MOOC learning experience design: issues and challenges
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MOOC Learning Experience Design: Issues and Challenges

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Abstract

This paper will present current work on various frameworks that are aimed at guiding the research, development, and evaluation efforts around Massive Open Online Courses (MOOCs). Initiatives and activities, including current work by the National Research Council (NRC) in the context of Learning and Performance Support Systems and MOOCs, will be presented along with outstanding challenges and issues to be addressed in the near future. Findings from case studies of Personal Learning Environments (PLEs) and MOOCs will be presented which suggest that learning experiences are impacted by much more than tools and technologies. There is the potential for an enormous palette of possibilities for creating effective, meaningful, and successful learning experiences, as well as many important issues and challenges to address. Recommendations coming of out of recent cMOOC surveys and forums will highlight participant focused and learner driven processes along with a changing notion of time and space in online learning environments. The paper also unveils current and future areas of research and development in a new Learning and Performance Support System (LPSS) program at NRC, including learning analytics, big data, and educational data mining, as well as ethics and privacy issues in networked environments and the use of personal learning data to feed into the research and development process.

Introduction

The term MOOC (Massive Open Online Course) was coined in 2008 by George Siemens (University of Texas Arlington) and Dave Cormier (UPEI) who facilitated their first online course with hundreds of participants distributed geographically, while the content, communication and collaboration were hosted by a large variety of social media platforms. Initially MOOCs were based on connectivist principles and supported by emerging technologies which facilitated peer to peer interaction and made it possible to collaborate and share resources on an unimaginable scale. The topic of this first cMOOC was "Connectivism and Connective Knowledge" (CCK08) (Downes, 2008, 2011).

MOOCs have since added to the range of online learning options and are considered to be a disruptive educational trend, especially in Higher Education and lifelong learning (Hyman, 2012; Yuan & Powell, 2013). A range of both topics and platforms have since emerged and the term MOOC has been described as "the educational buzzword of 2012" by Daniel (2012) reflecting widespread interest in the concept. In 2012, Brooks referred to the hyperbole surrounding the rollout of MOOCs as a "campus tsunami" that was purportedly poised to change the face of higher education.

Amidst all the hype are what seem to be two sound rationales for the existence of MOOCs. The first one relates to their potential for extending learning opportunities for those who would not otherwise have them. And the second one concerns the possible enhancement of the quality of learning and teaching. Interestingly, while much of the positive feedback has

focused on the noble sentiments behind making world-class courses (mostly from elite universities) freely available to anyone located anywhere in the world, a fair amount of the negative press aimed specifically at instructionist MOOCs or xMOOCs has revolved around the quality of the courses themselves (Daniel, 2012). The criticisms run the gamut of instructional design issues surrounding MOOCs; however, dropout and low completion numbers have garnered the most attention. These last two criticisms may be misplaced as they are founded on historical assumptions about learning environments and outcomes that do not necessarily apply to the recent phenomenon of MOOCs, at least not without some reconsideration and reframing (Grover, Franz, Schneider, & Pea, 2013). Hersch and Merrow (2005) suggest that beyond the learning opportunities MOOCs extend to learners around the globe REAL (Research, Evaluation, Assessment for Learning) strategies around MOOCs must be maximized in order to avoid recreating some of the same substandard, weak, and inadequate designs of higher education instruction of today (as cited in Reeves & Hedberg, 2014, p. 7).

This paper will present current work on various frameworks that are aimed at guiding the research, development, and evaluation efforts surrounding MOOCs. Various other initiatives and activities around MOOCs, including current work by the National Research Council in the context of Learning and Performance Support Systems and MOOCs will also be presented along with outstanding challenges and issues to be addressed in the near future.

MOOC frameworks

MOOC research, development, and evaluation

In order to strengthen the efforts around MOOCs, various frameworks have been proposed for research, development, and evaluation, and for the design of more effective

MOOCs, to maximize their potential impact on the existing educational sector. Grover, Franz, Schneider, and Pea (2013) have proposed a design and evaluation framework for MOOCs (Figure 1) based on distributed intelligence that encompasses the social and material dimensions, as well as the traditional roles and responsibilities of teachers distributed among learners because of the scale of the MOOC. The framework proposes specific as well as interrelated features that should work together in order to foster personal as well as cooperative learning.

Source: http://lytics.stanford.edu/wordpress/wp-content/uploads/2013/04/Framework-for-Design-Evaluation-of-MOOCs-Grover-Franz-Schneider-Pea_final.pdf
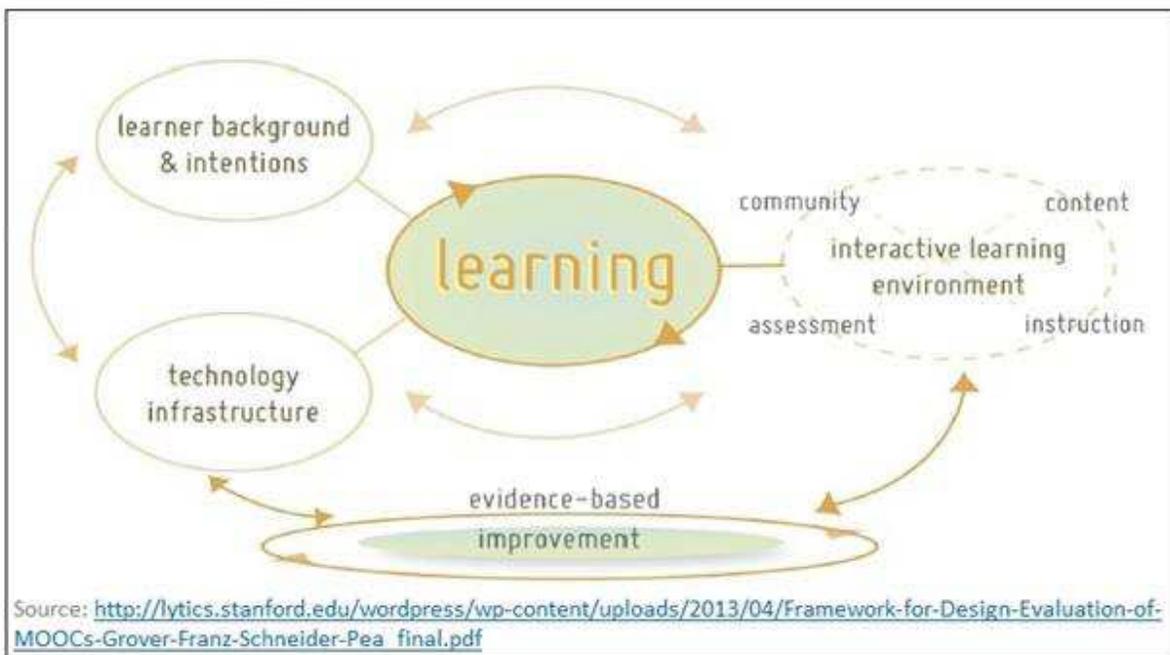
Figure 1: Framework for the design and evaluation of MOOCs

While the interactive learning environment is at the heart of the learning experience, this framework emphasizes that it is the interaction between the learning of individual participants and the collective learning that result in deeper learning experiences. The expertise of all participants in the development of the environment, such as instructional designers, faculty, technologists, and data analysts, contributes to shaping the environment for optimal learning. This framework (Figure 1) for the design and evaluation of MOOCs shifts the focus of

responsibility from the learning institution and faculty members towards a form of participatory learning for the MOOC participants as a whole. Built into the framework are elements of design for innovative and previously untested technology infrastructure elements such as scaffolding for the formation of social learning groups, peer assessment, question-clustering techniques, polling or voting mechanisms, or an automated system that provides "feel good" rewards or "karma points" (see Lewin, 2012) as an incentive to support learning by others in the MOOC.

In order to help guide conversations and advance notions of design, research, and evaluation of MOOCs even further, a new framework for MOOCs in higher education was proposed as part of the MOOC Research Initiative, led by George Siemens at University of Texas Arlington and funded by the Bill & Melinda Gates foundation. An asynchronous, typed, online discussion (also referred to as a Jam) was organized by George Siemens in November of 2013. This session brought together experts in online learning to discuss and design a new framework for MOOCs in higher education. The invitation-only MOOCJam generated much discussion aimed at bringing about order and institutional alignment on the topic of MOOCs, along with consistency and agreement on standards (Mackness, 2013). The Jam discussion, which was intended as a peer review forum, focused on the design of the framework, including a review of its strengths and weaknesses, structural integrity, and the selection, organization, and comprehensiveness of elements. This new MOOC framework (Figure 2) was informed by the ELLI profile, or Effective Lifelong Learning Inventory, which was developed over a three year period at the University of Bristol, resulting in several strands of knowledge. The ELLI profile can be seen here http://momentum.edthemes.org/about-mooc-jam/ as a part of the MOOCJam event. Mackness (2013) has argued that efforts to develop a framework for MOOCs may go against what MOOCs are trying to promote—that is openness, interactivity, diversity, and

autonomy. By fitting MOOCs within a framework, the potential for experimentation and promoting creativity and innovation in Higher Education may be compromised.

Figure 2. Framework for MOOCs

Mackness (2013) argues that the purpose of a framework for MOOCs must be clear and remain true to the initial aspirations of the early MOOCs; that of being disruptive to Higher Education in searching for new ways to think about and democratize education. Other important components of the MOOC Jam framework (Figure 2) include the learner profiles, assessments, and support required for learners in the environment, which should all be considered as existing on a continuum. Research efforts related to personal learning environments and MOOCs have

also contributed important baseline information on learning experiences beyond the tools and technologies. The next section presents important research findings from these various efforts.

Research on personal learning environments

The National Research Council Canada (NRC) has been conducting research on MOOCs since 2009 and has also proposed a framework for conducting research in the area of Personal Learning Environments (PLEs), including MOOCs as a particular instance of PLE (Kop & Fournier, 2013b). The ultimate aim of this work is to help online learners in the context of PLEs to work more effectively but also to contribute to a higher level of engagement and learning—along with efforts to develop support systems or components including: a profiler, aggregator, editor, scaffolds, and services. Previous PLE research and evaluation efforts (Fournier, Kop & Durand, 2014; Kop & Fournier, 2010 & 2013a) have provided important baseline data about user experiences with existing tools, applications, systems, and desirable features for creating new and improved personal learning environments, including learning in the context of MOOCs.

The importance of human factors such as motivation, incentives, support (organizational, social networks, either online or in the community) in creating high-quality learning experiences have been highlighted. Findings from NRC case studies of PLEs and MOOCs have also suggested that learning experiences are impacted by much more than tools and technologies. Philosophical, ethical, contextual, and pedagogical issues surrounding the use of technologies on an individual level and in relation to others inside and outside the social network determine how people learn. The potential exists for an enormous palette of possibilities for creating effective, meaningful, and successful experiences.

A great deal is already known about various experiences and their creation through established disciplines that can - and must - be used to develop new solutions. According to Shedroff, "most technological experiences—including digital and especially, online experiences—have paled in comparison to real-world experiences and have been relatively unsuccessful as a result. What these solutions require first and foremost is an understanding by their developers of what makes a good experience; then to translate these principles, as well as possible, into the desired media without the technology dictating the form of the experience" (Shedroff, 2009, p.3.). It is imperative to not let the technology dictate the development.

Recently, the NRC collaborated on the research and development of an International French MOOC on the topic of Open Educational Resources (OERs); a course lasting nine weeks, with 1,273 participants registered, from geographically dispersed locations across the globe—see CLOM REL 2014 at http://rel2014.mooc.ca/. Online surveys were conducted as part of ongoing information gathering efforts to feed into evolving cMOOC design and development work. Participation in three surveys administrated across the course included representation from Europe (60%), Africa (25%), and America (15%).

A conscious effort was made in the learning design of the MOOC to incorporate structures that might alleviate some of the challenges experienced by cMOOC participants in earlier MOOCs. A collaborative design was adopted with open tools and pedagogy combining both a directive approach (xMOOC type), focused on content, with a networked learning approach of a connectivist type (cMOOCs). The project was developed in an open mode with the following technical implementation: (1) gRSShopper platform to host content and aggregate the contributions of participants and their discussions, (2) the media for publishing chosen by the

participants which also serve as their portfolio, usually a blog, and (3) social media adopted for the course either the Google community, Twitter, and a Facebook page.

The course platform, that is the gRSShopper personal Web environment, provided a place to view course content, to participate in the course by viewing the daily newsletter, the ability to view and post comments in discussion forums, options to view calendars of live events and recorded sessions, as well as sharing RSS feeds. The gRSShopper application would then aggregate content from all feeds with the course hashtag #CLOM REL 2014, including posts and comments to forums and to personal blogs.

Information on new course content and updates was published in a daily newsletter that was emailed to participants who had subscribed to the newsletter service. In addition, the course Web environment would provide daily updates. The course relied heavily on video and text, both updated on a weekly basis, including a video introduction to the week's topic by an expert, various resources and activities, and recordings of live hangout sessions with the experts. Survey comments indicated that there were connectivity issues for those participating in certain parts of Africa, therefore accessing video content was problematic. Offering low-tech options to access content, in PDF file format for example, should be considered in the MOOC design where connectivity may be an issue; this is now part of the lessons learnt for MOOCs offered worldwide.

Essentially, following this first delivery of the OER MOOC, a foundation of solid contributions and capacity building for (French) open educational resources was laid. Currently, interested parties not only can direct their members to specific sections of the course and the course content, but also adapt their own teaching approach combined with the content available. This is referred to as a "wrapped" approach to online learning or MOOC design which consists

of utilizing free and validated pedagogical approaches and content to organize one's own set of learning activities around a topic of interest and around the expertise available.

The recommendations coming out of this recent cMOOC derived from surveys and forum discussions include: (1) the need for assessing the impact of the OER MOOC, (2) the desirability of disseminating shorter timely courses for specific participants (who may be more receptive to these specific events), (3) the need to operationalize (one or more specific aspects of) the adoption of OER by specific communities of interest, (4) the need to identify the core workflow for operationalizing OER, and, as in previous MOOC studies and lessons learned, participants indicated (5) the need to develop an accreditation mechanism that is open for continuing education relating to OERs. As Dave Cormier, our facilitator for Week 8 of the OER MOOC pointed out (Figure 3), in addition to the phenomenon of peripheral participation in cMOOCs there is also a participant driven process whereby the course continues on even after it has officially ended.

Figure 3. French recorded hangout session-accessible from
https://www.youtube.com/watch?v=pC9yH7mUHx0

The notion of a participant driven process underscores the changing notion of time and space in MOOCs as well. In the Rhizo14 MOOC (also referred to as #rhizo 14) participants continued the course without a teacher filling the role as guide or decision maker, for another 6 weeks, with activity in the Facebook, Twitter, and the Google+ realm, and the communal learning process continuing on. People posted ideas, challenges, and thoughts and others brought their perspective to it, and learnt often in vastly different ways, from each interaction (Cormier, 2014).

Similarly, a recent Stanford University MOOC (Coursera's Machine Learning Course—the third offering—ML3) introduced badges for the first time and had about 60% of the students registered before the class officially began and another 18% registered after it ended. This implies that a significant number of the students are interacting with courses solely after they end, which is an unexpected way in which MOOCs differ from traditional classes (Anderson, Huttenlocher, Kleinberg, & Leskovec, 2014). This difference in course content duration and learner activity was also the case for the OER MOOC, as discussions and newsletter contributions continued to flow after the course had officially ended, with participants and experts alike contributing to possible next steps for French-community capacity building of OERs. Such behaviour suggests that MOOC participants perceive MOOCs to be different from a traditional course; more as a learning event with open access Web-resources contributing to a community of learners or learning commons.

Despite the wealth of information now available on MOOCs through various scientific publications and social media including blogs, microblogs, wikis, and social networks, there is no shortage of challenges and issues to be addressed. The next section will highlight some of the obvious ones.

MOOC Learning Experience Design

Challenges related to learning and experience

      To date, research on cMOOCs has pointed to the conditions that clearly encourage the involvement and engagement of people in learning in a connectivist learning environment, including: (1) the social presence of the facilitators and of participants, (2) feeling competent and confident in using the different tools, (3) learning in an autonomous fashion without the provision of organized guidance by facilitators, and (4) the emergence of critical literacies such as collaboration, creativity, and a flexible mindset, which are prerequisite for active learning in a changing and complex learning environment (Kop, 2011).

      Empirical research into the actual MOOC experience is still sparse and areas of particular weakness include information on the types of support systems required by learners to be successful in MOOCs. There is also an overreliance on metrics commonly used in education to measure success in MOOCs, namely the number of enrollments, completion rates, and assessments. Accreditation and engagement continue to pose a challenge in MOOCs—whether in dealing with the semantics of digital badges, automated grading, calibrated peer review, learning analytics for assessment and adaptive learning, distance proctoring, and engagement diagnosis and remediation (Alain, 2014). Individuals now need a wide range of competencies—social skills, communication, problem solving—in order to face the complex challenges of today's world; especially those related to this increasingly digital world.

Important challenges remain to be addressed in order to ensure quality MOOC learning experience design. Current efforts to address important challenges related to personalization, ethics, and the use of personal learning data will be presented in the following sections.

Challenges related to personalization and supporting individual learning needs

Efforts directed towards "mass customization" are currently aimed at restructuring MOOCs at the individual level and to personalize information, resources, and communication in order to best support each student, and not only the aggregate (Salvador, De Holan, & Piller, 2009). These efforts also tie into the persistent challenge of sustained and personal engagement across both xMOOCs and cMOOCs. Participants in cMOOCs continue to express the need for greater presence of course facilitators, which makes cultivating a relationship with the course instructor or tutor a real challenge given the large number of students to attend to. To this end, Coursera has recommended an approach that borders in part on course automation, that is, a computer assigns classmates to give one another feedback. However, automated feedback does not provide students with a sense of being treated as an individual, and, therefore, falls short in providing personalized learning.

Additional inroads are also needed to begin to understand the specific types of resources that informal learners find valuable to their changing learning needs. Further insights into the purposes and goals leading someone to use a specific OER over another or to sign up for a particular MOOC are needed. The factors or learning components which support participant retention in a MOOC are still not well understood nor are the online supports or scaffolds that can be embedded to increase weak completion numbers of most MOOCs to date (Catropa, cited in Bonk 2013). Comments received in the OER MOOC surveys underscore similarities between

the barriers or challenges in MOOCs and many self-directed learning environments, which include less immediate feedback and guidance, lack of personalization, procrastination, and becoming overwhelmed by the resources made available (Graham, 2006). Increasingly, information about individual learners and their online behaviors are made available and harvested from their participation in MOOCs. Researchers need to carefully consider the ethical implications related to how personal learning data is collected, analyzed, and reported.

Challenges related to ethics and the use of personal learning data

Researchers need to consider the ethical implications of the chosen methods of obtaining data for a study as well as the use of the data. Johnson (2014) writes about the ethics of big data in higher education and the problems of privacy and individuality. According to Kitchin, (2014, p.1) "The challenge of analyzing Big Data is coping with abundance, exhaustivity and variety, timeliness and dynamism, messiness and uncertainty, high relationality, and the fact that much of them are generated with no specific question in mind or are a by-product of another activity." The use of learner data to enhance future learning has created a debate around the ethical use of data gathered from online learners. The recent Facebook experiment on emotional contagion (Authur, 2014) and a call from academics for clear guidelines to prevent the misuse of personal information (Schreurs, de Laat, Teplovs, & Voogd, 2014) both serve to highlight the debate and issues around informed consent in conducting research which could potentially influence or affect users' social media. Clearly, the issues are broad and complex.

Conclusion

It has been suggested that the proliferation of MOOCs in higher education requires a concerted and urgent research agenda. A body of research has started to develop. For instance, the MOOC Research Initiative (MRI) has made an effort to address research gaps by evaluating MOOCs and how they impact teaching, learning, and education in general (http://www.moocresearch.com/announcing-mooc-research-initiative).

Researchers have access to massive amounts of data that capture the entire digital experience in a constant stream of inputs and outputs, but the challenge is the effective analysis of such big data. It is easy for researchers to resort to the easiest way of capturing quantitative data, which would leave out the richness that more qualitative efforts could achieve. Some efforts are being made to develop data-driven learning environments that include features for visualizing traces of data that learners have left behind in their online learning activities (Duval, 2011; Downes, 2013). Machine-learning techniques to personalize the learning experience are also being pursued (Spice, 2014).

Social learning analytic tools are being applied in MOOC environments to stimulate, monitor, and evaluate networked learning activities. Tools such as the Network Awareness Tool (NAT) plug-in increases the power of analytics such that participant can render their connected world more visible. Visualizing networked learning activities can help learners to decide which discussion topics they should join and which experts they should aim to connect with (Schreurs, de Laat, Teplovs, & Voogd, 2014). Among the major complaints from participants in the recent French OER MOOC was the challenge of sifting through threaded discussions to find relevant contributions, an overabundance of discussions and content, and the difficulty of knowing who contributed what, especially in one's area of interest or learning. Tools for visualizing networked learning activities could help in supporting learners in MOOCs. Still, with MOOC learning

analytics there are the challenges of going beyond the logs, observing and making sense of interactions, annotations for assessment, dynamic adaptation of learning processes, the need to provide avenues for deeper learning, while managing and protecting the identity and privacy of learners (Alain, 2014). Moreover, there are also difficult issues relating to identity fraud, plagiarism, peer learning, meaningful feedback, and assessment of learning outcomes which need to be addressed going forward.

Two major threads of our work at NRC over the last few years have been MOOCs and Personal Learning Environments. The gRSShopper project and our PLE prototype development both included research and development of cMOOCs in the context of a network theory of learning, and now feed into the research and development of a new Learning and Performance Support System (LPSS) program at NRC. This program explores the challenges of personal learning and performance support, including areas of focus such as learning analytics, big data and educational data mining, and ethics and privacy issues in networked environments and the use of personal learning data feeding into the research and development process. It also looks at agile methodologies for improving system design and efficiency as well as implementing open badges and credentialing mechanisms. The goal of LPSS is to create a single point of access to all skills development and training needs, with individual learning paths, context-aware support, searchable and verifiable skills and competency records, and tailoring to industry needs as required. This research will inform the next generation of learning design, which includes a combination of machine-learning, analytics, and human interactions.

Systems—be they techno-social systems, course recommender systems or learning and performance support systems—must be effective, carefully crafted and designed to promote learner autonomy along with REAL (Research, Evaluation, Assessment for Learning) strategies

(Hersch & Merrow, in Reeves & Hedberg, 2014). The LPSS program has already put important mechanisms in place in its research and development environment to start addressing the challenges and issues of personal learning and performance support, including an internal research ethics review of the collection and use of personal learning data feeding into the research and development process. With the advent of social media and opportunities to connect people on a massive scale, we have now entered a new era of communication and trust. Learners, participants, and consumers of technologies should be encouraged to make informed decisions about what they share, who they share with, and what might be the potential risks and benefits in contributing and participating. Transparency as well as sound data privacy, security, and trust practices by those producing new technologies and learning environments are now a priority.

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