Short Communication

Comparison Study between Different Assessment Methods That Applied in Hammurabi College of Medicine

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Abstract

Background and Objectives: The present study evaluated different assessment methods to assess undergraduate medical students' mental, psychomotor, and coordination skills to ensure their preparedness for future clinical practice. The questions include Multiple Choice Questions, Extended Matching Questions, True/False questions, and Essay. **Methods:** the present study is designed to be a retrospective cross-section study conducted in Hammurabi College of Medicine by participating in the second and third stages from the first phase throughout the 2023-2024 academic years; the students assessed by different examination formats in the first course used MCQ and short answer assay while in second course the question applied MCQ, EMQ, true &false with the short answer, then a post-test survey format used for each assessment types question included clarity, relevance, fairness and difficulty. **Results:** the results show that the EMQ and True/False questions in the second semester (S4&S6) FOR the second and third stages improved succeeded significantly P value (0.001 & 0.008) for EMQ and true and false respectively, followed by MCQ as the better-assessed types finally short assay question that provides higher order thinking skills. However, concerns were raised regarding the clarity and difficulty of MCQs and the objectivity of True/False questions. **Conclusion:** The study highlights the importance of diverse assessment techniques in medical education. EMQs and essay questions were more effective in preparing students for clinical practice, as they align with real-world medical problem-solving. Future research should investigate the long-term correlation between these assessment methods and clinical performance.

Keyword: Medical education, assessment methods, multiple-choice questions, extended matching questions, essay questions, clinical reasoning, and student performance

Introduction

The evaluation of the competence of undergraduate medical students is a very critical task; at the undergraduate level, three skills must be evaluated: Cognitive, Affective, and Psychomotor. Different levels are included in the cognitive domain, such as knowledge, comprehension, application, analysis, synthesis, and evaluation. The affective domain discusses how students feel and their emotional responses in different situations. While the ability to perform tasks that require physical dexterity and control discussed in the psychomotor domain pertains to physical skills and movement coordination these domains

provide a comprehensive framework for assessing a wide range of skills and competencies. [1,2] Modified Bloom's taxonomy identified three levels of cognitive domain. In medical education, the primary emphasis is on developping and evaluating level III or problem-solving skills, as most of the physician's time is spent analyzing patient's problems. [3-4] there are different styles of questions; one of the traditional styles is MCQs; in this style, students must select the correct and best answer from a short list of alternative answers that the examiner preselects. The MCQ examination format is most frequently used in medical education due to its convenience for testing and grading large-size classes. [4-6] The second type of question is the extended matching question (EMQ), which is different from the single-best-answer multiple-choice questions and superior to it for assessing the students' problem-solving and clinical reasoning skills. It consists of a theme (symptom, diagnosis, and treatment), an options list (answers), a lead-in statement (question), and two stems (two clinical problems). [7-8] True-false type questions depend on one student's understanding and recognition of whether a statement is true or false depending on the subject matter; this type can help to test factual knowledge and understanding of key concepts. Assay questions require students to provide a written response to a prompt, allowing them to demonstrate in-depth understanding, critical thinking, and the ability to synthesize information. These questions can be beneficial for assessing higher-order thinking skills. [8] In medical education, assays may assess students' understanding of laboratory techniques, interpretation of test results, and application of basic science principles to clinical scenarios. Each of these assessment methods uniquely evaluates students' knowledge, skills, and competencies in medical school, helping to ensure that future healthcare professionals are well-prepared for the challenges they will face in their careers. [8-10] At Hammurabi Medical College, the integrated educational system is structured into two distinct phases, each with specific assessment methodologies. First Phase: Continuous and Summative Assessment During the first phase, two primary types of assessments are conducted:

A. **Formative assessment:** This aims to prepare students for the midterm examination and evaluate the effectiveness of learning by providing feedback and identifying areas for improvement in both teaching and learning strategies.
B. **Summative Assessment:** Begins with a midterm examination, which determines the student's midterm grade. A final integrated summative examination and the midterm examination results determine the student's final grade. The passing criteria are based on established examination standards.

In the second phase, students must pass only one final examination administered, incorporating the results of the midterm assessment. This structured assessment approach ensures continuous evaluation and skill development in the first phase, while the second phase focuses on comprehensive summative assessment to certify students' academic and professional competencies. The present study aims to determine each method's unique effects, advances, and disadvantages in evaluating the medical student by comparing them through the following: to evaluate the effectiveness of EMQs, MCQs, True/False, and Essay questions in assessing medical students' knowledge, to compare students' performance, satisfaction, and perceived fairness across these assessment styles,

to identify which assessment style best predicts future clinical performance and competence.

Materials and Methods

A retrospective cross-section study used medical students from the second and third years of study for one year in Hammurabi College of Medicine within the 2023-2024 educational years. The students undergo two courses. In the first course, the assessment style consists of an assay and MCQ style, while in the second course, EMQ, true, and false besides MCQ and short answer study to evaluate the best assessment methods applied in medical school, then shaping learning experiences and outcomes in medical learning.

The methods applied in medical education and included in this study are as follows: **Extended Matching Questions (EMQs), Multiple Choice Questions (MCQs), True/False questions and Essay questions**

The researcher compares students' answers between two courses to evaluate the effectiveness of different question styles and compare students' performance, satisfaction, and perceived fairness across these assessment styles; the researcher prepared a feedback Google form to identify which assessment style best predicts future clinical performance and competence.

The study excluded all students in the second phase because they have different styles and students in the first year whose courses are not integrated.

Data Collection

- Assessment Performance: Scores from the different types of assessments.
- Post-test Survey: To measure students' satisfaction, perceived fairness, and feedback on each assessment style.

Statistical analysis

This retrospective cross-sectional study conducted statistical analyses to compare outcomes between different groups. The Mann-Whitney U test was applied to assess differences between the first and second courses for data that did not follow a normal distribution, yielding a P-value of 0.005, indicating a statistically significant difference. Additionally, the Chi-square (χ^2) test was employed to analyze the distribution of students' responses to the survey, considering the non-normal nature of the data. These statistical methods ensured robust comparisons appropriate for the data distribution.

Ethical Approval

Not applicable.

Results

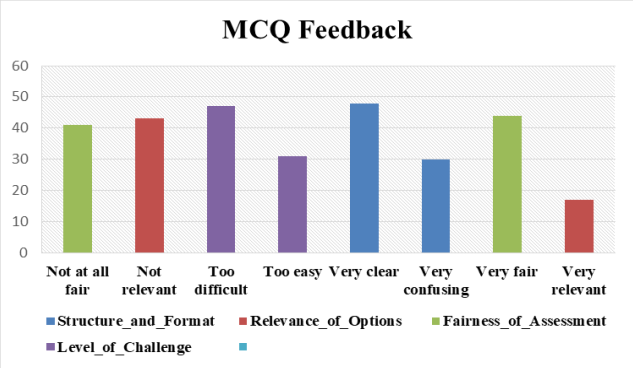
Table 1 compares the success rate between the two groups in the first and second semesters. In the first semester, the examiner used only MCQ and assay questions, and the success percentage (71.35-60.54; 89.44-90.6%) in papers one and two, respectively in the first semester for the second and third stages, while in the second semester the examiner used another style like EMQ, true and false besides MCQ and short answer the succeed percentage significantly increased where the percent in the second and third respectively increased (87.7-92.73;98.8-98.2%) *P*-value (0.001; 0.008)

Table 1: the difference in success percentage between the two-course question styles among the second and third stages

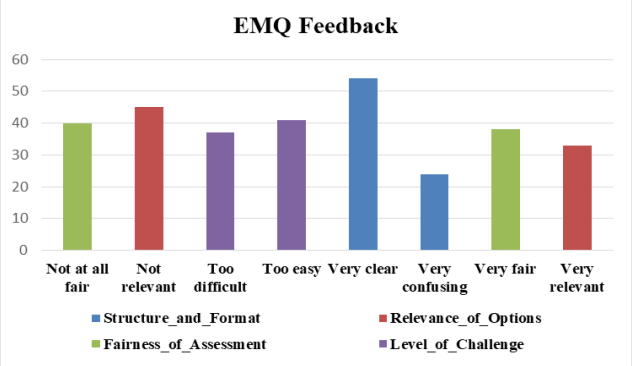
Stages	Semester	Stages	Success %	No. of successful students	No. of failed student	Total No. of student	*P* value
Second stages	third semester	Paper 1	71.35%	132	53	185	0.001
		Paper 2	60.54%	112	73	185	
	fourth semester	Paper 1	87.7%	157	22	179	
		Paper 2	92.73%	166	13	179	
Third stages	Fifth semester	Paper 1	89.44%	144	17	161	0.008
		Paper 2	90.6%	146	15	161	
	sixth semester	Paper 1	98.8 %	168	2	170	
		Paper 2	98.2 %	167	3	170	

The graph summarizes students' answers on the feedback Google form that was prepared to

evaluate the types of questions used in the examination. About 78 students participated in this survey where the question focused on clarity and relevance, difficulty level, distractors, and fairness; EMQ focused on structure and format, the relevance of option, fairness of assessment, and level of challenges, while in true and false types the question also discussed clarity of statement, assessing knowledge and difficulty finally the short answer dealing the clarity of prompts, encouraging critical thinking, time and effort. (Figure 1)



(A)



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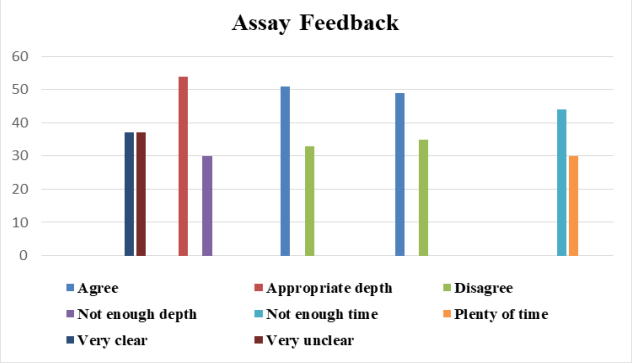

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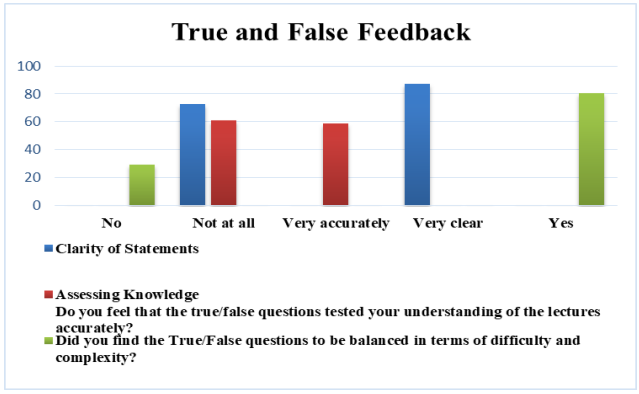

(D)

Figure 1: The chart shows the evaluation of the types of questions used in exams by students.

Discussion

This study evaluates the Hammurabi College of Medicine undergraduate medical students, which offers important insights into the efficacy of different assessment techniques, especially students' performance, fulfillment, and perception of fairness. Are highly affected by the assessment technique. The results of this study are crucial for improving the design and assessment techniques since medical education urgently needs comprehensive evaluation frameworks. This study showed that different assessment types have significantly different success rates in contrast to the third and fifth semesters, which only used essays and Multiple Choice Questions (MCQs), the fourth and sixth semesters' introduction of Extended Matching Questions (EMQs) and True/False questions led to more excellent success rates. In particular, with statistically significant p-values (0.001; 0.008), the success rates for the second stage rose from 71.35% and 60.54% in the third semester to 87.7% and 92.73% in the fourth semester, for paper I and paper II, respectively for the third stage, from 89.44%, and 90.6% in the fifth semester to 98.8% and 98.2% in the sixth semester for papers I and II. This agrees with earlier studies revealing that EMQs are

preferable for assessing medical students' competencies as they can better evaluate their problem-solving and clinical reasoning capacity. [13,14] Khan et al. [7] confirmed that essay questions might evaluate higher-order thinking abilities and encourage knowledge application, synthesis, and critical thinking. The diversity of assessment techniques is crucial so the exam can determine a broader range of student abilities and cover a wide curriculum items. According to the results obtained from the post-test survey, Students believed that EMQs were more fair and structured than typical MCQs; they prefer examinations that depend more on clinical scenarios, as demonstrated by earlier research, which is what EMQs are intended to do. [15] EMQs give students contextual clues that can promote cognitive engagement with the content instead of focusing only on examining the knowledge aspects. If we look again at the student survey results, we notice that students' comments about MCQs clarity and degree of difficulty raise worries about the possibility of ambiguity in statements. Although True/False questions are excellent at measuring factual knowledge, these findings imply that although True/False questions might be helpful for evaluation, a meticulous consideration of question formulation is necess-ary to guarantee objectivity and clarity. [16] Finally, the study's main objective is the assessment technique that best predicts future clinical success. Our findings demonstrate that essays and EMQs improved student performance; however, more long-term research is required to evaluate their association with practical clinical skills. Assessments that align with clinical thinking indicate fundamental medical practice skills. [17] EMQs can be considered a good examination tool for preparing students for upcoming clinical challenges; this fact is reflected by the high EMQ success rates in this study.

Conclusion

The vital requirement for various evaluation approaches in medical education is demonstrated by the comparative study of several question types at Hammurabi College of Medicine. Increased success rates and encouraging student feedback suggest that EMQs and essays offer benefits for thoroughly assessing medical students' knowledge and abilities.

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