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Competition-based learning in medical school: A literature review

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Abstract

Introduction: The healthcare sector faces increasingly complex challenges, prompting curriculum reforms in medical education to enhance healthcare service. The prevalent curriculum, Integrative System-Based utilizes a Problem-Based Learning (PBL) variation for consistent and structured medical practice. Additionally, an alternative method, Competition-Based Learning, has been identified to boost student motivation, improve final grades, and foster collaboration and self-confidence. The aim of this study is to provide a brief summary about the role of competition-based learning in the learning process of medical students.

Materials and Methods: Articles and studies were acquired from PubMed and ScienceDirect. Keywords used were: 'competition', 'medical student', 'learning process', 'medical education'.

Results: Several studies have shown that students' participation in competitions can transform their perspective toward the competed field in a more positive manner, increase motivation to study specific fields, and serves as a evaluative instrument for refining competencies and addressing weakness. The implementation of competitions in the learning process has been proven to enhance students' final grades.

Conclusion: The implementation of Competition-Based Learning can be considered as a complement to the existing medical education curriculum.

Keywords: Competition; Medical student; Learning process; Medical education

1. Introduction

Challenges in the healthcare sector are become increasingly complex over time [1]. Therefore, curriculum reforms are being implemented in medical education, with the expectation of delivering improved and professional healthcare services [1,2]. Currently, the widely adopted curriculum is the Integrative System-Based curriculum, a variation of Problem Based Learning (PBL) method, which enables medical graduates to practice consistently and in a structured manner [2]. In addition to the Integrative System-Based Curriculum, there is an alternative learning method that can be implemented, namely Competition-Based Learning. Several studies indicate that in a competitive environment, student's motivation to learn increases, leading to improved final grades. Additionally, this fosters collaboration and enhances self-confidence, as indicated by studies [3, 4, 5, 6]. The aim of this review is to summarize the role and potential of competition-based learning in medical student's education.

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2. Material and methods

This literature review examines the current knowledge and findings on competition among medical students, utilizing PubMed and ScienceDirect for literature and article. Keyword used were: 'competition', 'medical student', 'learning process', 'medical education'. Supplementary information was extracted from grey articles to maximize insights.

3. Results and discussion

3.1. Current Curriculum Trends in Medical School

Numerous medical institutions have addressed globalization challenges by developing modern curricula to educate physicians that capable of tackling contemporary global health issues [2]. The resulting Integrated-System Based curriculum seamlessly blends basic medical sciences or biomedical sciences with clinical sciences [2]. These curricula are perceived as more relevant and impactful by medical student. The Integrated-System Based curriculum enhances problem-solving skills, concept retention, fosters active and independent learning, strengthens analytical abilities, and eliminates barriers between basic medical sciences and clinical medicine [7, 8, 9]. The Integrated-System Based curriculum utilizes the Problem-Based Learning (PBL) method in the students' learning process. The PBL method was developed by McMaster University in 1969. This method is organized in small group comprising 8-10 individuals and guided by a tutor, with aim of addressing a given scenario [10]. The PBL methodology is effective in enhancing students' abilities to lead a team, collaborate in groups, and communicate effectively [2, 10]. This, in turn, aims introduce competencies that contribute to improving the healthcare system.

In 2010, the Carnegie Foundation for the Advancement of Teaching, an organization focused on education in United States, recommended four main goals for modern medical education [2], detailed in Table 1.

Table 1 Four goals for modern medical education

1.	Standardize the learning outcomes and general competencies and provide options for customizing the learning process, providing opportunities for experiences in research, policy making, education, etc., reflecting the broad role played by physicians
2.	In practice, physicians must constantly integrate all aspects of their knowledge, skills and values. They should acquire skills to educate, advocate, innovate, investigate, and manage teams
3.	Medical schools and teaching hospitals should support the engagement of all physicians-in-training inquiry, discovery and system innovation
4.	Development of professional values, actions, and aspirations should be the backbone of medical education

3.2. Competition as an Extracurricular Activity in Medical School

Participation in extracurricular activities can bring several benefits to medical students, including improved academic performance, increased motivation to attend lectures regularly, and the development of soft skills such as leadership and teamwork [12]. Student participation in competitions has proven to be effective in enhancing students' motivation towards specific subjects and improving academic achievement [4]. Through competitions, the creativity of medical students in applying their knowledge and practical skills is put to the test [6]. Competition also serve as a platform to identify talented students and nurture their abilities for future contributions to the field of medicine [13]. Student participation in extracurricular activities such as competitions and research publications can strengthen their portofolio, thereby increasing their chances of being accepted in the application process for postgraduate studies or medical residency program [14]. Considering the numerous benefits derived from the involvement of medical students in extracurricular activities, it is advisable for every medical school to provide adequate facilities for students to maximize their potential through extracurricular activities, including competitions [12].

However, the level of participation among medical students in medical competitions event remains relatively low. Possible reasons for this phenomenon include limited information, competition schedules conflicts with academic schedules, time-consuming preparation, and lack of lecturers participation in competition preparation. Potential solutions to address these issues involve collaborating with the media to disseminate information regarding medical competitions, developing an efficient schedule for competition preparation, allocating additional budget for lecturers involved in competition preparation programs, and providing training for lecturers [15].

3.3. Positive Aspect of Medical Student Participation in Competition

The involvement of medical students in a competition can transform their perspective on the competed field in a more positive manner. For instance, student participation in a public speaking competition in the field of Psychiatry has been proven to enhance students' interest in exploring Psychiatry [5]. The Surgical Olympiad in Russia similarly resulted in increased interest among participants, leading them to choose a surgical specialization after finishing their medical undergraduate training [6]. Another study involving participants in clinical skills competition in China demonstrated positive outcomes. The majority of participants acknowledged that their involvement increased medical students' interest and enthusiasm in the competed material. Furthermore, competitions have the potential to drive curricular changes in medical education and enhance the quality of supporting tools for learning activities to remain relevant [16].

In addition, medical students' performance in competitions serves as a valuable tool for identifying deficiencies in the learning process. It also acts as an evaluative instrument for refining competencies and addressing weakness [16, 17]. The majority of participants in the Surgical Olympiad in the United States expressed that competitions were a suitable method for evaluating their skills [17].

Competitions also enhance students' creativity in applying the knowledge and skills acquired in lectures. Creativity is pivotal in advancing healthcare, driving innovation in advanced medical tools, treatment methods, and procedural management [13].

Competitions not only boost motivation to study specific subjects, but also foster a strong work ethic among students to achieve their academic goals [6]. These events often involve team participation, enhancing collaborative and teamwork skills.

Additionally, competitions provide students with opportunities to network and build connections with peers from diverse universities and countries, fostering potential collaborations between institutions in the future [18]. Table 2 outlines the specific positive aspects of competitions in the field of medicine.

Table 2 Positive Aspect of Medical Student Participation in Competition

Study	Competition Title	Fields	Positive Aspects
(5)	Inter-Medical School Public Speaking Competition	Psychiatry	<ul style="list-style-type: none"> Stimulated participant interest in Psychiatry Encouraging participants to pursue Psychiatry as a carrer Stimulate participant to contributing mental health advocacy
(6)	Surgical Olympiads	Surgery	<ul style="list-style-type: none"> Stimulating students' interest in surgery Acquisition of practical surgical skills at the undergraduate level Help integrate basic and clinical components of surgical training Develop critical thinking skilss and clinical reasoning abilities
(13)	9 th National Medical Sciece Olympiad	Basic Sciences, Clinical Reasoning, Management	<ul style="list-style-type: none"> Increased students' motivation and fostered scientific discussions Promoting creativity and productivity in medical students
(14)	National Undergraduate Neuroanatomy Competition	Neurosurgery and Neurology	<ul style="list-style-type: none"> Increase motivation to continue learning the subject matter after the event Encouraging participants to pursue a career in neurosurgery or neurology Inspired by other participant to develop portfolio

(16)	National Clinical Skills Competition	Clinical Skills (internal medicine, gynecology and obstetrics, pediatrics, ophthalmology, ENT, and dermatology)	<ul style="list-style-type: none"> • Update teaching philosophy (promote the transformation from knowledge-based to the competency-based) • Promotes curriculum reform and updates instructional method • Improves educational resource • Enhanced the enthusiasm of students and promote the improvement of comprehensive competence of students, such as communication, clinical decision-making, teamwork, and professionalism
(17)	Surgical Olympiad	Surgery	<ul style="list-style-type: none"> • Improved surgical technique • Platform to assess students' skill level compared to their peers

3.4. Implementation of Competition-Based Learning on Classroom

Competition-Based Learning method is an effective alternative learning approach to enhance students' motivation and academic achievement. This method can stimulate students' engagement in the learning process by triggering the competitive instinct of each student [19]. A study by Lei et al. [20] states that the implementation of competition in a team format improves the effectiveness of learning process in severe infection courses. Students participating in the competition method demonstrate better performance in final exams compared to those who only follow conventional PBL learning method. Similar findings are also documented in a study by Van Nulan et al. [21], indicating that students participating in online anatomy competitions achieve higher scores in final exams compared to those who do not participate.

The implementation of competition in the learning process within the classroom has been proven to enhance students' final grades because competition enhance learning satisfaction and amplifies students' interest in the material [4]. Considering these positive aspects, Competition-Based Learning can complement the primary method, PBL, in the current medical education curriculum.

4. Conclusion

Competition is an effective extracurricular activity in boosting learning motivation and developing soft skills in medical students. Moreover, student participation in competitions enhances creativity and serves as a platform for evaluation. Furthermore, the implementation of competition in the learning process has proven to be effective in improving students' final grades and understanding. Therefore, the Competition-Based Learning method can be considered for broader implementation as a complement to the PBL method.

Compliance with ethical standards

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All authors equally contributed and acknowledged to read and approved the study.

Disclosure of conflict of interest

All authors declare no conflict of interest.

References

- [1] Frenk J, Chen L, Bhutta ZA, Cohen J, Crisp N, Evans T, et al. Health professionals for a new century: transforming education to strengthen health systems in an interdependent world. *The Lancet*. 2010 Dec;376(9756):1923–58.
- [2] Quintero GA. Medical education and the healthcare system - why does the curriculum need to be reformed? *BMC Medicine*. 2014 Nov 12;12(1).
- [3] Issa G, Hussain SM, Al-Bahadili H. Competition-Based Learning. *International Journal of Information and Communication Technology Education*. 2014 Jan;10(1):1–13.

- [4] Corell A, Regueras LM, Verdú E, Verdú MJ, de Castro JP. Effects of competitive learning tools on medical students: A case study. *PLoS ONE* [Internet]. 2018 Mar 8;13(3). Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5843339/>
- [5] Agyapong VIO, Hrabok M, Agyapong-Opoku G, Khinda H, Owusu-Antwi R, Osei A, et al. Evaluating the Impact of an Innovative Public Speaking Competition to Promote Psychiatry as a Career Option for Ghanaian Medical Students. *Academic Psychiatry*. 2018 Sep 28;43(2):180–3.
- [6] Dydykin S, Kapitonova M. The role of student surgical interest groups and surgical Olympiads in anatomical and surgical undergraduate training in Russia. *Anatomical Sciences Education*. 2015 Feb 16;8(5):471–7.
- [7] Obi CO, Onosogbe M, Ehimen AG, Olamide O, Toluwalase TV, Esther O, et al. Comparison of the integrated organ/systems-based curriculum with the traditional subjects-based medical curriculum: Short communication. *Annals of Medicine and Surgery* [Internet]. 2022 Jan 1;73:103116. Available from: <https://www.sciencedirect.com/science/article/pii/S2049080121010669#bib3>
- [8] Quintero GA, Vergel J, Arredondo M, Ariza MC, Gómez P, Pinzon-Barrios AM. Integrated Medical Curriculum: Advantages and Disadvantages. *Journal of Medical Education and Curricular Development*. 2016 Jan;3:JMECD.S18920.
- [9] Shrivastava S, Shrivastava P. Scope of organ system-based curriculum in the delivery of medical education: A critique. *Indian Journal of Health Sciences and Biomedical Research (KLEU)*. 2020;13(3):262.
- [10] Trullàs JC, Blay C, Sarri E, Pujol R. Effectiveness of problem-based learning methodology in undergraduate medical education: a scoping review. *BMC Medical Education*. 2022 Feb 17;22(1).
- [11] Clark CE. Problem-based learning: how do the outcomes compare with traditional teaching? *The British Journal of General Practice* [Internet]. 2006 Sep 1;56(530):722–3. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1876647/>
- [12] Ahmad M, Rahman F, Ali M, Rahman FN, Al-Azad AS. Effect of Extra Curricular Activity on Student's Academic Performance. *Journal of Armed Forces Medical College*. 2015 Dec;11(2):41–6.
- [13] Yazdani S, Hosseini F, Mehrjerdi EK, Amini M. Develop Talents to Increase Productivity: Report of the Ninth National Medical Science Olympiad in Islamic Republic of Iran in year 2017. *Journal of Advances in Medical Education and Professionalism*. 2018 Jun;6(3):144–5.
- [14] Hall S, Stephens JR, Myers MA, Elmansouri A, Geoghegan K, Harrison CH, et al. The Career Impact of the National Undergraduate Neuroanatomy Competition. *World Neurosurgery*. 2020 Jan;133:e535–9.
- [15] Hajinezhad ME, Yousef A, Jowkar F. The eleventh scientific Olympiad of Iranian medical students: Challenges and solutions. *Journal of Education and Health Promotion*. 2021 Mar 31;10(86).
- [16] Jiang G, Chen H, Wang Q, Chi B, He Q, Xiao H, et al. National Clinical Skills Competition: an effective simulation-based method to improve undergraduate medical education in China. *Medical Education Online*. 2016 Jan;21(1):29889.
- [17] Oberoi S, Caine AD, Schwartzman J, Livingston DH, Merchant AM, Kunac A. Surgical Skills Olympiad: A 4-Year Experience in a General Surgery Residency Program. *Surgery Journal*. 2021 Jul 1;07(03):e222–5.
- [18] Azami-Aghdash S, Ghojzadeh M, Nazavar R, Yaghoubi S, Vahedi L. Perspectives of faculty members toward Iranian National Olympiad for medical students: a qualitative study. *Russian Open Medical Journal*. 2016 Dec 17;5(4):e0405.
- [19] Anderson JR. On Cooperative And Competitive Learning In The Management Classroom. *Mt Plains J Bus Econ* [Internet]. 2006;7(1). Available from: <https://openspaces.unk.edu/mpjbt/vol7/iss1/4/>
- [20] Lei JH, Guo YJ, Chen Z, Qiu YY, Gong GZ, He Y. Problem/case-based learning with competition introduced in severe infection education: an exploratory study. *SpringerPlus*. 2016 Oct 21;5(1).
- [21] Van Nuland SE, Roach VA, Wilson TD, Belliveau DJ. Head to head: The role of academic competition in undergraduate anatomical education. *Anatomical Sciences Education*. 2014 Oct 15;8(5):404–12.