

Considering the Use of Massive Open Online Courses (MOOCs) in Medical Education

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Abstract

Massive open online courses (MOOCs) are a form of e-learning that currently allows people to learn about a wide variety of topics remotely from experts. They may serve as a way to augment the current delivery of medical education. Specifically, MOOCs have a role in supplementing curricular content, enhancing preparedness for clinical medical practice, and guiding personal interests to assist in specialty decision-making for students in the foundational years of medical school. We will be exploring the benefits of learning with MOOCs, their limitations, and their potential implementation into medical curricula.

Introduction

Given the current explosion of medical knowledge and evolving societal needs, medical curricula must adopt a pedagogical approach that addresses the changing requirements of a physician-in-training. Technology in the form of e-learning is being used increasingly as a means to achieve these goals and circumvent the time and resource constraints of an undergraduate medical education program.¹ E-learning refers to disseminating education via technology, such as the internet and multimedia platforms like Khan Academy. Massive open online courses (MOOCs) are a form of e-learning that are generally free and open to anyone for registration.² MOOCs are comprised of different elements including: 1) pre-recorded content; 2) graded assessments; and 3) discussion forums. Once registered, there are suggested timelines; however, course completion is asynchronous from learner to learner.³ MOOCs can be created by educational institutions and are hosted on online platforms, such as edX and Coursera. MOOCs may have an important role in helping medical students achieve certain CanMEDS competencies throughout their foundational medical training while supporting rapidly changing content.^{4,5} This article aims to explore the benefits, shortcomings, and relevant considerations regarding the potential implementation of MOOCs into medical education as a supplemental resource.

Benefits of MOOCs in Medical Education

MOOCs can be used to support the foundational first two years of medical education. Currently, students have content delivered in didactic lectures and are provided with recommended resources for supplementation. This traditional approach has some inherent limitations, including inflexibility to various learning styles.⁶ A systematic review reported that e-learning interventions compared to no intervention demonstrated higher degrees of clinical preparedness with better patient outcomes.⁷ With MOOCs, the content is provided in short pre-recorded segments utilizing both audio and visual learning. Research has shown this style of teaching increases attentiveness and retention of information.^{8,9} The content is also available to review at any time, enabling students to access content remotely and at any point in their education. In addition, MOOCs promote retrieval-

based learning by using frequent assessment checkpoints to keep students engaged and active. Furthermore, as MOOCs are an open resource, students from various healthcare backgrounds, including physiotherapy, nursing, and pharmacy, may enrol at any given time. A diverse cohort coupled with the discussion forums promotes real-time collaboration and fosters an interprofessional community.⁶ Students can also use these forums to provide feedback to peers, which has been proven to be an effective model of learning.⁴ Lastly, the integration of MOOCs into formal medical education could allow students to better prepare for case-based learning, thereby providing more time in session to focus on interactive aspects, such as problem solving, team-based skills, and knowledge application.⁶

While the conventional curriculum delivered in the foundational years of medical school is essential, there remain gaps in clinical preparedness that MOOCs can address. Medical students may have particular areas of interest which are not taught in-depth.¹⁰ For example, a student interested in a surgical subspecialty may opt to use a MOOC to gain preliminary knowledge about procedural practices. This could further enhance current practices, such as learning from upper-year medical students, shadowing practitioners, and using informal online resources. MOOCs in these specialized areas could be generated by leading doctors from around the world and accessed remotely by students.¹⁰

Limitations of MOOCs in Medical Education

It is important to consider the limitations of using MOOCs for medical education. Formal studies evaluating the effectiveness of MOOCs in medical education are lacking.^{6,11} It remains unclear whether they offer an advantage in comparison to other online education resources, such as the modules used in current curricula. In addition, the large heterogeneous population of students enrolled in MOOCs makes it difficult for instructors to cater to individual needs. The student-teacher ratio in MOOCs is typically in the thousands, which makes one-on-one interactions unlikely and places increased reliance on peers assisting each other through discussion forums.¹⁰ While MOOCs may be an effective form of teaching foundational knowledge, knowledge translation to patient care would be challenging without sufficient in-person interaction. In addition, while enrolment in current MOOCs is extremely high, the completion rate of these courses is typically less than 10%.³ Lastly, it is unclear whether MOOCs offer a sustainable business model for educational institutions to use.¹⁰

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Implementation in Medical Curricula

There are several important factors to consider when exploring implementation strategies for MOOCs into formal educational structures. In order to address high incompleteness rates, medical institutions could incentivize students by providing academic credits or certification for the completion of MOOCs that meet their educational standards.¹⁰ With regards to content covered, MOOCs could be tailored to supplement lecture content as opposed to more complex problem solving and clinical reasoning.⁶ There should be an emphasis on national-level collaboration for creating resources in medical education. Sharing of these MOOCs across institutions would reduce the cost of producing and disseminating redundant materials.¹² This could be achieved by developing one centralized online collaborative learning platform like Coursera. In theory, the platform could act as a repository for students to access MOOCs synthesized by healthcare professionals within Canada, as well as MOOCs licensed from other international institutions.

Discussion

Technological innovation in the field of education is occurring at a rapid rate. However, it is ultimately effective teaching pedagogies that will determine the utility of these tools.¹⁰ Shifting towards a more student-centered approach can enhance medical education to fit progressing times. MOOCs can be used to augment and personalize traditional educational models in a way that serves varying learning styles. Furthermore, beyond the use in medical school, there remain many potential applications of MOOCs in supporting the transition into medical practice. MOOCs could help recent graduates understanding billing practices, medical-legal nuances, and navigating and operating health information technology (HIT) systems such as electronic health records.¹² In conclusion, additional research evaluating the efficacy of supplemental MOOCs in comparison to current teaching standards could validate the implementation of MOOCs into higher-level education. Overall, we remain optimistic about welcoming MOOCs in formal medical curricula.

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