

ADVANCES IN GLOBAL EDUCATION AND RESEARCH

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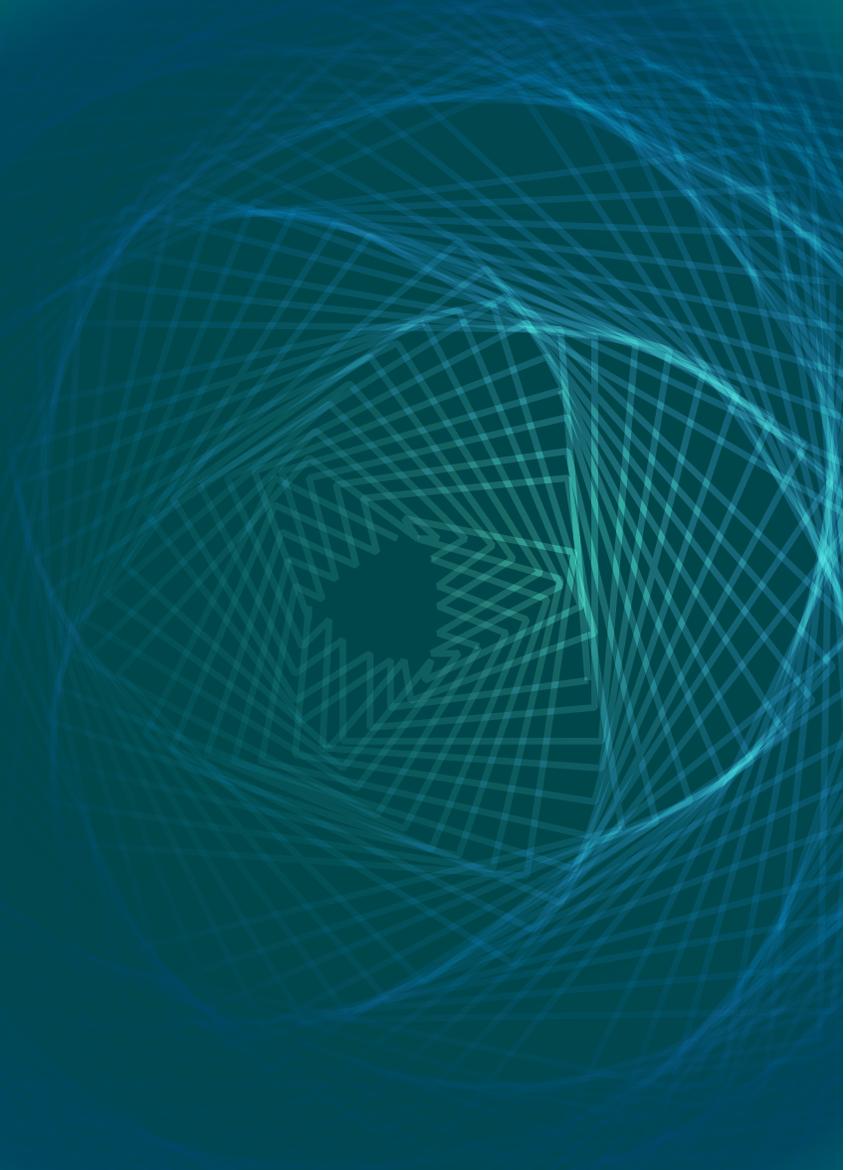
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Overarching Themes of MOOCs: An Integrative Literature Review

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Abstract

Massive open online courses (MOOCs) represent a growing means of offering mass instruction to students separated across distances and countries. MOOCs provide a flexible platform for instruction across numerous disciplines via the Internet. By incorporating a variety of online environments and discussion formats, MOOCs enable learners to engage with content and instructions in new ways. As MOOCs continue to evolve in design and involve more students, it becomes important to determine overarching themes in the literature discussing MOOCs. Such an investigation offers the potential to reveal new connections and ideas pertinent to the successful design and running of online courses. This article will offer a discussion and review of themes in the educational literature common to MOOCs, starting with an introduction to the current state of the MOOC space and the review process employed. This article will then provide a review and discussion of how these concepts and themes relate to the design of MOOCs.

Keywords: MOOCs, online learning, distance learning, technology in training, adult learning

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Introduction

In 2018, Massive Open Online Courses (MOOCs) turned ten years old. The first course to be considered as a true MOOC was Connectivism & Connective Knowledge (CCK08) taught at Manitoba University by Stephen Downes and George Siemens (Downes, 2008). Since the first MOOC, their popularity has risen dramatically; course enrollments in individual MOOCs now reach into the tens of thousands of students (Pursel, et al., 2016), and over 2.8 million students have registered for MOOCs affiliated with the Massachusetts Institute of Technology MITx platform on edX (Cagiltay, Cagiltay, & Celik, 2020). This rise was not immediate and did not see the initial, dramatic shift in popularity until 2011, when Stanford faculty Sebastian Thrun and Peter Norvig gave open access to their Artificial Intelligence Course, which attracted nearly 58,000 students (Howarth, et al., 2016). With this, the “Connectivist MOOC” or cMOOC and the Stanford-based xMOOC were created, along with various other classifications of MOOCs (Pilli & Admiraal, 2016).

According to Zawacki-Richter, Bozkurt, Alturki, and Aldraiweesh (2018), MOOC research shows a primary focus on the following topics: the potential and challenges for universities, MOOC platforms, learner and contents, and quality and instructional design. In addition to the various research topics for consideration, researchers have also been able to identify and describe the various taxonomies of MOOCs (Pilli & Admiraal, 2016), as well as modify and improve current

MOOC models (Garcia-Penalvo et al., 2018). The topic of MOOCs has grown from a singular concept in the post-dawn of high-speed internet and “Smart” technology, to a revolutionary way to access knowledge for those around the globe. This article offers a thematic review of current literature on MOOCs so as to uncover overarching themes in their design and organization. In addition, this article presents a framework in which to consider the continued development and implementation of MOOCs, beginning with an explanation of the review methodology employed before proceeding to a discussion of pertinent concepts and themes in the MOOC field.

Methods

This paper offers a review of the pertinent literature on MOOCs which seeks to offer a pertinent critique and synthesis of the relevant literature. Through this review, this paper seeks to provide a representative set of fundamental themes that reflect the strengths and weaknesses of specific components of MOOC design while also addressing current issues in the field. Specifically, this review of the literature seeks to employ an integrative literature review framework as proposed by Torraco (2005) in which the literature is analyzed to offer a representative synthesis of pertinent concepts and themes while also offering discussion on new and emerging research as well as strengths and weaknesses in the field (Torraco, 2005; Cooper, 1982). Per this framework, the review procedure employed in this study featured a formulation of the research question followed by the specific identification of key criteria and keywords for determining a synthetic sorting and analysis of the data, with resultant common themes following therein.

To begin this review, this review poses the following question: “What are the overarching themes that unify MOOC research in terms of the design and characteristics of MOOC classrooms?” To this end, the search undertaken by the authors of the literature employed the following search keywords within the “Title” portion of the articles: “MOOC”, “Massive Open Online Course”, and “Massively Open Online Course”. The quotations were specifically left as present in the keyword phrase search in order to exclude any articles that may have included only a single individual word at the exclusion of other words. It was also important to specifically distinguish and separate the words “massive” and “massively” in accordance to previous research that showed a significant change in the search results (Liyanagunawardena, Adams, & Williams, 2013). The key words and phrases were searched using the “or” method of searching, which would allow for an article to contain the phrase “MOOC” or “Massive Open Online Course”, rather than the article needing to contain both phrases. This could have significantly reduced or limited the results.

Once the initial search was conducted using the key words and phrases, the results were filtered using the following filters: Full Text Online, Scholarly & Peer Reviewed, Journal Article, and in the English Language. To further narrow down the relevant research within each period, we filtered out all topics other than “Education”, which would mean that the articles included in the sample would have to be research conducted within an educational setting. This helped reduce and eliminate articles that focused on the surrounding technology and other specific topics associated with MOOCs.

Within our framework of articles and the ensuing filters, we were able to extract the data from “Subject Terms” and reviewed the Top 10 Subject Terms associated with the articles. We excluded any Subject Terms that included any variation of “MOOC” or “Massive Open Online Courses” as we believed them to be redundant to the overall topic of the research. While this data did not help

us select articles for our sample, we were able to obtain insightful details into the topics of the literature available in order to have a framework for selection.

This review included a few key limitations in regard to subjectivity. The first limitation is that the articles that were chosen were chosen at the discretion of the researchers, so long as they met the original criteria for the literature review. The other limitation that has been taken into consideration is the method of searching for the articles. While the articles were chosen as part of a database within the subscription databases of a major state university, we recognize that search results may vary from search engine to search engine and from database to database.

Literature Review

Beginning and Taxonomy

With the MOOC being approximately ten years old, it is still relatively new in the age of technology and education. Over the last ten years, education has seen the MOOC grow from an open online course on Connectivism & Connective Knowledge (CCK08) at Manitoba University which attracted some 2,200 students (Downes, 2008) to an artificial intelligence course taught by widely-famous professors at Stanford University in 2011, which attracted nearly 160,000 students from 190 countries (Rodriguez, 2012). The MIT edX online course platform has recorded over 2.8 million students between 2012 to 2016 across the world from 122 MIT MOOCs, demonstrating the international scope of MOOCs as an educational tool (Cagiltay, Cagiltay, & Celik, 2020). Roughly ten years into the MOOC and we now have a multitude of MOOC taxonomies (Pilli & Admiraal, 2016) and platforms through edX, Coursera, and Khan Academy, to name a few of the more popular, well-known sites.

Specifically, there were over 1,000 articles published on MOOC research from 2014-2020 and only 140 articles published from 2008-2013. This is a major distinction that shows the popularity of MOOC research from the beginning to the present. In respect to the topics and keywords associated with the MOOC research, there is a correlation between the top topics and keywords between both time periods. Of interest to note is the emergence of “Educational Technology” which saw a rise from 16 articles published between 2008-2013 to over 100 articles published between 2014-2020. Overall, the topics do not appear to provide additional insight into the MOOC research and any other trends that may be appearing between the two time periods.

Regarding taxonomy, the first MOOCs were split between the cMOOC - or Connectivist MOOC - and the xMOOC. These have been widely regarded as the “first generation” and “second generation” MOOCs, respectively (Garcia-Penalvo, 2018). These two MOOC types laid the groundwork for what has become a host of MOOC sub-sets. While it does not appear that there is a set number of MOOC types, a few authors (Clark, 2013; Pilli & Admiraal, 2016) have created a list of taxonomies based on their research into MOOCs. The taxonomy of MOOCs confirms that the MOOC is an ever-evolving educational resource with guidelines that are meant to be stretched and extended. The MOOC, by its very definition should be “massive”, “open”, “online”, and a “course”. Stephen Downes, the founder of the cMOOC, suggests that open resources be open for educational resources, the actual course, and assessment (2012). However, many MOOCs may be lacking at least one of these key characteristics and still be considered within the realm of a “MOOC” (Baggaley, 2013). A likely, more common definition of the MOOC, with a primary

focus on the “massive” and “open” portion of the initialism; no prerequisites, no cost, easy access, and over approximately 50 students (Spector, 2014).

The definition criteria provided by Spector (2014) is consistent with the general taxonomy of the MOOC system. Within Pilli and Admiraal’s (2016) research, they have identified fifteen different types of MOOC systems. The MOOCs within their taxonomy provide a focus on the “massive” and “open” criteria and is illustrated through an xy matrix that graphs and charts the MOOC based on the massiveness and openness of the class (Pilli & Admiraal, 2016). From this matrix, MOOCs such as the LOOC (Little Open Online Course), SPOC (Self-paced Open Online Course), and MOOR (Massive Open Online Research) have been identified with varying degrees of complexity, size, and material (Pilli & Admiraal, 2016).

A less formal approach to the taxonomy of the MOOC design can be found in Clark (2013), who has identified eight major MOOC concepts through research in his blog. He notes in the blog post that the eight taxonomies he lists are a “starting list”, suggesting that there are more out there that have been unidentified in his research. The overlapping MOOCs from Clark’s (2013) research and Pilli and Admiraal’s (2016) research are the groupMOOC and the cMOOC. The other MOOCs appear to be fundamentally different or just a simple difference in their naming.

Learner Profile

As stated earlier, one of the core aspects of the MOOC is that is “open”. This makes it difficult to characterize the learner profile as one conglomerate of learners across all the MOOCs. It would stand to reason that the topic of the course could generate a unique pool of learners that is unlike the pool of learners of a different course topic. While the criteria for demographics is seemingly endless, the main demographics of relevance appear to be with age, education or experience, and English-fluency (Engle, et al., 2014; Pursel, et al., 2017). Learner characteristics can help determine the expected course completion and participation among the learners. As Shrader et al. (2016) suggests that participants over the age of 30 are twice as likely to be labeled as “high activity” participants and participants over the age of 60 are four times as likely to be in the same category when compared to the activity of the 18-24 year olds.

In a 2014 study of a Coursera-hosted MOOC, over 55% of the sample (n=15,046) stated that they were between the ages of 18-34 years (Engle, et al.). This is consistent with a similar study which studied three separate courses and found a combined 66% of the participants were between the ages of 18-34 years (Shapiro, et al., 2017). True to the inconsistency of the demographic portion of MOOCs, Pursel, et al. (2017) indicate in their study of MOOC participant data that their median age was 37 years within their sample size of 9,266 students. The Coursera course in which they studied had an overall course participant size of 94,711 students with a median age of 35.1 years. The mean age of a large cohort of 2.8 million learners in the MIT edX MOOCs was 30.29 years of age, a number which was very consistent (range 27.67 – 32.49) across 15 different subject areas (Cagiltay, Cagiltay, & Celik, 2020).

Learners education and experience levels, while technically two separate factors, give an overall impression of the type of learner within the MOOC. The literature suggests that the predominant highest level of education complete amongst MOOC learners is the Bachelor Level degree (Shapiro, et al., 2017; Engle, et al., 2015). Pursel’s (2017) study indicates the highest educational

level as a degree above a Bachelor's, however there is minimal difference between the two (37.5% to 42.9%, respectively). Along with education levels, the literature delves into the “specialist versus non-specialist” track of learners, which suggests that learners that are currently in the field, students of the field, or have prior experience within the field of study that the MOOC course is teaching have a higher completion rate than their non-specialist counterparts (Stohr, et al., 2018). As an example, the majority of courses registered for by students in the MIT edX MOOCs system between 2012 and 2016 were introductory courses (45%), with 60% of learners registering for these courses; 31% of courses were intermediate courses, and 24% were advanced courses (Cagiltay, Cagiltay, & Celik, 2020).

English-fluency is another key characteristic of the learner that is being widely used in studies. Pursel et al. (2016) suggests that learners that do not speak English as their native language actually see higher rates of completion than those with English as their native language. Shapiro et al. (2017) saw 44% of their population within the Americas with the remaining students identifying themselves as from either Europe, Asia, or Africa. Although this is not language based, it shows that the MOOC is a worldwide presence and not just a “Western” concept, which would include English as the primary language. Additionally, Pursel et al. (2016), saw 51% of their sample study as being non-native, fluent English speakers in comparison to 37.9% as being native English speakers. This is consistent with Engle et al. (2015) which showed non-native English speakers comprising of 56.9% of their survey sample.

Learner Motivation

A common criticism of the MOOC format is the level of learner attrition. Pursel et al. (2016) revealed that the level of completion sat at 5.6% of the entire 94,000+ enrollments. This is consistent with Shrader et al. (2016) which suggested a certificate completion rate of 4.4% of their 50,000+ enrollments. Generally, edX courses have been reported to yield completion rates of 4.6 to 5.6 percent (Pardos, Bergner, Seaton, & Pritchard, 2013; Despujol, Turró, Castañeda, & Busquets, 2017). Not all learners have the goal of completing the course and this would affect the completion rate. There are four types of learners within the MOOC system: Active & Negative, Active & Positive, Touring, and Sampling (Wang et al., 2018). This is an expansion of the Active, Passive, and Lurker participant suggested in (Milligan et al., 2013). These types of learners may have never had the intention of completing the course, however they must enroll in the course to obtain the material that they want (Howarth, et al., 2016). In general, learners that more actively participate within the course framework tend to see higher completion rates as compared to those that do not actively participate (Sunar et al., 2017).

Keller (2010) states that motivation “explains what goals [emphasis in original] people choose to pursue and how actively or intensely they pursue them” (p. 3). Learners in MOOCs tend to be self-determined and autonomous (Durksen et al., 2016). It is also suggested that learners may be in a state of spontaneous learning which may add to negative emotions for the learner, leading to their eventual drop out of the course (Wang et al., 2018). Student learners also show interest in MOOCs as a way explore, learn, and develop their own skills (Zutshi et al., 2013). Overall, learner attitudes towards MOOC appear to be positive, but only slightly (Shapiro et al., 2017).

Instructional Design

As MOOCs move into different versions and classifications, the instructors must be careful of how they present the course. There is a difference in the instructional design strategy based on which university the MOOC is hosted from, the instructor that is teaching the course, or the kind of MOOC that is being utilized (e.g. xMOOC or cMOOC). Spector (2014) suggests in an editorial article that universities are “putting audio-video media clips (usually involving a recording of a famous scholar) and presentation slides...to simulate the experience of being in the famous person’s class” (p. 391). Realizing that this type of design strategy is ineffective, Klemke et al., (2018) suggests a more advanced flipped MOOC experience that involves the gamification of certain criteria within the MOOC structure. Cagiltay, Cagiltay, and Celik (2020) recommend that interactive components be integrated early into the structure of a course to increase student participation and retention.

The design of the cMOOC, revolves around a model in which it is recognized that each learner is unique and that the learners must be connected to the others (Downes, 2012). In order to accomplish the connection, we may need to implement aspects of social media, such as Twitter or microblogging, to help expand their knowledge (Luo, 2018). Since MOOC enrollment is so high, it does present challenges with identifying and maintaining group structure. Groups must have hierarchy and leadership in order to function properly (Dron & Anderson, 2014). This grouping may present a challenge for design, especially with the high attrition rates mentioned previously. A co-design approach in which participatory design of the course via feedback sessions can also be employed in designing a MOOC; this requires enough participants to organize sufficiently with a variety of backgrounds, domains, and experience knowledge to represent the group (Cavignaux-Bros & Cristol, 2020). Using frameworks such as the Systems Approach Model from Dick, Carey, and Carey (2015) can also increase student engagement; Giasiranis and Sofos (2020) report a completion rate of 80.2% from a starting cohort of 1309 learners for their MOOC.

Within the instructional design of the MOOC are the instructional materials needed. Learners tend to report that they prefer videos (Stohr et al., 2018), message boards, quizzes, and social networking to stay engaged in the course (Zutshi et al., 2013). Cagiltay, Cagiltay, and Celik (2020) recommend the promotion of forum-based communication between students and instructors as a means of further increasing participant engagement. The xMOOC typically only sees a video generated weekly for the learners to view and study the material (Rodriguez, 2012). The xMOOC tends to be a more cognitive-based learning strategy with a hub-spoke model approach, while the cMOOC is more network based socially (Rodriguez, 2012). These designs show contrasts between the number of active participants and the passive participants from course to course with the cMOOC tending to be more favorable to active participants (Milligan et al., 2013).

Assessment

Assessment within a MOOC course can either be peer- or self-assessed. This is due to the constraint that MOOCs are massive and to have one professor, or even a team of assistants or tutors cannot grade and provide feedback to the potential thousands of essays written in a given course (Ventista, 2018). Within the peer assessment, learners can either be paired up with a partner with similar skills or different skills than what the learner is currently capable (Huisman et al., 2018). However, this form of assessment can lead to a certain level of bias (Ventista, 2018). Peer

review may also be outsourced to technology, which is emerging as the new way to grade essays within the popular MOOC platforms (Balfour, 2013). Within the self-assessment technique within MOOCs, the demographics of highly educated, self-determined learners may be favorable in large classes (Ventista, 2018). Sample, data collection, data source, empirical model will be discussed.

Conclusions

MOOCs have begun to offer a potential revolution in education by virtue of their ready adoption by large groups of students, their ability to transcend distances and gaps in access, and the variety of content offered across different skill levels and disciplines. The themes identified in this review offer a synthetic summary of the issues as well as design components that are important in ensuring that MOOCs can function as effective and viable educational tools. Questions of learner characteristics and motivation as well as fundamental design issues such as instructional design and assessments employed all represent critical components in considering the implementation and development of an effective MOOC.

The power of online education is greatly magnified by the availability of MOOCs to students around the world. Although the face-to-face classroom still represents the current majority paradigm in education, the role that MOOCs will come to play in education is still very much in evolution. Course designers will shape the future of how that role develops as they continue to grapple with issues of learner motivation and addressing learner characteristics as well as the optimization of MOOC design and assessment. While MOOCs continue to grow in both scope of content as well as learner membership, designers would do well to consider the issues in translating face-to-face instructional paradigms effectively into online media. The classrooms of the future will take their lessons and their form from the virtual and face-to-face classrooms of the present.

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