

The Role of Holding Medical Students' National Scientific Olympiads in Medical Education Enhancement: A Narrative Review of Student and Faculty Perspectives

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Abstract

Background: Improving medical education involves various aspects, one of which is increasing student empowerment. The purpose of organizing scientific Olympiads is to prepare medical students to solve problems in a competitive environment.

Objectives: Therefore, this study examines the role of scientific Olympiads in improving medical education.

Methods: In this review, relevant articles were identified through an internet search of international databases, including PubMed, Scopus, and Web of Science, as well as Persian databases such as SID and Magiran. The search employed a combination of keywords such as 'Medical education,' 'Scientific Olympiad,' 'Medical students,' etc. A total of 47 studies were obtained. After excluding 38 studies that did not meet the inclusion criteria, the remaining 9 studies were reviewed.

Results: After reviewing the articles, the views of students and faculty were assessed. Overall, the views were categorized into two parts: positive and negative. Some of the positive views included improving problem-solving skills, reasoning, and creativity, developing relationships between universities and students, and creating a healthy academic competition environment. Negative views included uninterested students, memorizing some questions, and a disproportionate volume of resources concerning study opportunities, among others.

Conclusion: The results showed that holding scientific Olympiads for medical students in the country can improve medical education. The overall performance of scientific Olympiads was satisfactory from the perspective of students and faculty. On the other hand, paying attention to weaknesses and attempting to eliminate them may be a suitable approach to achieving the goals of medical education.

Keywords: Scientific Olympiad; Medical Students; Medical Education

Background

The primary goal of medical education is to train skilled health professionals with sufficient and up-to-date knowledge, who prioritize patient care over their own interests and are committed to maintaining and continually developing their expertise throughout their careers (1). To achieve this important goal, medical universities play a key role (2). Achieving the goals of medical education requires strong, visionary leadership that responds effectively to both internal and external

challenges. This leadership should effectively guide our current students on their path to a medical career. Achieving this requires ongoing review and enhancement of medical education, actively addressing its shortcomings (3, 4).

Improving medical education encompasses various aspects, one of the most fundamental approaches being the increase in student empowerment (5). Student empowerment, as a motivation-based construct, refers to learners finding meaningful tasks, feeling competent

to perform them, and perceiving that their efforts have an impact within the learning (6). No one can deny the importance of universities in identifying, nurturing, and guiding students' scientific talents. Although educational methods in the past provided students with information and concepts in a theoretical manner, today, the analysis, prioritization, and organization of new knowledge —essential for critical thinking and effective learning —have become more important (7). Additionally, enhancing skills such as decision-making, problem-solving, clinical reasoning, practical skills, and integrating existing knowledge will increase students' competence and help achieve the goals of medical education (8-10). Since medical students are the intellectual capital of a society and play an essential role in improving health, supporting superior talents and creating opportunities for their growth are among the most important tasks of educational institutions, and the use of talents can bring about significant changes in scientific, social, and economic fields (11-13).

Numerous studies show that friendly competitions provide strong motivation for students and help improve their performance (14-16). Creating a healthy, competitive environment in medical science education is an effective approach to guide students toward a full understanding of the concepts presented. It also encourages students to refer to relevant articles and participate in group learning, both of which are essential for promoting the competence of medical science students (15).

Science Olympiad is an event that provides a competitive environment for student groups from medical universities across the country (17). In general, the purpose of holding science Olympiads at the national and international levels is to compensate for the weaknesses in the education system. Therefore, these Olympiads aim to identify creative and innovative talents by conducting tests and, by optimally utilizing the elite, provide the necessary platform for the progress and development of society (18). The Science Olympiad has a history spanning 80 years. Russia was the first country to hold science Olympiads (19).

In Iran's healthcare system, the initial idea of holding a student scientific Olympiad in medical sciences was proposed in 2000 at Isfahan University of Medical Sciences. The first Olympiad was held at the same institution for undergraduate and professional doctorate students of medicine in 2009. Subsequent Olympiads were held in Shiraz, Tehran, Tabriz, and Kerman, respectively (20, 21). The purpose of holding the Olympiad for university students in our healthcare

system is to prepare groups of medical science students to solve problems in a competitive environment, which can be effective in maintaining and promoting community health. Therefore, efforts to develop problem-solving and reasoning skills, emphasize critical and creative thinking, focus on the goals of the healthcare system, and encourage teamwork are among the primary objectives of the Olympiad (20).

It seems that holding a national festival like the Olympiad can encourage medical science students to go beyond routine studies and may potentially fill some educational gaps in health system education (22).

Objectives

Therefore, this study reviews the role of holding scientific Olympiads for medical science students in promoting medical education from the perspectives of both students and faculty.

Methods

This study is a narrative review that aims to investigate the role of scientific Olympiads for medical students in the country in improving medical education from the perspectives of students and faculty. To identify relevant articles, an internet search was conducted between 2009 and 2024 (in other words, from 2009 to the present, when the scientific Olympiads of medical students began) in the international databases PubMed, Scopus, and Web of Science, and the Persian databases SID, Magiran, and the scientific search engine Google Scholar, using a combination of the keywords in Table 1.

Studies were included if they focused on medical students' scientific Olympiads, presented perspectives from students or faculty, and were available in full-text format in either English or Persian. Studies were excluded if they were irrelevant, duplicate records, letters to the editor, or lacked sufficient methodological detail. A total of 47 studies were retrieved, of which 38 were excluded because they did not meet the predefined eligibility criteria. A large proportion of retrieved studies were not directly focused on scientific Olympiads or did not provide perspectives from students or faculty relevant to the Olympiad context. Several articles were excluded because they were duplicates or not available in full text. Due to the limited number of studies in this field and the unique nature of the Olympiad exam in the country, all 9 remaining articles, including descriptive studies, case reports, qualitative studies, and action research, were included and reviewed.

Results

After reviewing the full texts of the articles, the perspectives of students and faculty on the role of scientific Olympiads for medical sciences students in the country's universities were examined. The details and results of these studies are presented in Table 2. Among the 9 articles, there were 4 qualitative studies, 2 case reports, 2 cross-sectional studies, and 1 action research project. The temporal distribution of the studies indicates that most articles were conducted in the early years of these scientific Olympiads for medical sciences students. Most studies primarily examined the students' perspectives, while only 3 studies also considered the faculty's perspectives. We categorized participants' views into two sections: positive views and negative views, which will be explained below.

Positive viewpoints: Overall, the majority of students in all studies were satisfied with the organization and quality of the Olympiads. One study stated that most students would recommend this exam to their friends. Four studies reported that the Olympiad improves students' problem-solving skills. Improved reasoning in the learning process of students during this exam was reported in three studies. Other notable skills mentioned in the studies included creativity, scientific thinking, and teamwork. Creating motivation in students for greater success in their future professional lives was another positive viewpoint. Additionally, the necessity and main philosophy of holding Olympiads, as stated by experts, were to improve the performance of the health sector, expand mutual relations between universities, develop scientific competition, and stimulate students' creativity. One study stated that, from the perspective of the majority of participants, the achievements of holding these Olympiads are insignificant compared to their costs. In one study, most students stated that the clinical reasoning exam of the Olympiad is a useful test for assessing competence. In two studies, the important strength of this exam was identified as the development of relationships between universities and students. Increasing students' motivation and creating a healthy scientific competition environment were also among the positive viewpoints mentioned in the reviewed studies.

Negative perspectives: One study reported that, from the perspective of most students (88%), the skills required for this exam are not taught at the university. The most significant obstacles identified in one study were the lack of effective communication between universities, inadequate support for hosting these Olympiads, low faculty motivation, unenthusiastic

students, and insufficient resources and facilities. Although increasing reasoning and problem-solving skills was mentioned as one of the strengths of the Olympiad in numerous studies, in one study, students objected to the rote memorization aspect of some of the questions and stated that the questions should be designed in a reasoned and analytical manner. The disproportionate volume of resources allocated compared to the study opportunity, as well as the low effectiveness of the Olympiad in developing and enhancing students' skills in other professional or interdisciplinary fields, were also reported. Considering that improving students' educational skills and ultimately improving the performance of the health sector were among the goals and positive points, one study stated that if this exam is not implemented correctly and the problems of previous periods are not solved, it will not help the health system and can impose significant costs on the system.

Key findings from the studies indicate that the Medical Sciences Olympiad is widely viewed as a valuable initiative that enhances students' problem-solving and teamwork skills while fostering academic creativity. However, challenges such as high costs, reliance on memorization-based questions, and weak institutional support hinder its full potential. To maximize impact, experts recommend independent oversight, diversified assessments, and stronger collaboration between universities and faculty.

Discussion

This review study was conducted to investigate the role of holding scientific Olympiads for medical students in enhancing medical education from the perspectives of both students and faculty. The results showed that most students and faculty were satisfied with the overall performance of the scientific Olympiads. We divided participants' views into two parts: positive views and negative views.

As mentioned in previous sections, a key goal of medical education is to train skilled and competent personnel (1). Achieving this requires empowering students and providing them with up-to-date education. Factors affecting competence development in medical students include enhancing skills such as problem-solving, critical thinking, creativity, and clinical reasoning (7, 8). Cotrer et al. (2013) stated that clinical reasoning is a vital skill for all physicians, regardless of their specialty, and helping trainees develop effective clinical reasoning is a primary goal of medical education (29). Since the promotion of clinical reasoning,

problem-solving, critical thinking, and teamwork has been identified as a major strength of scientific Olympiads, as indicated by positive perceptions from reviewed studies, it can be concluded that these exams are likely effective in meeting medical education goals and enhancing their development. Similarly, a 2016 study by Egochi reported that competitions like the Olympiad challenge students' reasoning, creativity, and problem-based learning skills, while also fostering collaboration and teamwork (30). Another beneficial aspect of the Olympiad is the creation of a healthy, scientific, competitive environment. Lei et al. (2016) also noted that establishing such an environment in medical education helps students understand concepts more comprehensively. This setting encourages participation in group learning, which is critical for improving competence (14).

Additionally, Olympiads offer opportunities to strengthen relationships between universities and students, positively impacting students' learning experiences (31). In 2016, Kulbago et al. emphasized that the interplay between competition and cooperation is essential during the Olympiad, and interactions within and between teams help students develop their social and life skills in addition to knowledge (32). Lastly, motivating students to achieve greater success in their future careers was also viewed positively. In 2024, Pattipeilohy et al. noted that Indonesia's National Science Olympiad positively impacted the quality of education, potentially preparing young Indonesians to face future global challenges by boosting motivation, developing critical and analytical skills, raising educational standards, identifying talents, and fostering networks and collaborations (33). Conversely, although many studies suggest that the Olympiad enhances reasoning and problem-solving skills, some students have objected to memorizing certain questions and suggested that questions should be framed in an argumentative and analytical manner. Therefore, improving question quality could better empower students in reasoning and problem-solving (34). It's worth noting that this issue has been previously discussed, and as the quality of Olympiad questions evolves annually, recent data should be examined. Another concern raised was the lack of training in Olympiad-relevant skills at universities. Since skills such as problem-solving, reasoning, critical thinking, and teamwork are promoted through the Olympiad and are vital for the development of medical education, emphasizing these skills within university programs

could positively influence policy and educational planning.

Furthermore, low motivation among faculty and students' lack of interest are significant barriers. Strategies aimed at increasing motivation could greatly enhance engagement with scientific Olympiads (35-36). For instance, Vahedi et al. (2016) identified continuing higher education and becoming faculty members as key motivations for students participating in the Olympiad. Focusing on these motivations could encourage greater student participation (37). Similarly, in 2023, Moradi et al. pointed out that both material and non-material rewards can significantly motivate Olympiad participants (38). Although many participants felt that the benefits gained from Olympiads are modest relative to their costs, some believed that improperly conducted Olympiads, coupled with unresolved course issues, could harm the health system and lead to unnecessary expenses. In 2010, Campbell et al. highlighted the importance of finding cost-effective ways to develop student talent amid rising education costs (39). Finally, the excessive volume of resources presented as study material was identified as another obstacle to achieving Olympiad goals. Qaedamini et al. (2023) reported that the overwhelming nature of lesson content can deter improvements in educational quality (40). Therefore, considering the resource volume in relation to students' available time is crucial for enhancing the quality of Olympiad assessments and medical education overall.

Conclusion

Results showed that holding scientific Olympiads for medical students in the country can be beneficial for improving medical education. The overall performance of scientific Olympiads was satisfactory from the perspective of students and faculty. According to the study, hosting Olympiads can enhance education by developing skills such as reasoning, problem-solving, and critical thinking, fostering a healthy competitive environment, and boosting student motivation. On the other hand, paying attention to the weaknesses and trying to eliminate them can probably be a suitable approach to achieving the goals of medical education.

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Table 1. Search keywords

Word	Search keywords	
	English	Persian
Medical Education	Medical education, education promotion, and education development	آموزش پزشکی، ارتقای آموزش، توسعه آموزش
Scientific Olympiad	Olympiad, scientific Olympiad, medical Olympiad, national Olympiad, scientific competition	المپیاد، المپیاد علمی، المپیاد پزشکی، المپیاد ملی، رقابت علمی
Medical students	Medical students, undergraduate students	دانشجویان علوم پزشکی، دانشجویان درحال تحصیل
Iran	Iran, Iranian	ایران، ایرانی

Table 2. Characteristics and results of the articles reviewed in the study, in order of publication year

Author/Year	Type of study	Study objective	Students/Faculty Views on the Olympiad
Adibi et al. 2011 (21)	Action research	Expressing experience in designing, holding, and evaluating Olympiads	Although 94% of students believed the Olympiad differed from regular university exams, around 60% were satisfied with its overall quality, and 72% encouraged their peers to participate. Nonetheless, they suggested that to maintain its quality, an independent institution, preferably outside the Ministry of Health, should conduct annual and long-term evaluations to measure goal achievement.
Amini et al. 2011 (7)	Case report	Describing the experience of holding the country's second National Medical Sciences Olympiad	Ninety five point four percent of students were satisfied with participating in the Olympiad, 97.2% believed problem-solving skills should be part of the university curriculum, 87.4% felt the Olympiad enhanced their scientific thinking and problem-solving abilities, and 85.2% said it motivated them to pursue greater career success.
Hadizadeh et al. 2011 (23)	Case report	Expressing experiences gained in the process of holding the Olympiad	Most students (98%) reported that the test was different from typical university tests and that the skills required for the test were not taught at university (88%). They believed that the test measured creativity, problem-solving, and reasoning (52%).
Amini et al. 2012 (24)	Cross-sectional	Details of the clinical reasoning test in the Olympiad and participants' satisfaction with it	Most students believed that the Clinical Reasoning Test was a useful test for assessing competence. More than 50% of them reported that success in this test required clinical competence, teamwork, and problem-solving ability. Therefore, it could increase students' willingness to participate in group work and be beneficial.
Ghojzadeh et al. 2015 (25)	Qualitative	Assessing the opinions of Olympiad experts regarding the necessities, costs, achievements, obstacles, and solutions for holding effective Olympiads.	Experts described the Olympiad's core philosophy as improving health sector performance, enhancing inter-university collaboration, fostering competition, and stimulating student creativity. However, most participants felt its achievements didn't justify the costs. Key obstacles included poor communication between universities, a lack of support, low faculty motivation, student disinterest, and limited facilities.
Hazrati et al. 2015 (26)	Qualitative	Analyzing students' opinions on strengths and weaknesses, and their suggestions for better holding of the Medical Science Olympiad exams in the country	Most participants were satisfied with the exam execution and the provided services. They criticized the memorization-based questions and preferred analytical and argumentative formats. Suggestions included enhancing topic specificity, increasing subject diversity in laboratory sciences, and comparing students with similar grades to foster healthy competition.
Nasrollahpour-Shirvani et al. 2015 (27)	Cross-sectional	Investigating the level of satisfaction of national candidates with the quality of holding the Fifth Scientific Olympiad	National candidates reported the highest satisfaction with the relevance of the questions to their field and the distinctiveness of the test content compared to typical university exams. The lowest satisfaction was with the ratio of introduced resources to study opportunity and the Olympiad's effectiveness in enhancing skills for other careers or interdisciplinary fields.
Azami-Aghdash et al. 2016 (28)	Qualitative	Evaluating the views of faculty members regarding the mission and performance of the Medical Sciences Olympiad	Most participants (79%) had a positive view of the Olympiad. Faculty members highlighted their strengths in promoting reasoning, teamwork, and academic collaboration. Key weaknesses included limited question authorship, low motivation for participation, and lack of innovative output from descriptive tests.
Hajinezhad et al. 2021 (17)	Qualitative	Explanation of issues related to the Iranian Medical Students' Scientific Olympiad program	Students, faculty, and officials believe the Olympiad can foster inter-university scientific exchange and enhance educational practices in medical schools. However, without proper implementation and resolution of previous issues, it may burden the health system without offering real benefits.