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Addressing Challenges of Undergraduate Medical Education in India Through Massive Open Online Courses (MOOCs)

Rakesh Kumar [1, *]

[1] Department of Community Medicine, Dhanalakshmi Srinivasan Medical College & Hospital, Perambalur (Tamilnadu), India

[*] *Corresponding author*: Department of Community Medicine, Dhanalakshmi Srinivasan Medical College & Hospital, Perambalur (Tamilnadu), India. Email: dr.rakesh2k@gmail.com

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Abstract

Context: Massive open online courses (MOOCs) have much potential in higher education, including medical education. This paper explores the challenges and potential solutions through planning, developing, and integrating MOOCs into the medical curriculum.
Evidence Acquisition: A non-systematic review study was conducted in March and April 2021. A comprehensive literature search was done on Pubmed, Scopus, Web of Science, Google Scholar, and websites to retrieve articles on MOOCs and medical education using relevant search terms.
Results: With their wide availability, open access, and affordability, MOOCs have attracted the attention of several educationalists and learners. Indian medical undergraduates face several problems, such as introducing the new competency-based curriculum, information overload, the COVID-19 pandemic, and increased health care demand. The advantages of MOOCs can be leveraged to solve some of the problems in medical education. They can be effectively used to educate and empower the general public and provide patient education and continuous professional development.
Conclusions: With embedded advanced interactive tools, MOOCs have the potential to reshape medical education. Sustained commitment, promotion competition, and collaboration can help overcome the common barriers to MOOC development and integration into the undergraduate medical curriculum.

Keywords: Massive Open Online Course, MOOCs, Medical Education, Flipped Classroom

1. Context

E-learning can result in greater educational opportunities for students while simultaneously improving faculty effectiveness and efficiency (1). Massive open online courses (MOOCs) are a variant of e-learning with key features such as open access, massive reach adaptability, and low cost. There is much potential to use MOOCs in medical education to educate students, health care practitioners, and professionals, particularly in continuous professional development. Because they can reach massive numbers across the globe, MOOCs can provide an enormous boost in educating the public on health and medicine (2).

MOOCs have become popular within a short period, and there are dozens of providers offering courses in various subjects (2, 3). Online educational platforms such as Coursera, futureLearn, and Edx have teamed up with leading universities to develop MOOCs and offer courses on various clinical and non-clinical topics. Its potential to reach thousands of students and a combination of short video lectures, frequent comprehension testing, and active participation in an online community through a discussion board makes it an effective learning tool for learners (4). By watching prerecorded lectures and using online quizzes and discussion forums, the enrolled students assess their progress and collaborate remotely with classmates (5). Discussion forums also promote engagement and the likelihood of completing the course (6).

There is a downside to MOOCs as well. Most courses are from developed countries, and institutions in the developing world offer only a few. Only a few proportions of those enrolled in MOOC courses complete them. For all these reasons, MOOCs cannot fully replace face-to-face traditional medical teaching, particularly for acquiring complex clinical skills that require exposure to real-life scenarios (7, 8). However, even for teaching skills, the student can be exposed to preliminary steps of Peyton's skill acquisition stages, such as demonstration and deconstruction through MOOCs. The other two steps of skill development, comprehension, and performance, can be taught through the conventional face-to-face classroom method (9). Sev-

eral studies have concluded that a blended learning model by combining online and face-to-face classroom teaching is more effective than the traditional method for teaching medical subjects (10, 11).

However, the development and implementation of MOOCs require a certain level of institutional readiness in human and infrastructural resources that are not always present in developing countries. Common barriers to e-learning and MOOCs are lack of infrastructure, lack of face-to-face interaction, lack of sufficient instructional designers or technologists, lack of cultural relevance, and language appropriateness. Many of these challenges can be addressed by commitment, competition, and collaboration (1). Indian medical undergraduates in the present scenario face several challenges such as introducing the new competency-based curriculum, information overload, the COVID-19 pandemic, and increased health care demand. Therefore, this review was conducted to understand the challenges in undergraduate medical education in India and suggest potential solutions to address these challenges by integrating MOOCs into the undergraduate curriculum.

2. Evidence Acquisition

A non-systematic review study was conducted in March - April 2021. A comprehensive literature search was done on Pubmed, Scopus, Web of Science, Google Scholar, and websites to retrieve relevant articles and information on MOOCs and medical education using relevant search terms. The search terms included "medical education" OR "medicine" AND MOOC OR "Massive open online courses." We consulted original research papers, reports, commentaries, and reviews for writing this review. We went through 112 retrieved articles and cited those relevant to our concept.

3. Results

3.1. Challenges of Undergraduate Medical Education in India

India has 554 medical colleges with an intake capacity of 83,075 undergraduate seats every year. There has been an increase of 37% since 2014 - 15. Also, the annual intake capacity of medical colleges is increasing rapidly from the existing 100 - 150 to 250 undergraduate seats. On the other hand, the number of teaching faculty did not increase at the same pace (12). Presently, there are 33,386 teaching faculties to train these undergraduates (13). It is an uphill task to maintain the quality of these new colleges due to the immense shortage of quality faculty, especially for medical colleges in remote areas. In addition, there is a large variation in the number of medical colleges and teaching faculties across different states. Further, variation also exists in the teaching and training capacity of medical teachers due to insufficient training in medical education technologies (14). All these factors have affected the teaching and training of medical students to a great extent.

3.1.1. New Curriculum and Evaluation System

Until 2019, training was mostly done through didactic lectures, laboratory practicals, field visits, and clinical posting in various departments. Medical education in India underwent a significant shift in 2019 with the introduction of competency-based medical education (CBME) (15). It requires an Indian medical graduate to achieve five global competencies of clinical competence, communication, professionalism, leadership, and lifelong learning. These competencies have to be developed chiefly through small group discussions. Large group theory lectures have been drastically reduced to around 30% of total teaching hours. The CBME curriculum mandates medical colleges to have 175 hours of foundation courses at the beginning of the undergraduate course to impart basic computer and language skills, professionalism and ethics, basic skills such as biomedical waste management, and universal precaution, including basic life support (15). The new curriculum intends to follow "the spiral model," in which a combination of horizontal and vertical integration across disciplines and time is used to train undergraduate students. This model allows for the development of complex interdisciplinary knowledge and skills progressively throughout the entire duration of the course (16). MOOCs can be effectively used to impart most of these foundation skills and facilitate the effective integration of complex interdisciplinary knowledge.

There have been significant changes in the evaluation system through the introduction of the National Exit Exam (NEXT) at the end of the final professional phase of the undergraduate course, which will also be used for granting licenses for practice and registration of undergraduate degrees, and entry to postgraduate medical courses (17). However, evaluation and assessment based on a single exam at the end of the course have some pitfalls. Students may not seriously take the formative and summative assessments during the undergraduate course; instead, they may, in parallel, enroll in private coaching to be prepared for the NEXT exam. MOOCs can facilitate evaluation through the auto-generated system of credit points earned through these courses. Structured integrated medical MOOCs with the availability of vast question banks may also help them prepare for the NEXT exam. Medical educators should consider the blended learning format to

standardize the clinical learning of their students (10).

3.1.2. Information Overload

The large-scale availability of a range of devices, compatible software applications, social media, and the internet has made medical students vulnerable to information overload, including misinformation, infodemic, and unsubstantiated claims (18). Many medical and health-related content are available nowadays on the internet, and social networking sites, such as telegram, youtube channels, and blogs, which are not peer-reviewed, are of variable quality and lack authenticity (19). Availability of peer-reviewed MOOCs will improve access to relevant, credible, and authentic content for the public and medical students by assisting health institutions in implementing formal knowledge management strategies and incorporating formal digital literacy programs (19).

3.1.3. COVID-19 Pandemic

Repeated closure of medical institutes due to the novel coronavirus pandemic has paved the way toward the online mode of education. It is likely to be continued given the continued threat of virus mutants. Most of the online live lectures handle around 100 to 250 students at a time. It is next to impossible to ensure attentiveness, engagement, and retention in such large online classrooms. Some medical schools in the United States have introduced an "inverted" or "flipped classroom" model in which students watch prerecorded lectures online in their own time before showing up in class (5). Using flipped classrooms where MOOCs for outside class activity and live lectures for discussion and doubt clarification can effectively deliver content. Advanced MOOCs with inbuilt simulations can help prepare students for the real world while testing them in a safe and comfortable environment. With the evolution of such medical tools, there is now the opportunity to select, develop, and integrate appropriate MOOCs depending on desired outcomes. The parallel use of these tools will become necessary in the future to optimize medical education (16, 20).

3.1.4. Increased Health Care Demand

The ongoing pandemic has also highlighted the vulnerability of our healthcare system, particularly the lack of an adequately trained workforce and quality healthcare, non-responsiveness, and lack of resilient ability. Using MOOCs for the public and patients to deliver essential knowledge related to health matters and diseases can help mitigate some of these challenges. Moreover, these courses can also be used for skill learning such as 'self-care' for diabetes, hypertension, cancer, and other non-communicable diseases (2).

3.2. Scope of MOOCs Integration into Medical Education

The advantages of MOOCs can be leveraged to address some of the challenges of undergraduate medical education (21). MOOCs can be used to effectively implement small group discussion (SGD) in medical teaching. At present, SGD is difficult to conduct due to a shortage of skilled faculty and inadequate space or rooms. Further, MOOCs can aid the delivery of standardized, peer-reviewed content. MOOCs can also be incorporated into the 'flipped classroom' teaching method (22).

MOOCs can be used to learn cognitive, psychomotor, and affective learning domains. They can be a valuable supplement for medical students to become lifelong learners (23). There are several courses related to soft skills, professionalism, ethics, and values on different MOOC platforms. Identifying areas that can be taught through MOOCs has been an area of concern. However, the major problem is the lack of sufficient courses on medical topics. The selection of the topic and content level is crucial. Therefore, introductory, core, and advanced levels of MOOCs can be developed to integrate with the suitable block and phase of the undergraduate curriculum (8).

Further, MOOCs can be used to educate and empower the general public and provide patient education and continuous professional development. Medical students can participate in some of these MOOC platforms as facilitators of discussion forums, particularly those related to the general public and patients (3).

Investment in medical MOOCs can go a long way in improving the quality of medical education. Medical students are of diverse characteristics in terms of culture, language, skills, digital literacy, learning style, learning pace, and organization of memory (23). Access and availability of credible, authentic, and approved MOOCs can help meet their diverse needs.

3.3. Development and Integration of MOOCs into the Medical Curriculum

MOOC design and policy development need to focus on pretesting, followed by repeated testing throughout the course, assessment of procedures, concepts, and validated assessment measures to compare learning and effectiveness across MOOCs (3). We suggest a three-pronged strategy (3C's) for planning, developing, and integrating MOOCs into the medical curriculum: (1) commitment, (2) competition, and (3) collaboration.

3.3.1. Commitment

A high-level commitment by different stakeholders is required to overcome the challenge of fund availability and infrastructure development and provide training for

MOOC development. An expert committee set up at institutional and university levels can play a vital role in selecting topics and levels of MOOCs. Faculties should be encouraged to develop medical MOOCs. They should be provided with facilities and support to create such courses by the institutes. Further, they need to be provided with incentives for such work. There should be a stringent peer review system for those courses under the guidance of universities. Universities and institutes need to develop a checklist to facilitate a standardized peer review process.

3.3.2. Collaboration

Fostering tie-up and collaboration have the potential to bring together people in consumer, professional, health care organizations, and universities at different levels, such as between institutions at the state or national level or with international universities, to design and develop good-quality, evidenced-based, patient and family-centric, effective, and learner-friendly MOOCs. Such collaboration can be cross-institutional and/or interdisciplinary (3).

3.3.3. Competition

Promotion of competition among faculties at various levels similar to the best paper presentation at different forums and conferences can help select a suitable MOOC for integration into medical education. Colleges and institutes can be awarded additional points during accreditation to develop and provide infrastructure for developing and updating MOOCs.

4. Conclusions

MOOCs with embedded advanced interactive tools have the potential to reshape medical education. Common barriers to MOOC development and integration, such as lack of funds, infrastructure, and sufficient instructional designers or technologists, can be addressed by sustained commitment, promoting competition, and collaboration. Faculties can play a vital role in helping students select appropriate MOOCs to avoid wasting valuable time at the expense of regular courses.

Footnotes

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