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The Effect of Technology-Enhanced Formative Assessment on Learning and Test Anxiety in Anatomy Education Among Medical Students: A Quasi-Experimental Study

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Abstract

Background: *Anatomy is crucial in medical education, but traditional teaching methods can overload students and increase test anxiety. Technology-enhanced formative assessment (TEFA) may improve learning and reduce anxiety. This study examines the effect of TEFA on learning outcomes and test anxiety in anatomy education for medical students.*

Methods: *This quasi-experimental study included 147 second-year medical students enrolled in a Head and Neck Anatomy course at Mashhad University of Medical Sciences, Iran. Students were allocated into intervention (n=78) and control (n=69) groups based on pre-existing class structures determined by institutional scheduling procedures. Learning outcomes were measured using midterm and final exam scores, and test anxiety was assessed using Sarason's Test Anxiety Scale at three time points. Non-parametric statistical tests were applied for data analysis.*

Results: *Students in the TEFA group performed significantly better in both midterm and final examinations (P-value<0.001) compared to the control group. Although the intervention group exhibited lower levels of test anxiety, the differences were not statistically significant (P-value>0.05).*

Conclusion: *TEFA significantly improved learning outcomes in anatomy education but did not produce a statistically significant reduction in test anxiety. Integrating TEFA into medical curricula may enhance academic performance while requiring additional strategies to manage student anxiety.*

Keywords: Technology-enhanced assessment, Formative assessment, Anatomy education, Learning outcomes, Test anxiety.
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Introduction

Assessment serves as the engine that drives medical education, fundamentally shaping how students learn, what they prioritize, and ultimately how well they are prepared for clinical practice [1]. In the contemporary medical education landscape, there has been an increasing recognition of the need to move beyond traditional summative assessments toward more dynamic, technology-enhanced formative assessment (TEFA) approaches that support continuous learning and improvement [2-4]. These innovative assessment strategies are particularly valuable in anatomy education, where students must master complex three-dimensional spatial relationships and integrate vast amounts of structural knowledge with functional and clinical applications [5, 6].

Anatomy education faces unprecedented challenges in modern medical curricula. The discipline has experienced dramatic reductions in allocated teaching hours and contact time, with traditional cadaveric dissection being increasingly replaced by digital alternatives [6-8]. Medical schools worldwide have grappled with decreased numbers of trained anatomists, increased class sizes, and the need to accommodate novel subjects and teaching methodologies within compressed timeframes [9, 10]. These changes have precipitated significant concerns about whether medical graduates possess adequate anatomical knowledge for safe clinical practice [6, 8, 11, 12].

The intricate nature of anatomical structures poses inherent learning difficulties for medical students [13, 14]. Students must develop a sophisticated three-dimensional understanding while mastering terminology, spatial relationships, and clinical correlations. Traditional teaching approaches often fail to adequately address diverse learning styles and may not provide sufficient opportunities for active engagement with the material [5, 15]. Furthermore, the evolving landscape of medical education has created a critical need to identify essential anatomy competencies that span cognitive, psychomotor, and affective domains while maintaining direct applicability to clinical practice [6].

Test anxiety represents a pervasive and significant challenge affecting medical students globally. Research indicates that stress related to examinations is the most frequently reported source of distress among medical students [16-18]. Studies have found that substantial proportions of medical students experience moderate to severe test anxiety, with prevalence rates ranging from 18% to over 88% depending on the assessment modality and measurement tools used [17-20].

The impact of test anxiety on academic performance is well-documented, with negative correlations consistently observed between anxiety levels and assessment scores, particularly among female students [21, 22]. Different assessment formats provoke varying levels of anxiety, with objective structured clinical examinations (OSCEs), oral examinations, and practical assessments typically generating higher anxiety

levels compared to multiple-choice questions and problem-based learning assessments [16, 18, 23]. Test anxiety manifests through multiple domains including emotional responses, cognitive interference, physiological symptoms, and behavioral changes that can significantly impair student performance and learning outcomes [16, 24, 25].

TEFA emerges as a promising pedagogical approach to address these interconnected challenges in medical education. This methodology leverages digital tools and platforms to provide continuous, low-stakes feedback opportunities that support self-regulated learning and reduce assessment anxiety [2, 4, 26]. Unlike traditional summative assessments that primarily serve evaluative purposes, TEFA create safe learning environments where students can engage in trial-and-error learning without fear of academic consequences [4, 27].

The integration of adaptive learning platforms, immediate feedback mechanisms, and personalized learning pathways has demonstrated potential to enhance student engagement, improve learning outcomes, and support the development of critical thinking skills [1, 2]. These approaches align with contemporary educational theories emphasizing learner-centered instruction and competency-based medical education frameworks [3, 28]. Artificial intelligence and machine learning technologies further enhance these systems by providing personalized feedback and identifying individual learning needs [1, 29].

Despite the theoretical advantages and growing adoption of TEFA in medical education, empirical evidence regarding its effectiveness remains limited, particularly in anatomy education contexts [3, 4]. The available research often focuses on technology adoption rather than learning outcomes, and few studies have specifically examined the impact of these approaches on test anxiety levels among medical students [30, 31]. This gap is particularly concerning given the high-stakes nature of medical education and the critical importance of anatomical knowledge for patient safety [8, 11].

This quasi-experimental study addresses a critical gap in medical education research by systematically examining the effect of TEFA on both learning outcomes and test anxiety in anatomy education among medical students. The research is significant for several reasons: first, it provides empirical evidence regarding the effectiveness of digital assessment tools in a foundational medical science; second, it explores the relationship between assessment methodology and student anxiety levels; and third, it contributes to the broader understanding of how technology can be leveraged to improve medical education outcomes while supporting student wellbeing**.**

The findings from this investigation have important implications for medical educators, curriculum designers, and educational technology developers seeking to optimize learning environments and assessment strategies. By examining both cognitive and affective outcomes, this study provides a comprehensive evaluation of TEFA that can inform evidence-based decisions about educational innovation in medical schools worldwide [3, 5, 32].

Materials and Methods

Design and participants: This quasi-experimental study was conducted in 2024 at Mashhad University of Medical Sciences, Iran to investigate the impact of a formative assessment program on students' learning outcomes and test anxiety in a Head and Neck Anatomy course. A total of 147 second-year medical students enrolled in the course during the 2023–2024 academic year were included using a census sampling method. Students were allocated to two instructional groups according to the university's pre-existing class structure, and no individual-level randomization was undertaken. Accordingly, the study adopted a quasi-experimental design with non-equivalent groups. Participants were assigned to either the intervention group (n=78) or the control group (n=69). To minimize selection bias, baseline demographic characteristics were compared between groups, and no statistically significant differences were observed. Inclusion criteria consisted of students taking the course for the first time and providing informed consent to participate. Students were excluded if they declined participation or missed more than three sessions during the semester.

Intervention design: The intervention group participated in seven structured formative assessment sessions throughout the semester. These sessions integrated a variety of evidence-based formative techniques—such as quizzes, exit tickets, one-minute reports, directed paraphrasing, and concept mapping—implemented through interactive digital platforms including Kahoot, Socrative, Poll Everywhere, Nearpod, Verso, Mindomo, and ProProfs (Table 1).

Table 1. Visual matrix of formative assessment techniques

Technique	Application used	Learning style targeted	Topic area
Quiz	Kahoot	Listening, verbal, visual	Osteology
Exit tickets	Socrative	Individual	Osteology
One-minute reports	Poll everywhere	Individual	Neck osteology; nerves and vessels
One-sentence summary	Proprofs	Collaborative	Facial muscles
Directed rewrite	Nearpod	Collaborative	Surface anatomy and radiology
Confused model	Verso	Individual	Pterygopalatine fossa
Logical model	Mindomo	Logical-mathematical	Neck triangles

To ensure consistency and validity, all formative assessment items were designed collaboratively by the course instructor and the research team, then reviewed and approved by a peer instructor. The questions were subsequently integrated into the selected platforms by the research team**.**

Prior to the semester's start, the instructor responsible for the intervention group received training on the implementation protocol and digital tools. Additionally, students in the intervention group were provided with brief instructional videos on how to interact with each application. These tutorials were developed by the research team and validated by both the supervising educator and study coordinators**.** In contrast, the control group received traditional lecture-based instruction without any formative assessment or digital tool integration.

Each technique was selected based on its alignment with targeted learning styles and the nature of the subject matter. This design aimed to engage students actively, support real-time feedback, and promote deeper conceptual understanding through interactive, formative learning experiences.

Processing of formative assessment evaluation: A variety of formative assessment techniques were implemented using digital tools to enhance student engagement and reinforce learning during practical anatomy sessions. Below is a description of each method and its associated platform:

1. Quiz (Kahoot!): We utilized Kahoot!, a free game-based learning platform [33], to conduct a formative assessment on the topic of osteology. The instructor entered multiple-choice questions into the Kahoot interface, specifying a time limit for each. Students accessed the quiz using a unique game PIN provided by the instructor. The session consisted of five multiple-choice questions, and performance was immediately evaluated. At the conclusion of the quiz, students viewed their individual and collective results, including correct and incorrect responses, via a projected display.
2. Exit Ticket (Socrative): The Exit Ticket technique was used to assess key takeaways from the lecture. Students responded to three short-answer questions related to osteology using Socrative, a web-based formative assessment tool that enables teachers to pose questions and gather feedback in real time [34]. The instructor created a virtual classroom ("room") and invited students via a shared URL; no student account was necessary. Responses were collected and reviewed to inform subsequent instruction.
3. One-Minute Report (Poll Everywhere): To prompt reflection and identify areas of confusion, we used Poll Everywhere, a live audience response system [35]. Students answered two open-ended questions concerning the subclavian artery: (1) "What was the most important concept you learned today?" and (2) "Which concept was least clear in today's lecture?" Responses were displayed in real time, providing immediate insights into student understanding.
4. One-Sentence Summary (ProProfs): Using ProProfs, an interactive learning platform that allows instructors to create and share flashcards and quizzes [36], students were asked to summarize key concepts from the session in a single sentence. This activity required students to synthesize and simplify complex material on facial muscles. A team-based quiz followed, where each group responded to three targeted questions. This approach facilitated the segmentation of content into more manageable and memorable units.
5. Directed Rewriting (Nearpod): Fifteen minutes before the end of the session, students engaged in group discussions focused on head and neck radiology and superficial anatomy, using an image-based prompt accompanied by three related questions. They then summarized the content in their own words and presented it to peers. Nearpod, an interactive instructional platform [37], was used to support this activity. After creating an account, the instructor shared an access code with students, enabling them to join the session and participate collaboratively in real time.
6. Confused Model (Verso): At the conclusion of the training, students were asked to identify and describe the most confusing or least understood aspect of the topic (pterygopalatine fossa). The Verso app, an anonymous feedback and survey tool [38], was used to collect responses. The instructor created an online survey and distributed the access link to students, who submitted their feedback confidentially.
7. Logical Model (Mindomo): To promote deeper conceptual understanding, students were instructed to create a concept map illustrating the anatomical neck triangles. Mindomo, a cross-platform application available on Windows, macOS, Linux, iOS, and Android, was used for this task. The platform supports the development of logical models and digital diagrams [39], allowing students to visualize the structural relationships and spatial organization within the neck region.

Instruments

Learning outcomes: Students' learning outcomes was evaluated using their midterm and final examination scores. Both assessments were standardized with respect to structure, content coverage, administration procedures, and timing. Examinations were administered under controlled conditions, and the research team directly supervised the entire process to ensure consistency and fairness across both the intervention and control groups.

Test anxiety: Test anxiety was assessed using the Sarason Test Anxiety Scale [40-42], a validated and widely adopted self-report instrument comprising 37 dichotomous (yes/no) items. The scale captures both psychological and physiological symptoms of anxiety associated with examinations. Total scores range from 0 to 37, with higher scores indicating elevated levels of test anxiety. Based on established scoring guidelines, scores ≤12 denote mild anxiety, scores between 13–20 reflect moderate anxiety, and scores >20 indicate severe anxiety. The instrument has demonstrated robust psychometric properties in prior research [43-45]. In the present study, the internal consistency of the instrument was re-evaluated, yielding a Cronbach's alpha of 0.72. To monitor changes in anxiety levels over time, the Sarason scale was administered at three key points: baseline (prior to the intervention), immediately before the midterm exam, and immediately before the final exam.

Demographic information: Demographic data were collected to assess potential confounding variables and to confirm baseline equivalence between groups. Variables

included gender, type of admission, and residency status. These data facilitated subgroup analyses and allowed for statistical control of background characteristics when interpreting outcomes.

Data analysis: All statistical analyses were conducted using IBM SPSS Statistics for Windows, Version 27 (IBM Corp., Armonk, NY, USA). The Kolmogorov–Smirnov test was applied to assess the normality of the data distribution. Since the assumption of normality was not met, non-parametric statistical methods were employed.

Group comparisons were performed using the Mann–Whitney U test, and the interquartile range (IQR) was calculated to describe the dispersion of scores. A P-value of <0.05 was considered statistically significant for all analyses.

Results

In this study, a total of 147 medical students were enrolled, with 69 students (47%) assigned to the control group and 78 students (53%) to the intervention group. The demographic characteristics of participants are summarized in Table 2. Statistical analyses indicated no significant differences between the two groups in baseline characteristics that could potentially confound the outcomes (P-value>0.05), confirming demographic homogeneity at the outset of the study.

As shown in Table 3, the intervention group demonstrated significantly higher mean ranks on both the midterm and final examinations compared to the control group.

Table 2. Demographic characteristics of the participants

Characteristic		Control (n=69)	Intervention (n=78)	P-value
Gender	Male (%)	34 (49.3)	41 (52.6)	0.69
	Female (%)	35 (50.7)	37 (47.4)	
Admission type	Tuition-free (%)	58 (84.1)	62 (79.5)	0.27
	Tuition-paying (%)	7 (10.1)	14 (17.9)	
	International (%)	4 (5.8)	2 (2.6)	
Residency status	Local (%)	30 (43.5)	44 (56.4)	0.11
	Non-local (%)	39 (56.5)	34 (43.6)	

Note: n indicates the number of participants.
Values in parentheses represent the corresponding percentages.
P-values were calculated using the Chi-square test or Fisher's exact test, as appropriate.

Table 3. Comparison of learning outcomes between the two groups

Exam	Mean rank (control)	Mean rank (intervention)	P-value
Midterm	59.25	82.62	<0.001
Final	38.15	100.21	<0.001

Note: The data are presented as mean ranks of the relevant variables.
P-values were calculated using the Mann–Whitney U test.

Figure 1 presents a boxplot comparison of learning outcomes between the control and intervention groups, based on midterm and final exam scores. Students in the intervention group significantly outperformed their counterparts in both assessments (P-value<0.001). The mean rank of exam scores was significantly higher in the intervention group (mean rank=82.62) compared to the control group (mean rank=59.25) (P-value<0.05). For the final exam, the intervention group showed a higher mean rank (100.21) than the control group (38.15), indicating a statistically significant difference. Additionally, the intervention group exhibited lower score variability, reflecting more consistent academic performance. These results indicate that the intervention had a substantial and positive impact on student learning outcomes.

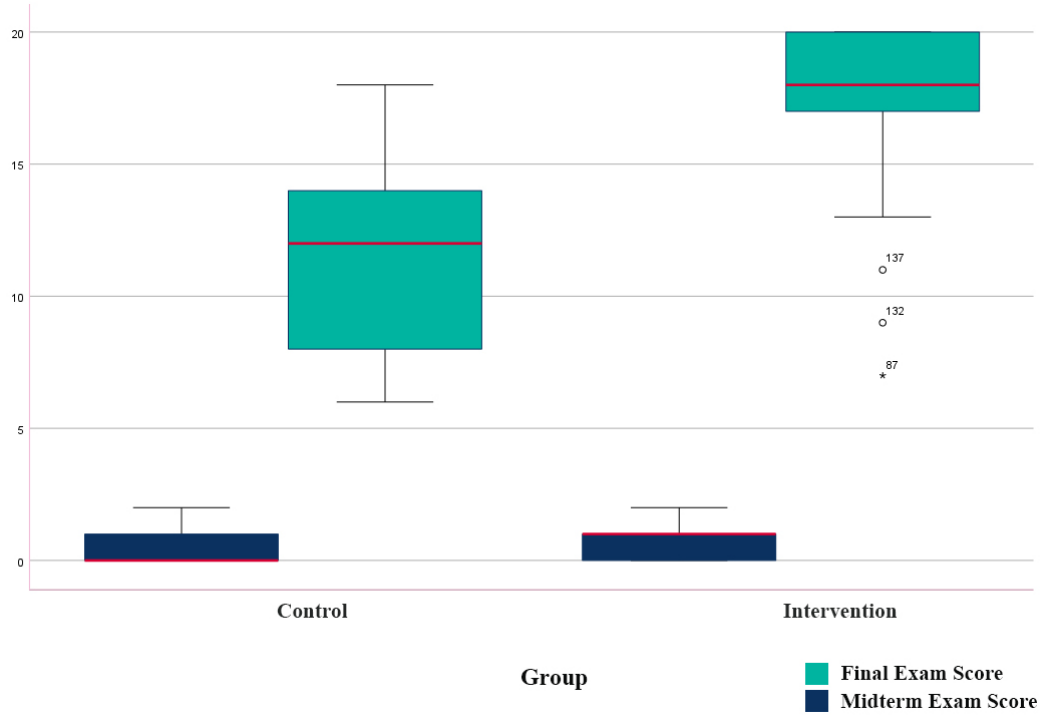

Figure 1. Boxplot comparison of midterm and final exam scores in control and intervention groups

The impact of the TEFA method on test anxiety was evaluated at three time points: (1) prior to the study, (2) before the midterm exam, and (3) before the final exam (Table 4). Although the control group consistently exhibited higher mean ranks of test anxiety compared to the intervention group, the differences were not statistically significant (P-value>0.05), as determined by the Mann–Whitney U test.

To complement the statistical analysis, a line graph was developed to illustrate trends in test anxiety across the three time points for both groups (Figure 2). The intervention group, which received TEFA, consistently reported lower anxiety levels than the control group. While these differences were not statistically significant, the visual trend suggests a potential moderating effect of TEFA on test anxiety over time, indicating possible emotional benefits not fully captured by quantitative analysis.

Additionally, the comparison of median test anxiety scores between the two groups is provided in Table 5.

Table 4. Comparison of test anxiety between the two groups

Time point	Mean rank (control)	Mean rank (intervention)	P-value
Before study	79.53	78.94	0.13
Before midterm exam	74.85	73.25	0.82
Before final exam	75.64	72.55	0.66

Note: Data are presented as Mean Ranks.
P-values were calculated using the Mann–Whitney U test.

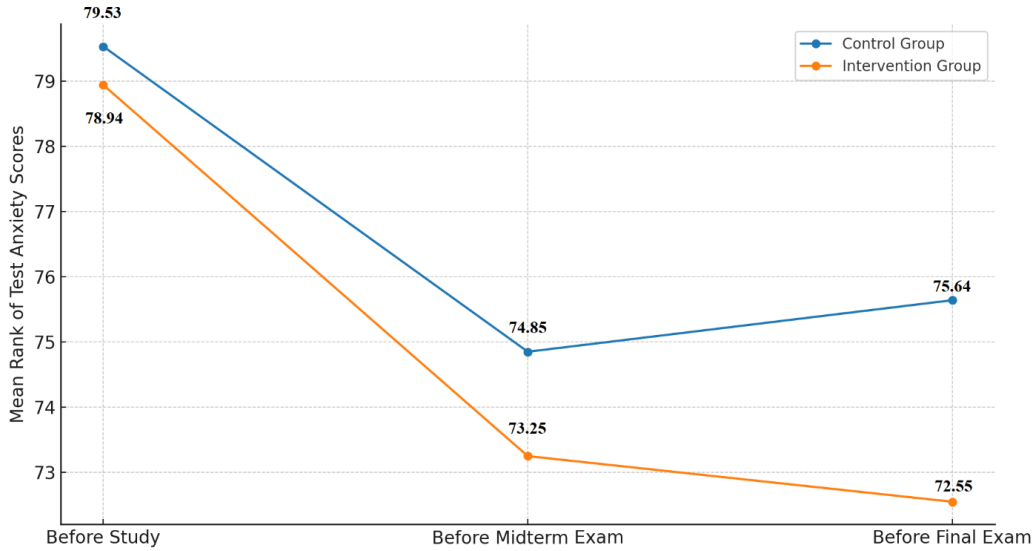

Figure 2. Trends in test anxiety scores across three time points in control and intervention groups

Table 5. Comparison of median test anxiety scores between intervention and control groups

Group	Median anxiety score	P-value
Intervention	14.32	0.087
Control	16.89	

Although the intervention group demonstrated a lower median test anxiety score compared to the control group, the difference was not statistically significant (P-value=0.087). Nevertheless, this trend may indicate a potential effect of the TEFA approach in alleviating test-related anxiety. Further research with larger sample sizes is warranted to substantiate this potential benefit.

Discussion

The findings from this quasi-experimental study demonstrate that TEFA significantly improved learning outcomes in anatomy education among medical students. The intervention group demonstrated significantly higher mean ranks in both the midterm (82.62 vs. 59.25) and final examinations (100.21 vs. 38.15) compared to the control group (P-value<0.001). However, while a reduction in test anxiety was observed, this difference did not reach statistical significance, suggesting that multiple factors beyond assessment methodology influence student anxiety levels.

These results align with the growing body of evidence supporting the integration of digital technologies in medical education. The significant improvement in learning outcomes corroborates previous research demonstrating that formative assessment serves as a valuable method for enhancing students' learning by offering timely and effective feedback through digital platforms [46]. The effectiveness of the specific tools employed in this study—including Kahoot!, Socrative, Poll Everywhere, and other interactive platforms—reflects broader trends in medical education toward technology-enhanced learning environments that promote active student engagement [31, 47].

The implementation of various digital platforms in this study demonstrates the versatility and effectiveness of TEFA tools. Kahoot!, used for quiz-based assessments, has been consistently shown to be effective in anatomy education, improving collaborative learning, knowledge retention, attendance, and participation [48]. Research specifically examining Kahoot! in anatomy education found that the platform offers teachers a new and engaging way to assess students' knowledge while encouraging classroom participation [49, 50]. The game-based learning approach inherent in Kahoot! motivates students to study, helps them determine subject matter that needs attention, and increases awareness of their learning progress [49].

The use of Socrative for exit tickets and Poll Everywhere for one-minute reports aligns with findings that TEFA provides low-stakes, personalized feedback opportunities that support self-regulated learning [1]. These platforms create safe learning environments where trial-and-error learning is permitted without fear of academic consequences [4]. The implementation of concept mapping through Mindomo and directed paraphrasing via Nearpod reflects the growing recognition that diverse technological approaches are necessary to

accommodate different learning styles and maximize educational effectiveness [51].

The significant improvement in learning outcomes observed in this study is consistent with multiple previous investigations. A study utilizing Google Form-based multiple choice question (MCQ) tests in biochemistry education found significant improvement in students' scores, with 99.3% of students reporting high benefit from formative assessment tools in the teaching-learning process [52]. Similarly, research on crossword puzzles as formative assessment tools demonstrated that students who participated in crossword activities achieved significantly higher scores than those receiving lecture-only instruction [47].

The effectiveness of TEFA in anatomy education specifically has been documented across various technological platforms. Virtual reality (VR) applications in anatomy education have shown significant improvements in students' understanding and retention of knowledge, allowing visualization and interaction with complex structures in ways not possible with traditional methods [53, 54]. However, this study's focus on more accessible digital tools—rather than high-cost technologies like VR—demonstrates that significant learning improvements can be achieved with readily available, cost-effective platforms [3].

The finding that TEFA did not significantly reduce test anxiety, despite showing a trend toward lower anxiety levels in the intervention group, requires careful interpretation. This result is consistent with research suggesting that test anxiety in medical students is influenced by multiple complex factors beyond assessment methodology alone [19, 55]. Studies have shown that test anxiety affects substantial proportions of medical students, with prevalence rates ranging from 18% to over 88% depending on the assessment method and measurement tools used [17, 18].

The persistence of test anxiety despite improved learning outcomes may reflect the multifaceted nature of anxiety in medical education, influenced by factors including gender, academic year, study habits, and pre-existing psychological conditions [21, 56]. Research has consistently shown that female students report significantly higher anxiety levels than male students across various assessment formats [19, 23], and that anxiety fluctuates at different stages of the assessment process [22]. The finding that TEFA did not significantly impact anxiety levels suggests that addressing test anxiety may require comprehensive interventions beyond technological enhancements to assessment methods [25].

The implementation of TEFA in anatomy education addresses several documented challenges in the field. Anatomy education faces unprecedented challenges including dramatic reductions in allocated teaching hours, decreased numbers of trained anatomists, increased class sizes, and the need to accommodate novel subjects within compressed timeframes [8, 10]. The COVID-19 pandemic further highlighted these challenges, with 82.4% of students reporting that distance anatomy education was less efficient than traditional approaches, particularly for practical sessions [57].

Traditional anatomy education relies heavily on hands-on experiences including cadaveric dissection, prosection, and manipulation of anatomical models, which are difficult to replicate in digital formats [58, 59]. However, this study demonstrates that well-designed TEFAs can bridge some of these gaps by providing interactive, engaging alternatives that support knowledge acquisition and retention [51]. The variety of digital tools employed—from quiz platforms to concept mapping applications—addresses the need for diverse pedagogical approaches to accommodate different learning preferences and styles [60].

The findings of this study have several important implications for medical educators and curriculum designers. The significant improvement in learning outcomes suggests that TEFA should be integrated as a routine strategy in anatomy education to foster deep learning. The cost-effective nature of the digital tools employed—including free platforms like Kahoot! and Socrative—makes this approach accessible to institutions with varying resource constraints [61].

The implementation strategy described in this study provides a practical framework for educators seeking to integrate TEFA into their curricula. The provision of instructor training on implementation protocols and digital tools, along with student tutorial videos, represents best practices for technology adoption in educational settings [62]. The variety of assessment techniques employed—ranging from immediate feedback quizzes to reflective concept mapping exercises—demonstrates the importance of utilizing multiple modalities to address diverse learning needs and preferences [63].

This study contributes to the broader discourse on educational innovation in medical training. The integration of technology-enhanced assessment aligns with contemporary competency-based medical education frameworks that emphasize learner-centered instruction and continuous improvement [28, 64]. The findings support the strategic incorporation of digital tools to enhance learning outcomes while maintaining focus on fundamental knowledge acquisition [65].

The positive outcomes observed in this study, combined with similar findings in other medical education contexts, suggest that TEFA represents a promising direction for educational innovation that can improve both learning effectiveness and student engagement [66, 67]. However, the persistence of test anxiety despite improved learning outcomes emphasizes the need for holistic approaches to student support that address both academic and psychological dimensions of medical education [68, 69].

In conclusion, this study provides compelling evidence for the effectiveness of TEFA in improving anatomy learning outcomes. While challenges remain in addressing test anxiety, the significant improvements in academic performance demonstrate the value of integrating accessible digital tools into medical education. Future research should continue to explore optimal implementation strategies, long-term learning retention, and comprehensive approaches to supporting student well-being in technology-enhaced learning environments.

Limitations and future directions: Several limitations of this study warrant discussion. The investigation was conducted at a single institution, which limits the generalizability of findings to other educational contexts and student populations.

In addition, the absence of individual-level randomization represents a methodological limitation. Although baseline demographic equivalence was confirmed, the use of pre-existing class groups may introduce potential selection bias and limits causal inference. Future studies employing randomized controlled designs are recommended to strengthen internal validity. The measurement of test anxiety using the Sarason Test Anxiety Scale, while validated, captures only one dimension of student psychological responses to assessment. Future research should explore additional measures of student stress, motivation, and engagement to provide a more comprehensive understanding of TEFA's impact on student well-being [25]. Longitudinal studies examining the sustainability of learning improvements and the long-term effects on student confidence and clinical performance would provide valuable insights into the lasting benefits of TEFA.

Conclusion: This study provides compelling evidence that TEFA significantly improves academic performance in anatomy education among medical students. The intervention group achieved higher scores on both midterm and final exams, demonstrating the value of using diverse digital tools such as Kahoot!, Socrative, and concept mapping platforms to foster active engagement and deeper learning. However, while TEFA was associated with lower test anxiety levels, the reduction was not statistically significant, indicating that assessment innovation alone may not fully address psychological stressors. These findings suggest that TEFA should be integrated into anatomy instruction as a routine practice to support academic success, while comprehensive student support systems should be developed to effectively manage exam-related anxiety.

Ethical Considerations

Ethical approval for this study was obtained from the Research Ethics Committee of the School of Medicine, Mashhad University of Medical Sciences, Iran (Approval ID: IR.MUMS.MEDICAL.REC.1402.410; Approval Date: 17 October 2023). The study was conducted in accordance with the principles of the Declaration of Helsinki. Participant confidentiality was rigorously safeguarded. Prior to the commencement of the study, students were fully informed about the study objectives and the voluntary nature of participation. Written informed consent was obtained from all participants before enrollment.

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Conflict of Interest

The authors declare no financial or non-financial conflicts of interest.

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