scenarios. Faculty training is necessary for the development of various assessment tools and their effective use in a current hospital setup.
- **Feedback and Coaching:** Enhancing faculty ability to provide continuous, formative feedback that supports student learning and professional development. Timely delivery of appropriate feedback via proper methods is a key for the improvement of student performance.
- **Reflective Practice and Portfolio Assessment:** Training faculty to evaluate reflective journals and portfolios, focusing on longitudinal assessment of competencies [13]. Students are also taught how to write reflections and faculties need to be taught how to evaluate reflections.

Discussion

The transition from traditional to CBME models in toxicology education necessitates a shift in faculty roles and assessment strategies. Traditional methods focus on knowledge acquisition through standardized testing, whereas CBME emphasizes the practical application of skills and continuous, competency-based assessment. Faculty development programs must address these differences, providing training tailored to each educational model's needs. Effective faculty training ensures that educators can support and assess students appropriately, ultimately enhancing the quality of forensic education [14,15]. Various newer methods like e learning, google sites, etc. are now widely used post Covid period in teaching learning [16-19]. For the successful implementation of CBME, the role of faculty in assessment is very crucial. Multiple assessment methods via multiple assessors and multiple time assessments need to be adopted. There is a need to develop standardized methods of assessment as per local needs. Various studies should be encouraged to adopt global assessment and rating scales in the Indian context.

Brief outline of Faculty Development Program for CBME in Toxicology

Program Objectives

- To equip faculty with the knowledge and skills to implement Competency-Based Education (CBE) in Toxicology in medical curriculum.
- To familiarize faculty with EPAs, core competencies, curriculum frameworks, Specific Learning Objectives, and assessment tools.
- To develop teaching strategies that emphasize practical, outcome-based learning to meet community needs.
- To foster interdisciplinary and critical thinking in toxicology along with research.

Program Duration

- Depending upon feasibility of institute and resources, it can be of 5 days (intensive workshop) or spread over 4-6 weeks with blended learning modules.

Target Audience

- Faculty teaching toxicology in medical, pharmaceutical, and allied health programs can be enrolled.
- Junior and senior educators looking to transition to CBE.

Key Components of the Training Program

A. Introduction to Competency-Based Education

What is CBE?

- Principles and philosophy of CBME.
- Importance in medical education and toxicology.
- Outline of curriculum and its delivery methods

Core Competencies in Toxicology

- Toxicokinetics and toxicodynamics.
- Environmental and occupational toxicology.
- Poisoning management and antidotes.
- Public health and prevention.
- Research avenues

B. Curriculum Design for CBME in Toxicology

Mapping Learning Outcomes to Competencies

- Define milestones and Entrustable Professional Activities (EPAs) related to topics.

Developing Modular Curriculum

- Foundational science, clinical applications, and public health aspects to be included.

Integrating Technology and Simulation-Based Learning

C. Teaching Strategies in CBME

Active Learning Techniques

- Case-based learning (CBL).
- Problem-based learning (PBL).
- Flipped classrooms.
- Simulation and Hands-On Training
- Toxicology labs and virtual simulations.
- Handling poisoning cases with standardized patients.

Team-Based and Interdisciplinary Approaches

D. Assessment Methods in CBME

- Formative and Summative Assessments
Case presentations, lab work, and reflections.
- Workplace-Based Assessments (WPBA)
Direct Observation of Procedural Skills (DOPS).
Mini Clinical Evaluation Exercises (Mini-CEX).
- Feedback Mechanisms
Constructive and timely feedback to promote learning.

E. Faculty Development Skills

Mentoring and Coaching in CBME

- Guiding students through self-directed learning.
Improving Educational Leadership
- Curriculum planning and stakeholder engagement.
Professional Growth
- Conducting research in toxicology education.

Delivery Methods

- Workshops and Interactive Lectures
- Case Discussions and Role-Plays
- E-Learning Modules (webinars, online assessments).
- Simulated Scenarios and Practical Demonstrations

Program Evaluation

Pre- and Post-Training Assessment

- Faculty understanding and confidence in CBE principles.
Feedback Surveys
- Evaluate the relevance and effectiveness of the training.
Long-Term Follow-Up
- Assess faculty implementation of CBE in toxicology.

Expected Outcomes

- Faculty trained to deliver competency-based toxicology education.
- Improved student performance through innovative teaching and assessment methods.
- Enhanced patient care and public health initiatives in toxicology.

Conclusion

Faculty plays a vital role in the assessment of toxicology learning, with distinct responsibilities in traditional and CBME frameworks. Understanding and adapting to these roles through targeted training is crucial for the success of toxicology education programs. By embracing the principles of CBME and developing robust assessment skills, faculty can better prepare students for the complex demands of toxicology practice. As the current world is changing very

fast, educational methods, curriculum and assessments need to be revised from time to time along with continuous faculty development programs.

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