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RESEARCH ARTICLE

ELUCIDATING THE NEED TO STUDY INSTRUCTIONAL DESIGNS AND PEDAGOGIC MODALITIES OF MASSIVE OPEN ONLINE COURSES (MOOCs)

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ABSTRACT

This paper signifies the need of having more research on engaging parts of Massive Open Online Courses (MOOCs). It summarizes a significant number of recent reviews on the design, engagements, and assessment strategies of select MOOCs. The study mainly focused select studies on Future Learn as it has more impact on students of higher education. The paper gives an overall idea of MOOCs, engagements in MOOCs in general, and a summary of various reviews on engagements, assessment, and instructional designs of MOOCs. The paper also highlights the need for carrying out further studies on MOOCs.

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INTRODUCTION

The 21st century has witnessed significant advancements in the incorporation of technology in education and of course in recent years, the COVID-19 pandemic has further highlighted the importance of online learning, leading to a surge in its demand (Impey&Formanek, 2021). Online learning refers to the process of acquiring knowledge and skills using the internet, in a flexible and self-paced manner which allows students to interact with instructors and peers at their own leisure, without the necessity for simultaneous online presence or a physical location (Abuhassna, et at., 2020; Singh and Thurman, 2019). Online learning is sometimes used interchangeably with distant education, as the majority of distance education programs nowadays are conducted online (Scagnoli, 2009). Furthermore, it facilitates communication and interaction between the teacher and the student via internet-based technology (Lee, 2017; Moore *et al*., 2011; Ryan *et al*., 2016). Furthermore, it signifies a significant advancement in higher education throughout the last century (Mayadas, 2000).

Having many teaching methods is always beneficial for classrooms, since students need a variety of instructional assistance, guidance, and oversight, which may be offered in several ways. "The US classroom, a technology that has been in use for 150 years, is now outdated and no longer suitable for meeting the current requirements due to changes in time and conditions." (US Secretary of Education, 2000, p.120). Online learning is the utilization of the internet to improve the communication and engagement between educators and learners. Online delivery includes both asynchronous modes of contact, such as assessment tools, and the supply of web-based course materials, as well as synchronous interaction through email, newsgroups, and conferencing technologies, such as chat groups. It encompasses both traditional classroom-based teaching and distance education methods. Online learning, often known as web-based education or e-learning, refers to the same concept (Curtain, 2002).

MASSIVE OPEN ONLINE COURSE (MOOC)

An online-phenomena combines the interconnection of social media, the guidance of a recognized authority in a certain

subject, and a set of openly available internet resources (McAuley *et al*., 2010). The term "massive open online course" (MOOC) is commonly used to describe these types of courses. "When a massive open online course (MOOC) is well-designed, it can draw in thousands of students who engage with weekly video lectures, mostly peer-graded assignments, and, on occasion, course-related chat rooms" (Zemsky, 2014, p. 238). Online courses that welcome an unlimited number of students are known as massive open online courses (MOOCs) or open online courses (Kaplan &Haenlein, 2016). Massive open online courses (MOOCs) are clearly courses meant for a larger number of students, offered entirely online for free, accessible from any location with an internet connection, and available to everybody without entrance requirements (Webmaster, n.d.). Furthermore, concerns on MOOCs, or Massive Open Online Courses, were hot topics in the field of educational technology in the past decade, drawing the interest of both academics and industry professionals. Despite initial predictions that massive open online courses (MOOCs) would cause a major upheaval in the academic world, a new commercial platform provider-driven online education industry has formed throughout the world (Ruipérez-Valiente *et al*., 2020). Mega centers that gave rise to massive open online courses (MOOCs) were the School of Engineering at Stanford University. In this lifetime, we have the power to alter the course of history by putting technology at the disposal of educators. Indeed, for the millions of people both domestically and internationally who do not have access to high-quality, face-to-face education, online learning can be a lifesaver (Koller, 2011).

MOOC PLATFORMS

MOOCs provide a wide range of courses and attracted millions of enrolled users globally. However, the origins of MOOCs may be traced back to the early 2000s (Zawacki *et al*., 2016). The year 2008 was particularly significant in establishing networked learning and MOOCs. MOOCs, which stands for Massive Open Online Courses, were initially defined by Stephen Downes and George Siemens in 2008 as a form of connectivist learning that takes place on networks (Baturay, 2015). In 2011, a group of professors from Stanford University created educational movies and distributed them via free web channels. In 2011, the Artificial Intelligence MOOC, led by Peter Norvig and Sebastian Thurn, gained worldwide popularity, attracting 160,000 learners from 190 countries. In the beginning of 2012, independent educational platforms like Coursera and Udacity were created. Coursera initially required payment but eventually became a non-profit project affiliated with Stanford University. The Massachusetts Institute of Technology (MIT) created the MITx online platform. Subsequently, it was included into EdX (Baturay, 2015). Despite its beginnings in United States colleges, MOOCs have gained acceptance in several nations, including India, as a form of online education. According to Coursera CEO, Mr. Richard Levin, India is in the top five countries in terms of money earned by Coursera. Additionally, it has the position of being the second-largest country in terms of registered users, as reported by the Economic Times in 2014. IITBX, mooKIT, NPTEL, and SWAYAM are Indian platforms that have been established and are now providing educational courses. The main factor driving this expansion is a low rate of enrollment in higher education.

Fig. 1. Different MOOCs across the globe (Self-developed diagram)

INDIAN INITIATIVES IN MOOCs: The Indian government has implemented several measures to bolster online education, so facilitating continued access to education for a wide range of individuals and contributing to a rise in the nation's enrollment ratio. NPTEL, mooKIT, edX, Coursera, and SWAYAM are the leading online platforms in India. In addition to the aforementioned platforms, there are additional lesser-known platforms that offer online education in many subjects. SWAYAM, NPTEL, mooKIT, IIT BombayX, Shikshit India, Vskills, U18, Million Lights, Apna CourseUpGrad, EduKart Open, LearnVern, and Digital Vidya are notable online platforms and advocates of online education and MOOCs. MOOCs are frequently launched by third-party online platforms and autonomously designed by academics. The history of MOOCs is quite recent. The phrase was initially introduced in 2008 by Stephen Downes and George Siemens, and it is rooted in the 'connectivist' distributed peer learning model. Subsequently, in 2011, further educational movies were created by academics at Stanford University and made available on open internet platforms with the use of freely accessible web resources. 2021 witnessed a global surge in the popularity of MOOCs, with their quantity continuing to grow daily. In early 2012, Coursera was formed as an independent for-profit technology. In the same year, several autonomous non-profit endeavors were founded, including Udacity (created by Sebastian Thrum) and Udemy. Subsequently, MIT and Harvard integrated their MITx platform into EdX. FutureLearn and Iversity are European platforms that followed the example of other non-US platforms. They are distributing their courses throughout Europe. FutureLearn is a subsidiary of the UK's Open University, a renowned institution in distant education noted for its extensive knowledge and experience in teaching methods.

FUTURELEARN: FutureLearn is a British online learning platform that was established in December 2012. This is equally owned by The Open University and SEEK Ltd. This platform is a massive open online course (MOOC) that offers micro-credentials and degree programs. As of November, FutureLearn has formed partnerships with more than 250 UK and worldwide entities, including business and government partners.

PEDAGOGY IN MOOCS

In Massive Open Online Courses (MOOCs), teachers are not assigned a distinct position, but they are required to dedicate more time to developing the course and pre-planning learning

activities (Ross *et al*., 2014). Instruction may be delivered via several mediums such as text, video, and visualizations, allowing for student assistance across many channels (Anderson &Dron, 2012). According to Glance *et al*. (2013), MOOCs are online course platforms that utilize pedagogical tools such as glossaries, pictures, videos, and public repositories. While some may argue that MOOCs offer a way for higher institutions to fulfill their non-profit objectives, such as providing free knowledge and making education accessible to all, they also represent a shift in the current technology model that aims to generate profits even when offering something for free (Glance, 2013 as cited in Bali, 2014). When attempting to tackle the issue of learning in MOOCs, it is important to take into account the fundamental principles of effective teaching, the difficulties associated with online learning as a whole, and the particular challenges posed by MOOCs. These challenges include the vast number and wide range of students' cultures, languages, ages, experiences, educational backgrounds, and reasons for participating (Anderson *et al*., 2013 as cited in Bali, 2014, p. 46).

ENGAGEMENT IN MOOCs

MOOC courses based on three areas of student engagement (Grainger, 2013): They are

- Video Lectures: Video lectures in MOOCs have various presentation styles, from talking heads to lecturing instructors. Subtitles (primarily English, but other languages are being introduced) are provided by Coursera. The running time for the lecture videos is usually 5-10 minutes each, with in-video quizzes embedded
- Assessment: Assignments are primarily evaluated through the use of:
    - auto-graded multiple-choicequestions or auto-graded programming assignments,
    - Peer review assessment is where students evaluate and grade assignments based on a defined rubric set.
- Forums: Students post questions and reply to other students.

They are the main method of student interaction between course takers and instructors. Forums usually consist of general discussion, subject-specific discussion, course feedback, and technical feedback threads. Similarly, Live video sessions will also be provided. i.e. in addition to the weekly lectures, there are live video sessions with the course instructor. Fredricks *et al*. (2004) define engagement as a comprehensive and intricate concept that encompasses several academic factors and is used to explain student achievement. In her paper on framing student engagement, Kahu (2013) examines the behavioral aspects of engagement, including digital observations, online time to task, effort, and participation. These factors are all pertinent to the study of MOOCs and highlight the intricate nature of the multidimensional concept of engagement, as well as the influence that institutions can have on it.

ASSESSMENT IN MOOCs: Upon completion of a massive open online course (MOOC), assessment is an important factor since it may be utilized as a criterion for certification eligibility. According to Bloom and Krathwohl (1956), educational aims that are outlined in Bloom's taxonomy enlarge on the value that is generated at its highest levels, which are creation, evaluation, and analysis. Unfortunately, multiple-choice quizzes are not appropriate for evaluating higher-level learning that goes beyond the lower levels of Bloom's taxonomy (remember, comprehend, and apply). In these situations, different types of scaled evaluation are necessary (Churches, 2008). Peer evaluation, self-assessment, and automated assessment are the three types of assessments that are most commonly encountered in massive open online courses (MOOCs) (Papathoma *et al*., 2015). These assessments are used to narrow this gap.

REVIEW OF RELATED LITERATURE: The study done by Margaryan *et al*. (2015), titled "Instructional Quality of Massive Open Online Courses (MOOCs)", is the most often referenced study on the design of MOOCs. The researchers utilized their CourseScan tool to evaluate the instructional design quality of a sample of 76 MOOCs. Coursescan is a tool that follows the 'Ten Principles of training' (Merril, 2013), which is a traditional method for designing training. It includes features such as focusing on problems, promoting collaborative learning, and providing expert feedback. The majority of MOOCs in their sample had low scores on these 10 essential design criteria for instructional quality, therefore supporting the beliefs of those skeptical about MOOCs. In their recent study titled "Instructional Quality of Business MOOCs: Indicators and Initial Findings," Egloffstein, Koegler, and Ifenthaler (2019) examined the instructional quality of MOOCs in the field of business and management. They utilized a slightly modified CourseScan instrument and determined that the overall instructional quality of these MOOCs is low. Oh *et al*. (2019) conducted a recent research where they applied Clark and Mayer's (2011) e-learning principles to examine 40 computer science xMOOCs on two distinct MOOC sites. Additionally, this study reveals a very limited implementation of the assessed principles. The authors question why the potential of computer science in terms of its ability for technological innovation is not being fully used within the specific field being investigated.

In their paper titled "The Future of Online Testing and Assessment: Question Quality in MOOCs," Costello *et al*. (2018) analyze the quality of Multiple-Choice Questions (MCQs) in MOOCs. They emphasize the common occurrence of item defects and the possible consequences for assessment reliability and validity. The study examines 204 multiple-choice questions (MCQs) from 18 Massive Open Online Courses (MOOCs) in the fields of computer, social science, and health sciences. It reveals that more than 50% of the MCQs had at least one error, and 57 MCQs had numerous defects. The results underscore the necessity of thoroughly analyzing MOOCs and the significance of guaranteeing top-notch evaluations to facilitate enhanced and refined teaching methods in the future of higher education. In their article titled "Theoretical-Practical Principles for the Design of MOOCs Applied to Continuous Teacher Education," Machiavelli and Cavalcante (2022, pp. 243–265) outlined the theoretical and practical principles for designing MOOCs specifically for teacher training. These principles are categorized into human, pedagogical, structural and technological, regulatory, and

analytical aspects. The article employs a research approach known as design-based research, which combines design, quantitative, and qualitative methodologies to create educational interventions. In their study titled "Examining learning engagement in MOOCs: a self-determination theoretical perspective using the mixed method," Lan and Hew (2020) investigated student participation in MOOCs through the lens of self-determination theory (SDT) using a mixed method approach. The study obtained 693 valid responses to a scale measuring engagement and motivation in MOOCs, and conducted interviews with 82 MOOC participants. The findings revealed noteworthy disparities between those who completed the MOOC and those who did not, in terms of their reasons for enrolling and the learning activities they engaged in.

The findings revealed substantial disparities between those who completed MOOCs and those who did not in terms of their reasons for enrolling and the learning activities they engaged in during the course. The examination of student interview data identified three primary aspects that might enhance learners' self-determination theory (SDT) needs: active learning, course resources, and instructor accessibility.

In their study titled "Learner Engagement in MOOCs: Scale Development and Validation," Deng *et al*. (2020) create and validate a measure called the MOOC engagement scale (MES). The MES has four dimensions: behavioural engagement, cognitive engagement, emotional engagement, and social engagement. The scale may be utilized to evaluate the pattern of involvement in MOOCs and explore the correlation between learner engagement and other significant elements related to MOOC teaching and learning. The scale creation procedure included of two focus group interviews, an exploratory survey, an expert review, a pilot survey, an item purification study, and a construct validation research. The final Measurement and Evaluation Scale (MES) consisting of 12 items was supported by conducting rigorous statistical analyses across several samples of participants in Massive Open Online Courses (MOOCs). The scale's ultimate iteration has four distinct dimensions: behavioral engagement, cognitive engagement, emotional engagement, and social engagement.

A research named "Evaluation of instructional and user interface design for MOOC: Short and Free FutureLearn courses" was undertaken by Azhar *et al*. (2019). The article aims to assess the instructional design, user interface, and usability of FutureLearn courses, with a particular focus on the FutureLearn MOOC platform. The study recognizes that there is a scarcity of research on the instructional design, user interface, and usability of FutureLearn. The study administered an online survey to 310 participants from Indonesia and included 30 FutureLearn users who assessed the usability of the platform using the E-Learning Usability Scale (EUS). 10 participants were engaged in usability testing sessions to obtain more insights into the efficacy of FutureLearn courses. The study revealed possibilities for enhancement in instructional design and user interface, namely with the process of enrolling in a course, searching for courses by category, and accessing course information.

Ven de Poel *et al*. (2019, pp 91–101), in their paper titled "Designing a MOOC- A new channel for Teacher Professional Development?" investigated the pedagogical benefits reported by 17 lecturers involved in designing a MOOC through a questionnaire survey. The results show gains in teaching skills and a strong appreciation for the collective training approach during the MOOC production process. The findings are relevant for staff development units, technology-enhanced learning competent bodies, and researchers interested in collective modalities for scholarship of teaching and learning.

In their study, Alexandaro *et al*. (2020) seek to identify and analyze a strategy for assessing Massive Open Online Courses (MOOCs) that achieves a balance between learner-centered teaching methods, incentive design, and the reliability of assessments. The goal is to provide MOOC designers with a validated model that reduces cheating during formative assessments while maintaining learner engagement.

Additionally, the study presents a methodology for using learning analytics to estimate the impact of this intervention, addressing the conflict between assessment, pedagogy, and monetization in MOOCs. The study assessed the impact of the CE model on two specific characteristics of learner behavior: the frequency of cheating and the level of involvement in formative course activities. The results demonstrated that the implementation of the CE model had a substantial impact on reducing cheating in the MOOC. The research presents an assessment model that has been analytically proven, which can be utilized by MOOC designers to effectively decrease cheating while still prioritizing learner-centered pedagogy. Shi *et al*. (2020), in their study "Social engagement versus learning engagement–an exploratory study of FutureLearn Learners", explores the contradiction between the popularity of Massive Open Online Courses (MOOCs) and the disengagement of learners, focusing on both learning and social engagement in MOOCs. The paper conducted an exploratory study on FutureLearn learners to analyse social engagement and learning engagement in MOOCs. It adopted a fine-grained temporal approach to examine learner behaviour and progression within the MOOC.

The research employed a quantitative methodology to collect and analyse learner interactions and study progression data. The study found a contradiction between MOOCs' popularity and learners' apparent disengagement, highlighting the need to analyse engagement from both a learning and social perspective. Ward and Hulme's work (2019, pp. 127–141) "Learners' Self-directed Learning in FutureLearn MOOCs: A Study Focused on Learner Autonomy" This study is a qualitative research investigation that examines how experienced online learners take charge of their own learning in MOOCs provided on the FutureLearn platform. The study used a bottom-up methodology to examine self-directed learning, including self-reported learning logs and interview transcripts.

The data analysis employed the method of constructing grounded theory, which involved coding and evaluating learner data in a transparent and evidence-based manner. The research comprises 56 people who are enrolled in three FutureLearn MOOCs. These participants have provided learning logs and have also been interviewed. The findings delineate five domains in which learners autonomously guide their own learning: context, individual or social learning, technology and media, learner characteristics, and organizing learning.

DISCUSSION

Providing important insights into student behaviors and learning requirements that are impacted by their ethnic origins was the goal of Phan's (2018) study, which intends to expand the existing research on massive open online courses (MOOCs). The study also investigated the combination of traditional face-to-face classrooms with online Massive Open Online Course (MOOC) classes. Another notable study was designed to gain an understanding of how various teaching methods could be combined to provide a more comprehensive and effective learning experience for students who are enrolled in higher education all over the world (Pacheco-Cortés & Ponce, 2020). A number of studies, such as the ones conducted by Margaryan *et al*. (2015), Egloffstein, Koegler, and Ifenthaler (2019), Costello *et al*. (2018), Machiavelli and Cavalcante (2022), Lan and Hew (2020), Deng *et al*. (2020), Azhar *et al*. (2019), Ven de Poel *et al*. (2019), Alexandaro *et al*. (2020), Shi *et al*. (2020), and Ward and Hulme (2019) conducted research and investigated various aspects. An overwhelming bulk of the research is carried out by academics from other countries, originating from countries other than India. Consequently, the investigators are of the firm belief that in-depth study is required in order to investigate the instructional design and pedagogical methodologies utilized by massive open online courses (MOOCs).

- Which instructional strategies are utilized in the MOOCs that have been selected?
- In online courses and massive open online courses (MOOCs), what is the influence of different teaching styles on the level of involvement and satisfaction of students?
- What do individuals consider to be the advantages and disadvantages of the instructional designs and pedagogical modalities that are utilized in massive open online courses (MOOCs)?

CONCLUSION

MOOCs are the points of discussion in educational technological research as it gets more attraction in COVID and post-COVID education. As a thread of research, various dimensions of MOOCs are widely researched in which pedagogy or webagogy is one of the concerns. Design and instructional paradigms of MOOCs, e-tivities, engagements, and assessment modalities need more attention in further researches. This paper highlights the need of studying more about the courses of FutureLearn as it has wider impact on teachers and students at tertiary levels.

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