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Design Principles for Massive Open Online Courses (MOOCs)

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Abstract. The creation of Massive Online Open Courses (MOOC) and the subsequent commercialization of MOOCs has generated lots of attention in the past eight years. However, the dropout rates continue to be high. This paper will explore the creation of possible course design elements to promote a more successful MOOC offering and how learners, instructors, and administrators measure success for MOOCs. The paper will also explore measures of success for a disruptive innovation still in infancy.

Keywords. MOOCs, instructional design, disruptive innovation, assessment.

Introduction

The creation of Massive Online Open Courses (MOOCs) and the subsequent commercialization of MOOCs has generated lots of attention in the past eight years [1]. Although questions abound about the large number of learners not completing MOOCs, an average completion rating of 15% [2], the interest, investment and continued research about MOOCs suggest the concept is here to stay. MOOCs disruptive nature and future implications for higher education provide interesting research material for defining success in open, large-scale course offerings. Disruption innovation in a simple definition by Clayton Christensen is to take an existing product offering or service and change either the accessibility or affordability in a way to create a new market. MOOCs fit this definition by improving higher education learning accessibility and creating a dramatic change in affordability for course content. Given the disruption of MOOCs, it is worth exploring success for MOOCs and their impact in teaching and learning.

This paper will explore the creation of possible course design elements to promote a more successful MOOC offering and how learners, instructors, and administrators measure success for MOOCs. Currently, it is difficult for the education world to view MOOCs, with their large dropout rates and varied learner motivations, as successful. This paper will provide context around MOOCs and possible design principles to influence learner behavior for a more successful learner experience. The paper will also explore measures of success for a disruptive innovation still in infancy. To achieve the goals of the paper, we address two issues: 1) the definition of success for courses in higher education and 2) measuring engagement for learners in MOOCs. We explore

these issues in the context of improving the overall success of MOOCs, defined as increasing the completion percentage for learners that begin a course, and increasing the overall engagement within a course. If either of these areas improves, then overall success improves.

In addition, given the varied motivation for MOOC course offerings and instructors, MOOCs may never achieve traditional success standards for learning in higher education. Later we will explore indirect measures of success influencing the investment decisions of colleges and universities in MOOCs.

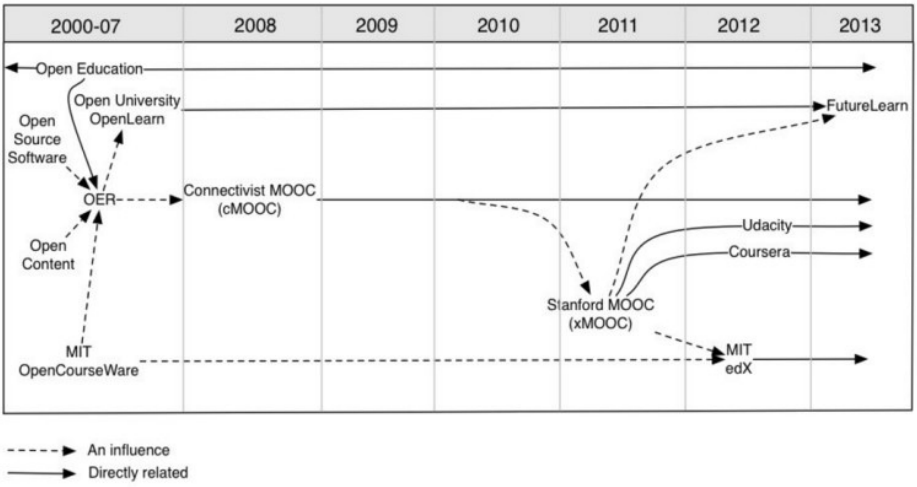
1. History of MOOCs

The recent history of MOOCs can be traced to 2008 and the launch of the course "Connectivism and Connective Knowledge", created by Stephen Downes and George Siemens [3]. Downes and Siemens based the course on an existing for credit course offered at the University of Manitoba, Canada. Downes and Siemens created the course as a free and open course to anyone who wished to participate. Dave Cormier at the University of Prince Edward Island and Bryan Alexander of the National Institute for Technology in Liberal Education used the term MOOC to describe Downes and Siemens course. The course engaged over 2000 learners and the course material interacted with Facebook, wikis, blogs, and forums [4]. Although some articles stated Downs and Siemens course was the first MOOC, other education institutions have offered distance education courses since the 1920s, some institutions even experimenting with new technologies, such as radio, to distribute course offerings to large audiences [5]. In contrast to a more traditional online course, MOOCs have two key features (Wikipedia, 2016): 1) Open access - anyone can participate in the course for free, and 2) Scalability - courses are designed to support a very large number of learners.

Since the launch of the first MOOC in 2008, numerous platforms emerged to host and distribute MOOCs. These platforms, developed in partnerships with leading universities such as MIT, Harvard and Stanford, now reach millions of learners in a large number of subjects [6]. Popular platforms such as Udacity, EdX, Coursera offer MOOCs in a wide variety of subjects to almost any learner with an internet connection. In 2015 alone, over 35 million people enrolled in MOOC offerings [7]. Figure 1 shows the timeline of MOOCs' development from 2000 to 2013.

2. Types of MOOCs

There are two different types of MOOCs, the xMOOC and the cMOOC [3]. While xMOOCs may use learning materials with traditional licenses and perhaps a structured schedule, cMOOCs make use of open educational resources, and allow learners to collaborate through student-to-student interactions [8].



Yuan, Li. and Steven Powell. MOOCs and Open Education: Implication for Higher Education White Paper. University of Bolton: CETIS, 2013. p.6

Figure 1. Timeline of MOOCs.

The xMOOC is a course based on an already existing traditional university course although the scope significantly changes by exposing the content to a very large number of learners. Platforms such as Udacity, Coursera, and EdX traditionally offer xMOOCs. In cMOOC, "c" stands for connectivism, which connects people together during the length of the course. A cMOOC more typically includes blogs, learning communities, and social media platforms to promote interactions between learners. The line between learner and teacher is more blurred in this environment as learning is taking place in forms such as peer-to-peer, student to content, and the more traditional instructor to student [3]. Table 1 compares the characteristics of a typical xMOOC and cMOOC.

xMooc	cMooc
Specialty designed platforms (i.e. Coursera)	Autonomy
Video lectures	Diversity of tools used
Supporting materials	Interactivity
Badges or certificates upon completion	Openness of content and interactivity

Table 1. Characteristics of a typical xMOOC and cMOOC

3. MOOCS – The Learners

Learners enrolling in MOOCs choose a subject to engage in, but other factors in their lives, such as managing time, their own learning goals within the course, seeking resources for the course, and trying new tools are factors in their learning outcomes or success [9]. The traditional classroom can provide more structure around these factors and the traditional classroom and course set up can provide an easier path to reduce the factors an individual spends time and resources completing. Simply, there may be more time necessary for a learner to engage with MOOC course materials than in a traditional classroom. Factors that influence a potential learner include possible future economic benefit, development of a professional identity, challenge and achievement, and fun [6]. For MOOC learners, surveys show that learner motivations for MOOCs typically fell into one of four categories [10]:

1. To support lifelong learning or gain an understanding of the subject matter, with no particular expectations for completion or achievement
2. For fun, entertainment, social experience and intellectual stimulation
3. Convenience, often in conjunction with barriers to traditional education options
4. To experience or explore online education

Given this wide variety of motivation for learners, it is possible to create hypotheses why the higher education industry views the dropout rate for MOOCs as unsuccessful. A researcher may hypothesize that learners interested in exploring online education do not view the completion of the course as a goal, but simply the registration and minimal interaction with an online course may be the learner's overall goal. In addition, if learners are simply using MOOCs to have a bit of fun or entertainment, there may be no desire to engage with peers enrolled in the course or course materials.

4. Learner Motivation and Behavior

To understand design principles that will increase the potential success of a MOOC, the Hasso Plattner Institute offered the first MOOC in German, "Internetworking with TCP/IP" in 2012 and conducted research on the MOOC participants. The research team from the HASSO Plattner Institute surveyed the learners in the course and received more than 1,000 responses. The design principles identified by the learners included consistency of information, multimedia, connected information, synchronous communication, and practical relevance [11].

In addition, a recent study by Guàrdia, Maina, and Sangrà [12] analyzed comments from learners in popular educational technology MOOCs. They identified 10 different themes that may be useful in improving student engagement with MOOCs:

1. Competency-based design approach
2. Learner empowerment
3. Learning plan and clear orientations
4. Collaborative learning

5. Social networking
6. Peer assistance
7. Quality criteria for knowledge creation and generation.
8. Interest groups
9. Assessment and peer feedback
10. Media-technology-enhanced learning

Of the 10 themes, the following four may be used to incentivize and increase student retention and engagement: (1) Competence-based design approach (CBDA), (2) Learner empowerment, (4) Collaborative learning, and (10) Media-technology-enhanced learning.

E-learning environments such as MOOCs demand different roles for learners and instructors. The instructor's role is to become a facilitator who stimulates, guides, and challenges the learner by empowering them with freedom and self-responsibility, and not just a lecturer who focuses on the delivery of instruction ([13]. Let us take a more in-depth look at these four themes and how they relate to student success and engagement.

4.1. Competence-Based Design Approach (CBDA)

The **Competence-Based Design Approach** focuses on the activities a learner can work on, not as much on the content a learner can digest. This theory of applicability relates to Knowles adult learner theory, where adult learners are more inclined to learn when they will be utilizing the tasks. Adult learners value relevancy of information more for immediate application rather than on theoretical perspective [14]. MOOC designers achieve this type of learning by implementing simulations, problem sets, and project-based work into course designs.

4.2. Learner Empowerment

Empowering the learner within a MOOC provides a design principle to better suit the online learning environment. Learners can be empowered by providing course content that is self-regulated, self-paced, and has a self-assessment strategy. By leaving the pace and interaction strategy to the learner, the learner becomes more involved in their goals for the course [12]. A MOOC may have over 1000 learners participating from time zones and geographic regions around the globe. By providing the flexibility for a learner to interact with course content on their schedule, the learner may be more inclined to continue engagement and maintain motivation.

4.3. Collaborative Learning

Collaborative learning within MOOCs should provide activities that promote interactions between learners. These activities may be in the form of large team assignments, small groups of two to three learners, or even one-to-one communication through discussion forums. To increase learner motivation, instructors should strive to incorporate interaction into course designs.

4.4. Media-Technology-Enhanced Learning

Today, MOOC designers and instructors can very easily create attention-grabbing, interactive media elements for their courses. Off-the-shelf software packages such as Articulate, Captivate and Camtasia are now widely available and provide intuitive platforms to build engaging opportunities for MOOC learners. One of the challenges of so many choices and a wide variety of media elements is selecting the most appropriate ones to enhance a course.

5. Course Outcomes

A typical course offered in higher education may rate success by the percentage of learners who pass the course, and the learning within the course, in theory the student's grade. The measure of learning may be from formal assessments such as quizzes or written papers, or based on student engagement with the course content. For MOOCs, as mentioned earlier, traditional measures of success may not be appropriate. New thinking shows other measures of success may be necessary for this disruptive innovation in higher education. New ways of measuring MOOCs success for an institution include increases in investment in technology, instructor exposure to new techniques, marketing to perspective learners and even a learner learning more than originally expected. Andrew Ho, an associate professor in Harvard's Graduate School of Education states, "A better criterion for success might be for learners to complete more of the course than they thought they would, or to learn more than they might have expected" [15].

MOOCs are driving significant investments in technology and teaching at universities and colleges. Due to personnel expenses, the estimated cost to create a MOOC can vary between $150,000 and $250,000, and may be even higher depending on production quality and number of people involved [16]. For institutions, the challenges they face in MOOC production are less on the technical side and more on the pedagogical strategies used to teach a large community of learners from around the world. Faculty involved in MOOCs may be required to use technologies new to them such as, wikis, discussion boards, video components, and digital reading materials. Instructors participating in MOOCs may also bring these new techniques into their traditional on-campus classrooms.

Another potential indirect success from MOOC offerings is marketing to perspective students. Today, more and more organizations, companies and brands rely on courses as ways to engage and educate their customers. Educational organizations are no different. By providing resources free, universities may be able to reach perspective traditional and non-traditional learners.

6. Conclusions

Since the modern beginning of MOOCs in 2008, there has been no shortage of opinions on their success, failure and future in higher education. Although attrition rates of

students remain high, researchers cannot measure the success of MOOCs using traditional assessments. Researchers must consider indirect measures such as investments in teaching, marketing, and exceeding learner expectations for measuring success and engagement. With over 35 million learners enrolling in MOOCs in 2015, the potential of direct and indirect benefits from MOOCs exists. Adjustments in course design principles may improve learner attrition rates and learner engagement with course materials. In addition, indirect benefits such as innovation and marketing exist for colleges and universities continuing their investment in a still young disruptive innovation.

A review of the literature shows that the vast majority of MOOC participants are well-educated although there may be a wide range of digital literacy and variation in their comfort level with social media, which should be noted by course designers. To make MOOCs truly effective however, activities that enhance collaboration and relationships among learners is key and will propel individual learners to take responsibility and ownership of their own learning. As noted in several studies reviewed here, an empowered learner is an engaged learner. The more designers are mindful of the power of collaboration, feedback, and assessment, the more likely MOOCs will be effective learning tools in the future.

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