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Massive Open Online Courses (MOOCs) and the Technologies That Support Learning with Them

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INTRODUCTION

Methods for teaching large numbers of people over the Internet have become a popular topic as new technologies for communication and teaching large audiences have emerged in recent years. Many educational institutions are turning toward MOOCs, or massive open online courses, as a technology for delivery of learning content. In this article, we describe a brief history of MOOCs and the technologies that support learning in MOOCs. We also illustrate what uniquely defines MOOCs in comparison to other forms of distance or online learning. We conclude with a discussion on the implications for teaching and learning with MOOCs and valuable steps for MOOC design, implementation, and future research.

BACKGROUND

Since 2011, large-scale, Internet-based courses began to dominate news headlines as a solution to 21st century educational challenges. These courses, known as *massive online open courses (MOOCs)*, are online educational courses that are open to anyone to participate, often free of cost. As The New York Times was declaring 2012 as "The Year of the MOOC" (Pappano, 2012), commercial providers of MOOCs began to offer classes to hundreds of thousands of students worldwide. The open accessibility, low cost, and internationally connected nature of MOOCs illustrates the potential to increase educational opportunities for populations that cannot afford or otherwise access college-level courses. These factors subsequently have generated popularity toward MOOCs in the last three years.

However, the initial excitement toward MOOCs has also revealed many challenges regarding the MOOC model as an alternative platform for learning (Fowler, 2013). Despite enrollments that are often in the tens and hundreds of thousands, the completion rate of MOOC courses is typically very low, often below 10-20% (Butler, Lauscher, Jarvis-Selinger, & Beckingham, 2004; DeBoer et al., 2013; Ho et al., 2014). Educators have also argued that MOOCs do not include aspects of learning environments that are important to the learning process, such as interpersonal interaction with instructors and peers, the importance of physical presence, and the ability to read body language (Koller, 2012; Kolowich, 2013). To complicate matters further, while MOOCs are regarded as an opportunity for increased access to education, finding ways to assess learning outcomes and provide credentials or credit for accomplishment within courses is still under debate among higher education institutions, state legislatures, and education scholars (Coursera, 2013; Lewin, 2012).

Knowing how technologies are used, how they influence learning processes, and what factors influence MOOC participation will be helpful in both leveraging the potential and addressing the challenges of the MOOC learning model. Many technologies are employed in a successful MOOC, many of which elicit different kinds of interactions from participants. As such, we argue that in order to maximize learning potential, MOOC providers should mindfully match technologies with activities that are known to produce desired forms of learning.

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CHARACTERIZING MOOCs

We attribute the emergence of MOOCs to the convergence of five favorable conditions: 1) a worldwide economic recession prompting the desire for additional education by millions of people worldwide (Lentell & O'Rourke, 2004; Megill, 2004); 2) the reduction in cost of personal digital devices such as laptop computers, smartphones, and tablets; 3) the improvement of worldwide technology infrastructure and Internet bandwidth around the world; 4) the improvement of high-quality asynchronous and synchronous communications technologies; and 5) the open content / open licensing movement (e.g., the Creative Commons and GNU attribution licenses). The convergence of these conditions has led to common elements that define MOOCs. As their name suggests, MOOCs are characterized by the following traits: 1) massive; 2) open; 3) online; and 4) course.

MOOCs have gained notoriety primarily due to the *massive number of participants*. While conventional college courses might host hundreds of students, MOOCs have the capability to host hundreds of thousands of students simultaneously with usually just one instructor. This is not to say that a MOOC instructor has direct, individual contact with each participant, but instead that the participants have the ability to contact the course staff as well as other students. Each participant also receives communications from instructors sent to the whole course.

Openness in the case of MOOCs refers to exclusivity or the ability of learners to access the course. The metaphor of "opening the doors to the classroom" best serves the concept of *open* in MOOCs. In essence, anybody can "attend" the class without having been formally admitted to an educational program. The "open" policy does not mean all MOOCs are free of cost, however. Some courses allow anyone to enroll, but charge a fee to receive certain services. MOOC providers often offer premium *certificates of completion* and dedicated coaching services for a fee.

All MOOCs operate over the Internet in various *online* spaces. While some MOOCs have been designed to incorporate in-person meetings of students, such as local study groups, all materials and interactivity within a course are generally facilitated online. A number of technologies support these large-scale communications and interactions, with a priority on ensuring enough technical capacity to serve content to potentially hundreds of thousands of students simultaneously.

Perhaps the most defining element of a MOOC is that they are generally centered on a *course of study*. The course element of MOOCs is the one that most closely matches conventional, in-person classes. MOOCs follow a specific schedule and need to be completed according to this schedule in order to satisfactorily complete the course. MOOCs are generally real-time, organized events in which participants are time bound with deadlines with dates and times. An instructor or coach facilitates a MOOC and makes these activities available for a certain time, in which participants are required to complete activities within the established timeframe.

Key Players in the MOOC Movement

While there are countless free educational resources available on the web, MOOC providers specifically deliver content around a topic of interest and have an instructor, much like a college course. The website www.mooc-list.com maintains an index of over 41 MOOC providers around the world that offer free educational content in a course-type format. While the five largest providers deliver course materials in a similar way, they differ in their course focus, origins, and target audiences. We provide a brief description of the key characteristics of these five providers in the paragraphs that follow.

Coursera (www.coursera.org)

Coursera is the most popular for-profit provider of MOOCs at the time of this writing. Coursera partners with professors and institutions of higher education to provide courses in multiple disciplines throughout the year. Coursera and their partners assemble live courses that are facilitated by instructors from parter institutions. The Coursera technology emphasizes delivery of multimedia content, work-at-your-own-pace tools, and an infrastructure to support peer interaction and assessment of other peers' work. All courses are offered free of charge, but some courses offer an optional premium "Signature Track" in which students may enroll to receive a certificate that verifies their identity upon completing the course.