

Exploring the Factors Influencing Massive Open Online Courses Development: A Qualitative Study of E-Learning Experts' Perspectives on Iranian Universities of Medical Sciences

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ABSTRACT

Background: Massive Open Online Courses (MOOCs) have transformed global higher education, yet their implementation faces challenges in resource allocation and faculty engagement, particularly in specialized fields like medical education. This study examines the multidimensional factors influencing MOOCs development through the perspectives of e-learning experts across 10 Iranian universities of medical sciences, addressing a critical gap in institutional readiness for digital education.

Methods: A qualitative content analysis was carried out in 2022 involving 15 e-learning experts with at least two years of experience selected via purposeful snowball sampling until data saturation. Semi-structured interviews were administered online via Adobe Connect, with two participants providing written responses. Data analysis followed Bolman and Deal's organizational framework, employing open, axial, and selective coding in MAXQDA to identify codes, themes, and categories. Trustworthiness was ensured through peer debriefing (10 external experts), member checking (participant validation of codes), and adherence to COREQ guidelines for qualitative rigor.

Results: Thematic analysis resulted in 28 codes, 12 themes, and 4 categories. Influential factors on MOOCs development and engagement included: 1) structural factors (rules/regulations, clarity, structure); 2) human resources (empowerment, support, attitude, motivation); 3) cultural factors (symbols, unity); and 4) political factors (equity, participation, and negotiation, profit). Participants emphasized that only intrinsically motivated faculty currently engage in MOOCs development, as extrinsic rewards (e.g., promotion credit) remain insufficient.

Conclusion: Successful MOOC implementation requires systemic reforms, including streamlined governance, faculty workload adjustments, cultural shifts to value digital pedagogy, and equitable political frameworks. The study recommends targeted interventions such as centralized MOOC development guidelines, workload credits for faculty, and national recognition programs. These findings have implications for global medical institutions.

Keywords: E-learning, E-content, Education, Distance, Massive Open Online Courses, Medical

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Introduction

Massive Open Online Courses (MOOCs) have increased globally during the last two decades (1). MOOCs, are online courses that offer open access via the Internet for free or at a low cost. They accommodate unlimited enrollments, often reaching hundreds of thousands of students, and are delivered asynchronously, allowing students to study at their convenience (2-5). MOOCs popularity hinges on four intertwined attributes: 1) massive, accommodating unlimited participants; 2) open and cost-free, without payment or prerequisites; 3) online, unbound by time or place; and 4) comprehensive, offering complete courses with objectives, content, and assessments for certification. MOOCs represent a grassroots educational strategy, fostering flexible and open educational avenues for broad and diverse populations, thus enhancing accessibility and equity (2-6).

MOOCs emerged in the 21st century as innovative techniques in the online education era (7), with the initial idea emerging in 2006 (8) and developed and delivered in 2008 (5). The first MOOC was created by Stephen Downes and George Siemens in 2008 at the University of Manitoba. The initial development incorporated the connectivism concept and used social media (9). Although MOOCs usage is increasing in prestigious and highly-ranked universities, it also holds particular significance for developing countries, given the constraints of resources within such contexts (1).

MOOCs encompass interactive multimodal learning, addressing various abilities, challenging students, promoting active participation, and fostering idea generation (8, 9). MOOCs may not generally include certification/degrees/credits, but learners may receive a variety of rewards upon completing the courses (10). MOOCs have become increasingly popular among educators and learners worldwide, as 2012 being declared the “Year of the MOOC” (10, 11).

MOOCs not only cover a significant gap in education by providing open access to

learning but also widen participation in higher education, particularly in medical education (12). Medical virtual worlds have become an inevitable part of the educational landscape, and medical students have shown great satisfaction with more flexible approaches to learning, such as blended and virtual learning approaches, using MOOCs due to a high level of flexibility, engagement, and creativity (9). MOOCs can play a complementary role in health and medical disciplines by improving soft skills, including problem-solving, research, and communication skills. However, medical education still may require traditional approaches due to the practical skills required to interact with consumers/patients and be present in a real-world scenario (5).

While MOOCs offer numerous benefits, several significant challenges persist. These encompass the risk of low-quality content, limited learning depth, absence of dependable and valid assessments, reduced student retention rates, and challenges in accurately tracking enrollment. Furthermore, engagement during course development, restricted credentials, sustainability concerns, intellectual property issues, information sharing complications, unequal access, and potential misuse of political power in course creation contribute to the complex landscape. (3, 13-18). The other challenges can be related to structural, cultural, and political factors that could impact communication, leadership/management, and standards in MOOCs creation (19). These challenges could be more significant in medical settings due to their multitasking across teaching, research, and practice (20). Medical faculty members suggested considerable time to develop, deliver, and maintain high-quality MOOCs (17). Collaborative multidisciplinary works are required for MOOCs content, design, development, and delivery. This synergy drives creativity, enabling the creation of globally valued courses that resonate with international audiences, ultimately attracting a diverse range of learners (17, 21).

Academic MOOCs are an emerging educational approach in Iran, initiated in

2015 to develop a national MOOCs system (22). Only some basic works have been done at the individual levels with the collaboration of some students and faculty members. For example, the Sharif University of Technology is one of the frontiers in generating similar works, although the works are not categorized as MOOCs (23). Medical universities in Iran are the leading universities in developing and delivering MOOCs courses. The very first announcements regarding the development of MOOCs started in 2017 under the Ministry of Health and Medical Education with the name “*Arman*”. Crises such as the COVID-19 pandemic resulted in more attention to online courses, requiring further flexibility and accessibility and enhancing the sustainability of health and medical educational programs. Overall, there are increasing challenges regarding the extent of MOOCs across the country, as the level of active engagement still needs to be higher (21). In addition, those faculties that are engaged have not been fully committed due to the amount of time and workload required. Considering the great potential of MOOCs, it is important to go beyond geographical locations and collaborate internationally to create high-quality global courses, empowering more entrepreneurs (21). Having a high number of faculty members at universities of medical sciences in Iran (230,000), MOOCs can play a significant role in promoting various multi / interdisciplinary collaborations beyond the specific field of the educators and even non-university educators to enhance the collective effort for more community and societal impacts (21).

During the first three years of MOOCs development in universities of medical sciences in Iran, about 225 Modules were created (9, 24). However, there is still a significant potential to develop high-quality and innovative MOOCs, considering the high number of current active faculty members (25). Hence, facilitating information sharing among various universities of medical sciences on a national scale promotes knowledge exchange and idea generation,

fortifying universities’ reputation and credibility, thereby enabling the practical application of acquired learning.

There have been many studies on MOOCs and students’ completion rate, satisfaction, and engagement. However, there have been limited studies about the experiences of educators involved in creating, delivering, and maintaining MOOCs (6, 19). For example, one of the research studies on MOOCs, including 47 papers from 2010 to 2018, highlighted the importance of active interaction, engagement, leadership/management, standardization, and contextual factors in the success of MOOCs (19). Another study emphasized the significance of creating a dynamic educational atmosphere for active involvement and mutual interactions to generate high-quality content (21). In addition, educators had safety concerns regarding access to open sources of information, the applicability of personalized approaches to MOOCs, and how they need to be tailored based on the capacity of learners (6). As there are limited studies on the influential factors for the active engagement of faculty members in the development of MOOCs, in the current study, we aimed to explore the factors influencing MOOCs development based on e-learning experts’ perspectives on Iranian universities of medical sciences. As faculty members are the critical partners for creating high-quality MOOCs, so their level of engagement and enthusiasm impact the MOOCs courses’ success and sustainability.

Methods

Study Design and Setting

A qualitative research design was used to conduct this study in 2022 based on the content analysis using a semi-structural questionnaire. Participants were selected through snowball purposeful sampling from academic experts of e-learning in Iranian universities of medical sciences. Research samples from the medical universities of Tehran, Shiraz, Mashhad, Jahrom, Babol, Bushehr, Hormozgan, Fasa, Mazandaran, and Isfahan universities were interviewed.

Participants and Sampling

Purposeful sampling was used to select the academics with relevant expertise in MOOCs development, delivery, and maintenance. The inclusion criteria were at least two years of e-learning expertise. Five of the faculty members who were experts in e-learning were approached initially, and then, using purposeful snowball sampling, the number increased to saturate the data. This resulted in an overall number of 15 participants. Participants were chosen from a diverse range of academic backgrounds and qualifications to provide an in-depth understanding of the topic based on different perspectives.

Data Collection

A semi-structured questionnaire was used for data collection about the viewpoints of e-learning experts at Iranian universities of medical sciences. Further questions were asked about the facilitators and barriers of the existing MOOCs and how they can be improved. Data collection was done through online interviews with the Adobe Connect platform. In two cases, participants were provided with written interview questions and they responded via audio recordings. All the content of the online interviews and audio files were transcribed into text.

Validity and Reliability- In qualitative studies, usually, instead of validity and reliability, the word rigor or trustworthiness is used. For the trustworthiness of the studies, participants were chosen from a diverse range of groups to provide various perspectives on MOOCs based on their specific academic and professional context in health and medical sciences (e.g., clinical specialist, basic science, dentistry). Two other experts in the fields were consulted to enhance the reliability of the work for coding and categorizing the items. In addition, the codes, categories, and themes were sent to participants for confirmation to enhance the precision.

Data Analysis

Thematic content analysis was used to identify open codes, themes, and core

concepts to comprehend the academic experts' perspectives on the development and engagement of MOOCs. We utilized the Bolman and Deal model, which proposes a framework for categorizing organizational development factors into structural, cultural, human resources, and political (26, 27). The data were analyzed at the level of open codes (Items), axillary codes (Themes), and selected codes (Concepts).

Results

A total of 15 academic experts in e-learning participated across 10 different universities of medical sciences in Iran (Tehran, Shiraz, Mashad, Jahrom, Babol, Boushehr, Hromozgan, Fasa, Mazandaran, and Esfahan). Participants were from both genders (female: 8, males: 7) and various backgrounds: educational experts (n:3) and academia (n:12, comprising 5 assistant professors, 4 associate professors, and 3 professors). Participants had expertise in e-learning (n:3), expertise in health and medical education (n:7), and educational management (n:5). All the participants had both qualifications and experiences working with MOOCs and had already engaged actively in the development of MOOCs.

After analyzing the phrases, paragraphs, and overall interviews with experts, 84 open codes were extracted. In the next step, the duplicate codes were removed, and the codes that had a common meaning were merged. After this stage, a total of 28 codes (items) were extracted.

The four key themes and 12 items are 1) structural factors (rules/regulations, clarity, structure); 2) human resources (empowerment, support, attitude, motivation), 3) cultural factors (symbols, unity), and 4) political factors (equity, participation and negotiation, profit). This categorization was achieved according to Bolman and Deal's organizational development framework (26, 27).

Figure 1 shows the results related to the coding based on the frequency of rating for each code. As Figure 1 indicates, the essential items repeated were the need for power distribution (equitable authority

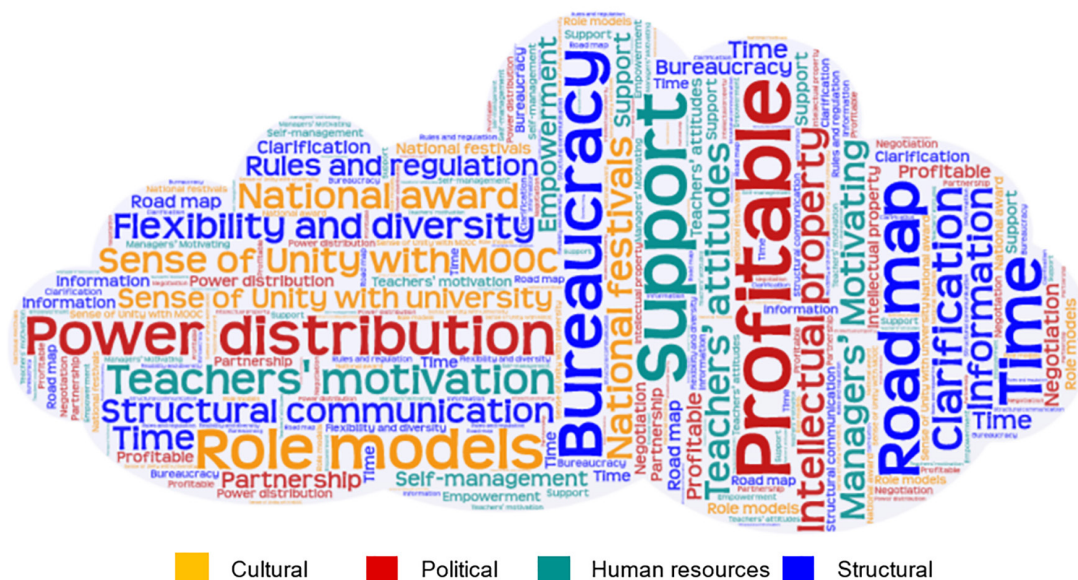


Figure 1: Influential factors in MOOCs* development according to faculties' viewpoints.

*MOOCs: Massive Open Online Courses

across different universities), intellectual property rights, decreasing bureaucracy, more collaborations across different settings, workload management, training, and support systems, and enhancing capacity to develop MOOCs (Figure 1).

The Four Key Themes Are

1) Structural factors indicating strategies, goals, regulations, rules, instructions, guidelines, hierarchies, plans, and the processes of MOOCs development, delivery, and maintenance. Establishing and maintaining transparent communication between the virtual universities and other medical universities were identified as the structural factors.

2) Human resources factors focused on human resource planning, management, and reward/recognition system. Human resource factors highlighted the empowerment required for enhancing the team members' skills and knowledge to enhance their capacity and motivate them to actively engage in MOOCs development.

3) Cultural factors indicate both visible and invisible indicators, such as the organization's norms, philosophies, and values, as well as its image externally. Regular gatherings and ceremonies were considered essential to showcase the main

MOOCs achievements, their output, outcome, and impact. Understanding the philosophy behind MOOCs development was highlighted as the basis that inspired the team members to engage in the development of MOOCs actively. A high level of integration and multidisciplinary collaboration across health and medical universities were considered the foundation of developing MOOCs.

4) Political factors included the influence of individuals, including the power of negotiations and the use of tactics and strategies in attracting resources. The autonomy and authority of universities were mentioned as the basis for enhancing their power in developing MOOCs and attracting resources. In addition, fair and equitable access in achieving both intellectual and financial benefits, fair power distribution, and active participation/engagement were highlighted as other influential factors at the political level.

Table 1 shows the key codes (Items), themes (Components), and categories (Concepts), and the weighting (reputation) per each item. The main critical barriers regarding MOOCs development and engagement reported were high workload, lack of time, unfair access to resources, lack of support, lack of capacity, lack of clear instructions, and transparent communication.

Table 1: Factors influencing MOOCs* development based on the content analysis of interviews

Concepts	Themes	Items	Repetition Time
Structural	Rules and regulations	Communication about the participation process in the national MOOCs* development via VUMS' website	6
		Development of criteria, guidelines, and content development formats by the VUMS **	6
		Communication within each university regarding the guidelines and indicators for national MOOCs development	7
	Clarity	Clear rules for a fair share of the participating universities and the VUMS for national MOOCs development	6
		Streamlining the participation process and reducing bureaucratic steps in the national MOOCs development	14
		Roadmap for the national MOOCs development and transparency in the share of each university	15
	Structure	Responsive and transparent communication channels between the VUMS and partnered universities	11
		Flexible and diverse mechanisms in facilitating national MOOCs development	8
Human Resources	Empowerment	Training the involved universities to enhance their engagement in e-content development for national MOOCs	9
		Empowering professors to upgrade their knowledge and skills in working with e-content development software	8
		Professors' ability to independently produce e-content that meets national MOOCs standards	7
	Support	Free and sufficient time for professors to participate in the national MOOCs development (Balancing the workload)	8
		Providing a supporting atmosphere (e.g., technical and training support) for e-content development by the VUMS	8
	Attitude	The belief of professors and officials in the importance and impact of education through MOOCs and open learning systems	11
		Professors' attitude about national MOOCs development with an educational justice approach, even without financial incentives	3
	Motivation	Motivational incentives and their impact on the vertical promotion of participating professors in national MOOCs development	12
		Motivational incentives for managers and follow-up experts in national MOOCs development	10
Cultural	Symbols	The importance of pioneering and leading individuals in the university to participate in MOOCs and encourage others to join	8
		Ongoing national festivals and showcases of the MOOCs for recognition of the key contributors and enhancing the motivation	8
		Considering a national award or prize for outstanding individuals and organizations in national MOOCs development	8
	Sense of Unity (Belonging)	Sense of unity, and belonging of the professors to their university to enhance the university's reputation at a national level	7
		Sense of unity, commitment, and belief of the professors to MOOCs advantages as a member of the national team	6

Concepts	Themes	Items	Repetition Time
Political	Equity	Fair power distribution in determining the benefits and conditions of the national MOOCs development between the parties	6
		Feeling the equitable benefit and partnership in national MOOCs development, given limited resources	4
	Partnership and Negotiation	Negotiation opportunities for all the partnered universities in Participatory decision-making".	4
		A win-win strategy for all the involved partners regarding both intellectual property and financial benefits	7
	Profit	Fair profitability of the scientific content development for the course instructor, given the time and cost spent	9
		Fair profitability of the e-content development and follow-up for the construction university	9

*MOOCs: Massive Open Online Courses; **VUMS: Virtual University of Medical Sciences

Some examples of supporting quotes from participants are provided below.

Participant A - Educational Manager, Ph.D. in Medical Education

"Faculty members do not have the motivation to engage in MOOCs, and it is difficult to justify them and keep them motivated. Their workload does not allow them to have an active engagement in MOOCs (*Theme: Motivation*). There are diverse tasks that we need to accomplish including teaching, research, service, and clinical tasks. As you know the creation and development of MOOCs are a lengthy process. If we use this amount of time in the generation of research and publications, it could have been more beneficial for our professional development. In addition, the process is not very cost-efficient and clear and decreases our level of motivation (*Theme: Motivation, Clarity, Profit*)."

Participant G - Educational Manager, M.D. Clinical Specialist

"The standards for developing MOOCs at medical universities are complex (*Theme: Clarity*). We spent a considerable amount of time and energy creating the content. However, the feedback we received suggests that it is not acceptable and/or the content is overlapped with previous work. There is no specific instruction, guideline, or structure for creating and developing MOOCs (*Theme:*

Motivation, Rules and regulations). This can result in many overlaps and a lack of clarification of what is required (*Theme: Clarity*). To be effective and cost-efficient, we require crystal-clear instruction and a roadmap in place to guide us for achieving an optimum result (*Theme: Clarity*) From an Educational manager with medical expertise. There needs to be an equitable and fair process to engage all the possible universities in the creation and development of the MOOCs. Sometimes, this only happens based on the approximate online educational centers as well as having a strong bond with authority. So not all universities are included (*Theme: Profit, Equity*)."

Participant K - Manager in Online Education, Ph.D. in E-Learning

"One of the key barriers in justifying faculty members' engagement is the lack of benefit for them, considering the significant amount of effort, time, and energy they put into content development. (*Theme: Profit*). For example, these activities are not counted in their promotion ladders and the intellectual property is not theirs, although they are creating the content. Only a few faculty members that are very active in the creation of MOOCs are those that are very passionate about this topic, although it does not have any tangible benefits for them, and this is not fair(*Theme: Profit, Motivation*)."

Participant B - Educational Manager, Ph.D. in Microbiology

“All the criteria for MOOCs development are developed by a virtual university, and then they require us to participate in the educational session for developing MOOCs (*Themes: Partnership and Negotiation*). They compare different universities’ outcomes with each other, although different universities need access to the same infrastructure and opportunities to generate high-quality content. We (a small university) do not have the foundation, infrastructure, and capacity to create and develop MOOCs (*Theme: Equity*). It is crucial to create a solid basis for this process and have a task allocation across different universities based on their capacity for participation. In addition, it is paramount to provide support, training, and resources to engage (*Theme: Support, Empowerment*).”

Participant N - Educational Manager, DDS in Dentistry

“For undertaking training sessions for MOOCs only some specific universities were contacted. The provision of training programs for creating MOOCs and engagement in developing MOOCs need to happen equitably and not solely include universities closer to the center of power (*Theme: Support, Equity, Empowerment*).”

For analyzing the content, all 84 expressions stated by the participants were extracted and analyzed. After combining common and semantically similar items and removing duplicates, finally, 28 items were obtained. They were placed in 12 core components or axillary codes based on the semantic similarities. Finally, using the Bolman and Deal’s four-lens model, they were placed in 4 selected concepts or selective codes. Three leading researchers initially performed this stage, and then the extraction of the items and their assignment to the components and categories were re-examined by the opinions of 4 peers. For this purpose, experts familiar with Bolman and Deal theory and who had expertise in medical education and e-learning did the re-examination process.

Discussion

Education is undergoing post-pandemic transformation. MOOCs, a pioneering method, play a significant role in reshaping online higher education, as they are online, open, and massive, fostering diverse participation and idea generation. MOOCs offer accessibility, self-directed learning, efficiency, and cost-free access, delivering exceptional flexibility (5, 10). By incorporating multimodal approaches, MOOCs enhance a high level of self-paced learning. They serve as a valuable avenue for undecided college students to explore interests before committing to a major. Moreover, MOOCs extend education access to remote areas, fostering more significant equity (5, 10).

In Iran, MOOCs have gained more attention recently, with a drive to establish a nationwide platform interlinking universities. This aims for an enhanced, efficient, equitable, and sustainable education system. Faculty members are pivotal in MOOCs development and delivery, making it essential to comprehend the factors influencing their engagement for optimal results. This national study on MOOCs growth and trajectory highlights a fundamental restructuring to achieve the optimum outcome.

Our study highlighted four key concepts, and 12 themes in enhancing the engagement of the faculty members, including structural factors (rules/regulations, clarity, structure), 2) human resources (empowerment, support, attitude, motivation), 3) cultural factors (symbols, unity), and 4) political factors (equity, participation and negotiation, profit). This is aligned with Bush (2020), and Bolman and Deal (2014) approaches to change management (26, 28). Lowenthal and Hodges (2015) suggested that MOOCs have the potential to be of similar quality to other online programs. Systematic factors that influence the quality of courses encompass various elements such as evidence-based content, communication skills, managerial/leadership aspects, student-centered approaches, and providing in-depth and constructive feedback to students. These factors play a crucial role

in designing courses that lead to successful learning outcomes (6). Nonetheless, MOOCs with poor design and quality can diminish learning quality, depth, and retention rates. There were details of inadequate instructional design in a considerable number of cases, including an evaluation of 76 randomly chosen MOOCs (29).

Structural factors play a pivotal role in a seamless transition in MOOCs development. This structural component encompasses guidelines, regulations, and instructions for the creation and delivery of MOOCs. As participants suggested, there appears to be a need for more clarity regarding the MOOCs development process, its significance, and their required contributions. This ambiguity can significantly impact their level of engagement. Establishing a robust structure not only brings task clarification but also accelerates attaining critical educational outcomes. Additionally, it is essential to simplify bureaucratic procedures in the educational system, as these can impede the MOOCs development. Faculty members have multiple responsibilities including teaching, research, and practice which can limit their involvement in MOOCs development. Hence, it is crucial to establish an appropriate framework that motivates them to focus on creating MOOCs and highlights the impact it can have on their personal and professional growth. This approach is supported in some previous research (1, 19, 21).

Human resource management is the core of success in developing MOOCs. This entails fostering genuine strategies to elevate faculty members' attitudes, motivation, and enthusiasm while also empowering them in MOOCs development (19, 21). Comprehending faculty perspectives on MOOCs enablers and challenges is crucial for establishing a solid foundation (6). The creation, design, and development of MOOCs cannot occur in isolation; it necessitates a team of specialists, including instructional designers/developers and domain experts (30, 31). MOOCs instructors may confront many challenges. Significant MOOCs

delivery challenges encompass managing collaborative work, time commitments, expectations, student engagement, and limited infrastructure/support, including compensation (32). Attracting motivated, expert teams is pivotal for a robust MOOCs system (31). Current faculty members proactive in MOOCs development are largely driven by personal motivation. For example, enhancing open and collaborative educational resources can result in some levels of creativity (33), contributing to global student learning, improving their professional standing, and gaining recognition through research and engagement (32). This indicates further research at different levels (individual and organizational) to explore the motivation of the instructors who have engaged actively in the development of MOOCs (6). Understanding the interconnectedness among the three dimensions of MOOCs creation is crucial for success. These dimensions encompass curriculum and content development, course implementation, and providing student feedback. In this study, educators committed to the substantial effort of MOOCs development due to their conviction in its global student impact, professional growth, and advancement of research opportunities and recognition (32).

Organizational culture acts as a glue, uniting partners for MOOCs advancement. Culture is like an iceberg, including unseen emotions and behaviors. Uncovering unseen cultural factors causing resistance to novel approaches like MOOCs is vital. Culture encompasses values and philosophies underpinning open education, ripe for fortification to ease MOOCs creation (34). A culture conducive to MOOCs engagement could involve shared vision, unity, and organizational commitment. Such cultural attributes can reinforce experts' and the public's interest, driving motivation to create platforms that revolutionize education into an accessible, cost-effective, and open system for all globally.

Political factors as the macro influential aspects of MOOCs creation and have been

highlighted by previous studies (35, 36). These encompass resource attraction strategies, fair resource access, balanced power distribution among universities, equitable contributions, and mutually beneficial outcomes for all partners. This aligns with prior literature (35, 36). Participants emphasized the significance of intellectual property and decision-making involvement. Equitable resource access, tangible/intangible benefits, and faculty professional development amplify motivation and commitment to MOOCs engagement (6).

Considering that faculty members are multitasking and are involved in teaching, research, and clinical activities, they may need more motivation for active engagement in MOOCs creation. In addition, a high level of autocracy and a need for more clarification around the standards/rules/guidelines for MOOCs creation can further decrease their motivation. Hence, it is vital to create a structured and organized system in place with equitable and fair access to decision-making, resources, and support services. Enhancing the cultural factors has been highlighted as the key in such change management processes, which may require re-designing, and re-structuring the organization (35, 36).

It has been strongly suggested to use MOOCs as a new competitive business model to enhance the competitive advantage, particularly in higher education (10). MOOCs provide a great opportunity for higher education students to leverage technology and become more creative and practical, by generating ideas for improving real-world issues in their workplace and beyond (10). In addition, it provides a great opportunity and market for publishers to be seen by collaborating in sharing the MOOCs (17). However, a systematic approach is required to achieve successful implementation. We have provided some recommendations and indications for different involved parties (e.g., universities, educators, and policymakers) to facilitate the barriers and improve the sustainability of MOOCs programs.

First, it is crucial to evaluate the capacity of the educational system to adapt to the

overwhelming amount of information and effectively deliver relevant knowledge to specific audiences, promoting a more personalized educational experience. The conventional educational framework struggles to handle this influx due to constrained resources and higher education institutions offer limited structured programs, yielding restricted efficacy and efficiency. Moreover, equitable access to education and personalized learning pathways need to be more adequately supported. The increasing trend toward leveraging technology in education and the shift towards online and blended learning approaches highlights the importance of Massive Open Online Courses (MOOCs) as a compelling solution (5). Functional MOOCs frameworks can result in a win-win situation for all the involved partners, including students, educators, the community, and society in health-related disciplines. For example, it can enormously assist in enhancing continuing professional and interprofessional education, effectively address knowledge and skill gaps through tailored research, and play a pivotal role in health promotion activities, improving public health literacy (9).

Second, it is crucial to acknowledge MOOCs limitations and have continued quality assurance in place. Some of the fundamental limitations are high attrition rates due to the fee-free nature and the absence of specific certification upon completion, the possibility of unengaging platforms due to the expenses, and the lack of tailoring for students with disabilities. Consequently, only highly motivated, self-directed learners tend to persist until course fulfillment. Furthermore, MOOCs may need more specific prerequisite background or demographic qualifications, creating a heterogeneous cohort that presents challenges in interaction but simultaneously fosters the exchange of experiences and generation of ideas. To tackle these barriers, it is crucial to explore how education can be opened using MOOCs through more integrated, holistic, and collaborative approaches (10).

In addition, ethical concerns and potential biases have been linked to the commercial engagement of third-party partners, such as industries. Nonetheless, these partners could play a pivotal role in aiding universities to conceive and advance innovative educational approaches, like MOOCs, aimed at boosting interaction and retention (9).

Third, technology is pivotal in enhancing engagement and fostering creativity within MOOCs, catering to diverse audiences through various platforms and social networks. Collaborating with tech-savvy organizations aids in selecting appropriate technology for MOOCs creation, rendering it appealing for heightened engagement. This approach simultaneously bolsters accessibility and ensures long-term sustainability. Technology needs to be adjusted based on the context and audiences. For example, MOOCs may be restrictive for skill development in medical sciences, as they require actual performance/learning by doing in a real-world scenario, such as health, social, and community care settings, and under close supervision. The full potential for using MOOCs in skill development, particularly in practical disciplines requires further research and attention (5).

Fourth, enhancing sponsors, partnerships, and advertising channels improve awareness and attract broader audiences. For instance, Harvard University collaborated with young family doctors and the World Organization of Family Doctors across 20 countries, utilizing various social media platforms. This partnership significantly boosted MOOCs awareness and utility, resulting in a fivefold increase in completion rates (9). Collaborations, including learners, instructors, and industry representatives in both commercial and non-commercial entities, play a pivotal role in MOOCs development sustainability. National associations can also be included to enhance the content's credibility and meet the specific population's unique needs. To ensure ethical integrity and program credibility, it is advised to delineate educational objectives and learning outcomes

in collaboration with other organizations, update content based on evidence-based literature, seek accreditation validation, and engage an independent organization for program delivery.

Fifth, MOOCs can also be very beneficial for Continuing Professional Development (CPD) and/or Continuing Medical Education (CME). CPD and CME are required for healthcare professionals to update their knowledge, skills, attitudes, and behaviors based on the changes in health, social, and community care settings to provide the most evidence-based care to consumers (5). Nowadays, the number and severity of non-communicable diseases are increasing, and this requires evidence-based actions to make the right decision for each specific population in each particular geographical situation with various sociodemographic factors. Hence, MOOCs can be beneficial in updating the knowledge, skills, and actions for making the right evidence-based decision for the right population at the right time. CME improvement by using MOOCs can significantly assist in engaging care provision and enhancing the quality and efficiency of care. Self-directed CME using MOOCs has been shown to be cost-efficient due to its accessibility and satisfaction with the care provided by both healthcare professionals as well as consumers (9). Moreover, MOOCs present a remarkable avenue for enhancing Interprofessional Education (IPE) by fostering multidisciplinary collaborations. This approach encourages idea generation beyond the course content and facilitates connecting theoretical knowledge to real-world problem-solving. Additionally, MOOCs offer professional growth advantages in educators, including easy accessibility, heightened efficiency, and interactive engagement (5).

Sixth, implementing a comprehensive framework for ongoing evaluation, assessment, and review is imperative to sustain momentum in the aftermath of MOOCs' implementation. This can enhance suitability and quality and prevent commercial exploitation of MOOCs.

This demands consistent communication with diverse partners to garner their input on MOOCs.

The MOOCs platform itself should feature interactive functionality enabling learners to appraise it, including provisions for inquiries, exchange of information about diverse practices, challenges, and local data, and fostering connections with peers and networks for future collaborations (9). The assessment can also include investigating evidence-based content and learning approaches to online education, assessing individual courses, and post hoc analyses (10).

Limitations and Suggestions

To our knowledge, this is the first comprehensive study conducted at the Iranian University of Medical Sciences on MOOCs and their impacting factors, viewed from the perspective of e-learning experts. The results of this research can be used in future policy-making about e-learning and MOOCs development. It is important to note that the study was carried out only among online educational managers of public medical universities. Therefore, it is recommended to conduct further independent studies in different settings and among faculty members using both quantitative and qualitative methods. Besides, it is crucial to further investigate the international implications of developing MOOCs, including possible barriers and ways to overcome them. Overall, further research is required to investigate the effectiveness, cost-efficiency, quality, and equity of education through MOOCs.

Conclusion

MOOCs, as an open global educational landscape, provide a great opportunity for a diverse range of collective expertise worldwide, including prestigious international universities and industries. Various cultural, political, human resource, and structural factors have an impact on the development, effectiveness, efficiency, and sustainability of MOOCs. In order to bring about changes and reforms in academic institutions, including

the development of MOOCs, it is necessary to create a clear vision, mission, goals, guidelines, and protocols to chart a roadmap. In this regard, and overall, in the educational system, faculty members are the core for developing any new educational system. Hence, to create high-quality MOOCs, developing a structured system for enhancing their capacity and motivation for optimum engagement is paramount. In addition, restructuring may be required regarding the cultural changes to consider open, online education as a part of innovative educational pathways in universities.

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Authors' Contribution

AB contributed to data collection and analysis. NS participated in content analysis and writing the discussion. ZK contributed to the study design, conducted the literature review for the background, conceptualized the study, collected qualitative data, analyzed the content of participants' opinions, and wrote the manuscript. MM was involved in the study design and data analysis. All authors read and critically approved the final manuscript.

Conflict of Interest

The authors declare no conflict of interest.

Ethical Consideration

Participants were given an information sheet and consent form prior to conducting the research. They were also given the opportunity to double-check the study's results before finalization. This study was approved by the Ethics Committee of the Research Deputy of Shiraz University of

Medical Sciences with the ethics code of IR.SUMS.REC.1400.679. No personally identifiable information was published. All methods were carried out by the Declaration of Helsinki.

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