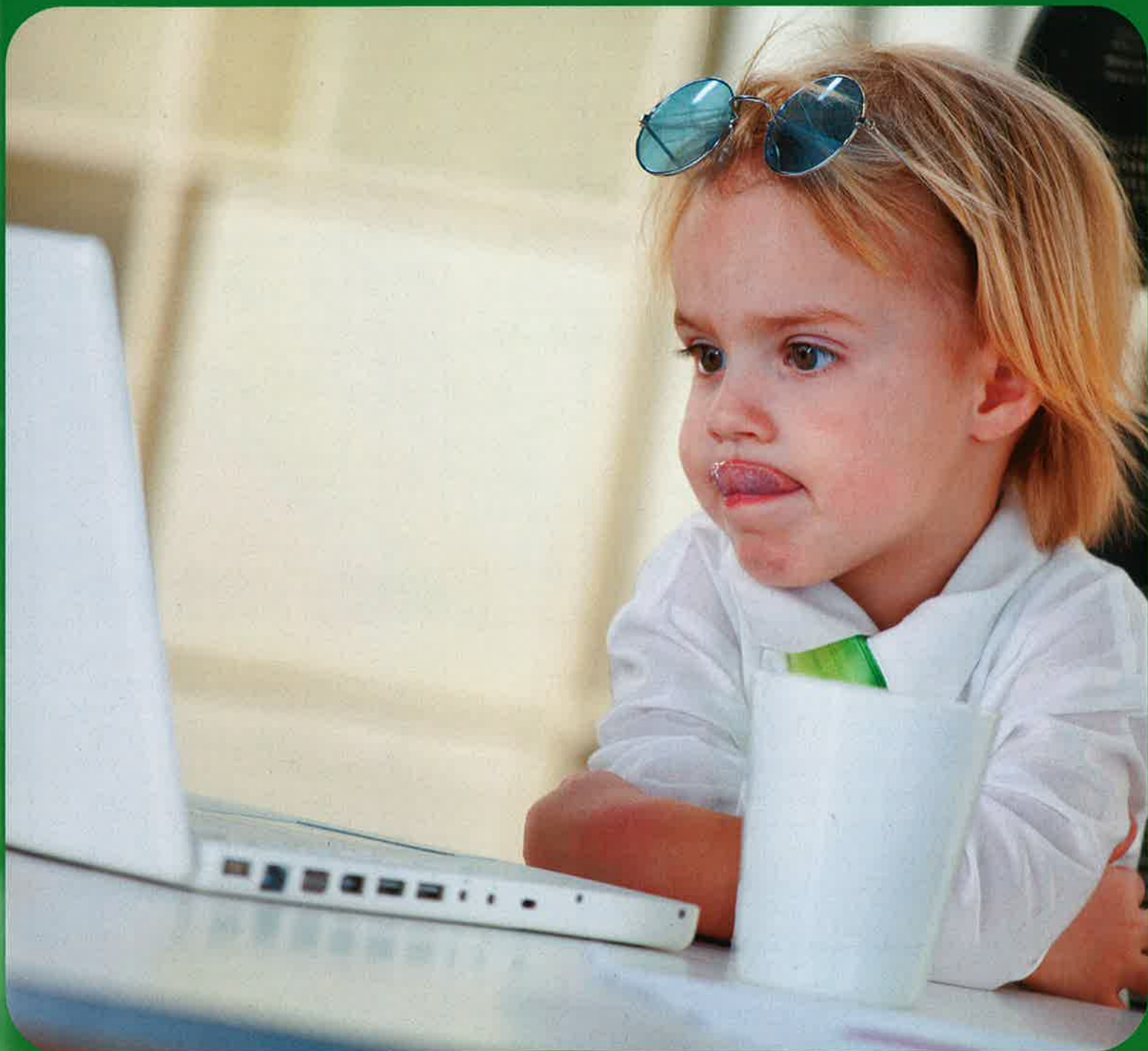


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Creativity and a Massive Course: Experience and Observations with Teaching a MOOC

Brad Hokanson
Marit McCluske

The most defining characteristic of MOOCs and other massive courses may be their scale. In their popular description, in the pedagogical and technological approach, in course operation, and in impact, the scale of the course is always foremost in mind. Beyond changes in scale, there are challenges and opportunities to adapt the new techniques in a variety of venues. This article examines the development and operation of a massive course on creativity and creative problem solving.

Introduction

As academics, we have expectations about the operation of our regular courses; there are scheduled times for registration and we know how many people will be registering and participating. We know how our regular classes perform, whether online or face-to-face, as people show up, then finish most assignments, and we know when classes are complete. We can see when a

Brad Hokanson is a Professor in Graphic Design at the University of Minnesota and serves as Director of Educational Futures for the College of Design. He has a diverse academic record, including degrees in art, architecture, urban design, and a Ph.D. in Instructional Technology. He teaches in the area of creative problem solving and has published research in the fields of creativity and educational technology (e-mail: brad@umn.edu). **Marit McCluske** is an instructor currently based in the College of Design at the University of Minnesota, where she recently received her MFA in Graphic Design. She is an award-winning educator; teaches classes in design, photography, and drawing; and continues a practice as an interactive designer, photographer, and illustrator. Her current work integrates design theory with cognitive and educational psychology to develop meaningful sensory interaction through emerging technology, applied in learning environments (e-mail: mccl0222@umn.edu).

student gets bored or confused. We adjust our work in relation to the scale of the course, using different assessment methods for a seminar or for a necessary lecture class, perhaps using machine grading for one and hand-writing comments on an essay exam for the other. We can make up a lecture or activity on the fly. Massive courses can change all these assumptions.

Our first involvement with massive open online courses [MOOCs] began with a sense of cynicism, wanting to explore the opportunity for a well-supported new use of technology, yet questioning some of the aspects of the medium. Like most faculty, we questioned the reasoning behind offering a non-credit course at high cost, which was free to the world. Perhaps this newest technological opportunity could have greater impact than other newly hopeful technologies: as we began the MOOC, we were near the peak of the "hype cycle."

The positive press heralded the birth of the MOOC as a means to save education as we began teaching our first MOOC. Early on New Year's Day, over 340 people had registered since midnight, when course enrollment had opened, which was three times as many as our largest face-to-face class. And the course was not scheduled to start for another eight weeks. By the beginning of the course, over 52,000 people had registered! This was the beginning of an unusual experience in presenting a MOOC for the first time, and it generated a feeling of awe at the numbers of students enrolled. Subsequently, our story also includes surprise at the high quality of the experience for both instructors and learners.

This article is a presentation of our experience in teaching a MOOC, a massive open online course, and involves observations about the value and challenges of this new form and scale of online education. It chronicles the conception, design, operation, and completion of a class in creativity and creative problem solving which ran in the spring of 2014. A second iteration of the course, tied to a for-credit course, will occur this fall, 2014.

Project Background

The University of Minnesota joined other institutions and began to sponsor massive open online courses in 2013, partnering with the MOOC provider Coursera. Coursera is one of the larger MOOC platforms, with over seven million registered participants. Faculty were recruited to develop courses for the massive environment, and the University provided support for technology, development, and pedagogy. The goal of central administration was to increase the use of educational technology, while raising the profile of the institution.

This article focuses on developing an existing course on creativity and creative problem solving for presentation as a massive open online course. A perceived value was in using digital material and MOOC technologies as part of the translation of a current face-to-face course to a fully online version.

We began the project with a strong sense that the course structure, and particularly the active learning components, could be successfully translated to an online environment. Lectures, discussions, and quizzes are all technologically simple to present, and our earlier work with the course management system used by the University had proved the value of collecting student work in a digital format. Unlike many courses targeted for online development, this class has a non-traditional structure and is problem-based. Academic work for the course is completed away from the computer, in the learners' real lives.

Nature of the Course

Creativity is a skill which crosses all disciplinary boundaries and is generally valued. It has been shown to be three times stronger an indicator of lifetime achievement than intelligence (Plucker, 1999). A large recent study by IBM found that creativity is selected by executives as the leading skill needed in today's world (IBM Business Services, 2010). But, despite being of value, it is seldom taught explicitly in higher education (Karpova *et al.*, 2011).

The face-to-face version of the course has been taught on a regular basis since 2000, and has been conducted in a large lecture/discussion format with teaching assistants since 2007. It is structured as a series of challenges and problems to be solved, with discussion, critique, and evaluation playing a major role in learning. It is not a lecture course, where students are tested on the presented information. Closer to a studio course, it is a very active learning environment, where significant changes in behavior are sought.

Both authors had significant experience in teaching the course in a hybrid environment. Hokanson had been the course instructor since the course's inception, and McCluske had served as a teaching assistant for six semesters, while completing her graduate studies. Most lectures were presented by Hokanson, and most weekly summaries by McCluske.

The course is unusual compared with other academic courses in that it is not solely about the topic of creativity; i.e., it does not seek to teach how creativity is defined, how it is researched, or the historical development of creativity. The course is about the students becoming more creative. This happens through challenges, drills, exercises, and supporting knowledge. It focuses on the changing of habits and beliefs, with some aspects of skills development and knowledge about techniques. The most important beliefs to affect are in developing an understanding that creativity, like intelligence, is dynamic and can be changed through effort.

One of the consistent tenets of the course has been that all parts of the course can be used to develop creativity; from warm-ups to demonstrations to exercises

to taking attendance. Everything is designed to consciously support the development of creativity.

The main way students are trained to be more creative is through a series of "differents," i.e., challenges to "do something different" along a specific theme. Having divergent experiences and stimuli is well proven to increase creativity, habits which can be taught. It is "learning to vary," an important cognitive skill (Neuringer, 2004). It is accomplished by changing ordinary events into creative responses, even events such as eating or sleeping, building a habit of divergent choices.

Conceptually, the "differents" are similar to work from an online course in soil sciences, whose first assignment was to go outside and bring back a can of dirt. Used as a focus for learning, dirt can be found anywhere on Earth, but it will vary with any given location. However, investigations to examine and understand any dirt will have some consistencies across the planet. Similarly, the expression of creativity will be different in many places, but there will be consistencies in how we understand the creative effort. The challenges to develop creativity can be uniquely applied in various contexts. Critical to the course is the direct, personal involvement of the individual in context. Students complete the assignments in person, unmediated, and not in the abstract.

As with any skills development, it is important for creative ability to be applied in context. To be creative, we need to be creative in our own workplace, in our professional lives, and in ways which are of value and which are applicable. The majority of the class assignments are challenges for students to complete away from the computer and with moderate direction. This method of training through personal action combined with reflection is highly effective and location neutral. Learning doesn't have to be at a computer or in a classroom and, in this course, was extended offline.

Development

One of the early choices in developing a massive course, either by default or by conscious selection, is a MOOC platform. Our University has chosen to work with Coursera, and by default included many attributes which affect the nature of the learning and instruction. Inherent in any system are choices, ranging from course structure to data access, and which include potential audience and access. As with course management software, a MOOC platform is complex and often generally not used to its full potential. There are problems with any CMS or MOOC software.

Most MOOCs are designed to run autonomously, with little direct contact between instructor and learner, due to the scale of the course itself. When seeking a massive audience, the direct connection between instructor and student is necessarily limited.

Video, frequently used, provides only a one-way connection on a personal scale, comparable to a television personality. For us as instructors, video was less rewarding, having less interaction directly with learners, and given the time required for preparation, considerably less spontaneous.

Presenting a class in a different format, whether larger or smaller, or moving from face-to-face to fully online, changes the nature of the course. Much of the epistemological structure can be retained. Central to this course was a commitment to active learning, through the personal involvement and engagement of the learner in a series of activities, moving past the concept of didactic education. Memory, development of skills, and expertise are strongest when people have to think deeply and actually do something.

As with the face-to-face class, the creative experiences were to be done in their own communities, surrounded by their friends and family. Learners develop creativity in the context of their own lives, as this is where they will need to live creatively. We sought to stretch and connect this learning activity through peer evaluation and a connection with the global community.

Our offering was scheduled for seven weeks and would replicate the linear educational structure of the face-to-face course. Course material was made available on Wednesdays and assignments were due the following Tuesdays, a holdover from the face-to-face class. By design, peer evaluations would take place the week after the "do something different" assignment was due. Projects and discussion were encouraged to be posted in a series of discussion forums. Very little structure was created for the forums.

Compared with a traditional face-to-face or online course, massive courses rely on a shift in the roles and efforts of the participants. The typical instructional design of massive courses includes written discussion of materials and machine-based testing. Faculty interaction in discussion forums is limited by the scale of the course, and it is often sorted by the participants themselves. And peer evaluation is often used to evaluate and grade learning projects.

In this course, students respond to specific challenges to be more creative, visually record their work, reflect on their efforts, and critique the work of their peers. Digital images or video generated by learners verifies and presents their effort. Collecting a record of the work by online methods uses common technologies of uploading images, videos, and written text. This verifies the direct learner participation by the learning and provides a visual explanation of the effort.

Perhaps the most substantial challenge to the course was the evaluation of students' work at a massive scale. With MOOCs and other massive courses, it is recognized that evaluation of the work must either be

by machine or by the students themselves. The added benefit to the students is a concomitant development of skill in understanding and critiquing the work of others. The challenge has become a benefit to the learners. The role of the instructor is then to structure the peer evaluation interchange through a rubric, having the reviewers learn through the review process. In our case, we challenged the peer reviewers to be creative in their evaluation, and to generate additional ideas for the context presented by the learners.

With this new effort in massive online learning, it is not the wisdom of the faculty member grading the student and offering comments that is key, but rather the wisdom the faculty member builds into the rubric or structure guiding the evaluation by others. As with a large lecture/discussion face-to-face course, for example, the lead faculty would tell teaching assistants how to teach and grade, and now faculty/developers will guide learners as how to grade their peers. If the structure of the grading experience is well designed, it can improve learning. As faculty and instructional designers, we are going to create heuristics and rubrics, when before, naively, at a personal scale, we were going to mold students' minds by close interaction.

In our rubric, many of the questions are objective and deal with the functions of presenting the project, such as: Were images submitted? Were the projects initiated by the learners or were the learners merely going along with friends—and therefore not as creative themselves? The evaluation also required more generative responses, again increasing the creative capacity of the reviewers: How could this project be improved? What would you do with this idea? What else would be possible? To evaluate one's peers, one needs to be able to come up with better, or at least advancing, ideas.

One of the main ways the course developed learning materials and tied the learning materials back to the learners was through the use of the participants' own images to explain concepts and highlight creativity. We used an ongoing process of creating summary collections of the student-generated materials on a weekly basis. While written commentary is useful to explain the activities of the learners, the visual materials communicated the scope and impact of their work, and provided vivid understanding of their efforts. One limitation of the platform was the inability to easily share and rapidly view the thousands of pieces of work, perhaps the richest source of a larger understanding of the effort of the learners.

A separate reposting to discussion forums was encouraged for students, but this was not automatic or required. For instructors, the summary process of collecting the images for summary and re-presentation on social media was also tedious. Posts to Facebook were directly possible by all students, whereas the visual summaries of Instagram and YouTube required

hand manipulation by the instructional staff.

One of the aspects of the face-to-face course is a continuing series of drills meant to improve learners' rapid generation of alternative ideas. This technique is based on classic creativity testing structures of Guilford and Torrance. It is a simple divergent thinking exercise, with a random image stimulation prompting users to come up with divergent uses. This was a significant improvement over the face-to-face course as it allowed regular, repeated drills by the learners at any time, even, as reported, at dinner with their family.

Operation

Teaching any course in a massive format must deal with the various streams of information in discussion forums, postings, and e-mail. Observations of course operations are varied and include audience, persistence, and the nature of the curriculum.

One challenge in shifting from a traditional scale teaching environment to an online and massive environment is balancing the instructional time available for the huge number of students. Responses which are possible with a 20-person or a 100-person class become overwhelming with a course enrollment of over 1000. As with the shift in grading and evaluation, much of the weight of communication relies on the sorting procedures of the group. As with the recommender systems of Amazon or Yelp, learner comments and liking help manage the large amounts of material. The scale of the course brings about a "forced anonymity" for the instructors, separating their experience from many of the learners.

Information for or comments to the class participants are done in a broadcast mode, as in a face-to-face lecture class, and are based on sampling of discussion forums and the limited e-mails directly from students inventive enough to find your e-mail. Substantial instructional time was spent trawling the discussion boards for interesting comments and posts. Voting and flagging among course participants helped raise the visibility of problems and positive events.

Lectures are an important part of the course experience and for Coursera. The video lectures were designed to be short, 5–7 minutes, and could be viewed as a streaming video or downloaded. There were about 50 different videos, and over the length of the course, there were 368,000 streamed views, and about 198,000 additional downloads. Students reported sharing course videos with work colleagues, indicating their perceived value.

One challenge with the videos for many students was language. While all videos were automatically subtitled, there often was a delay in transcription, so we also posted scripts online for each lecture. While technically the course was taught in English, there often was a need for learners to work in their own

language. For example, we encouraged them to use the online creativity drill in their native language. Challenges with language also lead to the development of study groups in Spanish, Portuguese, and Italian, as well as an *ad hoc* What's Up texting network in Africa.

It became clear over the course of the term that many of the learners were challenged by the lockstep schedule of the course, as was required by the peer evaluation system of the MOOC platform. This strict regimen was frustrating for the students, given the continued pace of their regular lives, and limiting for the faculty in their understanding of the class effort.

It is often said that learning in the new millennium will be at the learners' own pace, or another way to put it, any time, any place. But, in reality, much learning is done on a schedule dictated by academic institutions and platform software. Within a 24-hour day, work can be completed at any time, but the schedule for working adults may need to be different than that for full-time students. Designing a course to be done at the learners' own pace would be a different form of instructional design, and one which could have significant value. Some of the assumptions we have about education are often revealed in our translation to different formats. For example, we often believe materials to be sequential, progressive, and linear, and not all are.

One unanticipated aspect of the MOOC world was the development of a social contract among the regular participants in the class. We had designed the course without substantial required discussion participation, and had provided minimal support in this area. The learners, however, suggested and built components such as study groups, and actively connected with each other. They shared their projects and how people reacted to work from the course. For example, on one of the assignments, which asked for students to talk to someone different, one student had a set of conversations with a homeless person in Edinburgh and had reported the conversations through the discussion forums. Participants from around the world ended up sending messages to him, wishing him well, and thanking him for his philosophical comments.

In the face-to-face version of this class, students are supported in their unusual behavior by their peers in the class, helping them remain engaged and becoming more creative. In the MOOC, the social support for breaking habits and cultural norms was online, and for some, a strong connection developed. Students from our MOOC continue to attend, interact, and post in the class and in an ongoing Facebook site months after the completion of the course. Clearly this is an aspect to be encouraged in future iterations of the course, whether online or in-person. How we learn with help from social structures is less well recognized

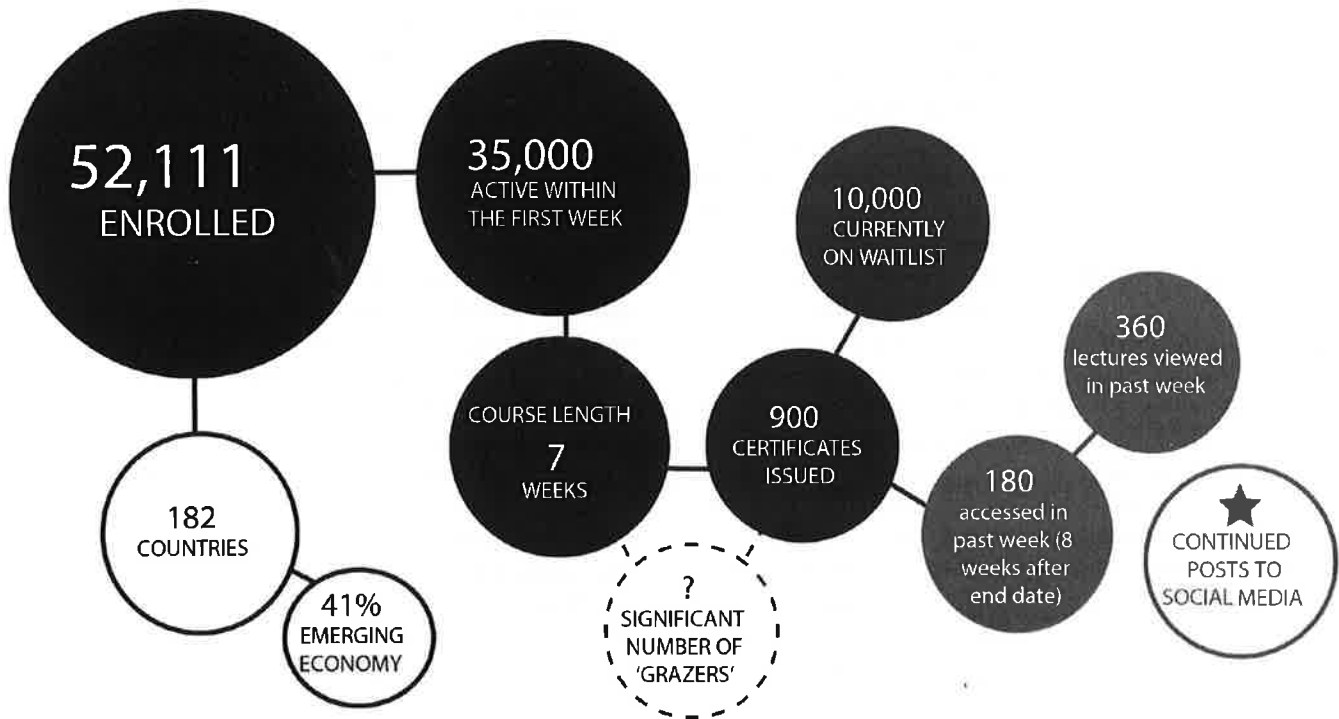


Figure 1. Course enrollment infographic (illustration by Marit McCluske).

than how we've learned through our own individual experiences.

One limitation of the Coursera platform was an inability for students to easily see others' work, unless it was one of their assigned peer evaluations. In order for their work to be public in the discussion forums, students would have to re-post their work. Curious participants would often complete more than the required number of evaluations to see other students' work. As instructors, we enjoy seeing the efforts of our students, and learners also wanted to see other examples.

From the onset of the course, and as a consistent element with the in-person course, we included a visual summary of the best work submitted on a weekly basis. Finding visual materials, even with the recommendations of the course participants and through peer evaluation, was a challenge. The software system did not allow for a bulk collection and viewing of the thousands of visual images, and the sole means for access was through an individual-by-individual review of the work. While individual feedback is important, and could be addressed through the evaluation system, the summarizing and addressing of more common visual issues to the class is also valuable. The instructors, the most skilled critics in the room with the most informed subjective judgment, can't talk to every

individual student in a massive course, as they can only address groups, and in a visually oriented world were not able to view all the work.

In the end, teaching the MOOC revealed many of the same questions we seek to address in instructional design; the value of understanding your audience, seeking to motivate and engage students, and using active learning. The course helped to identify the didactic aspects which are second nature with any face-to-face course as well as the need for personal engagement, the ability to use responses of the learners, and the ability to bring problems to the forefront by student or instructor.

Enrollment and Audience: Motivation and Connection

One of the most substantial differences in the teaching experience was in the interactions with students, the nature of the audience, and the unintentional development and value of interest and community. Each will inform our later work, both in-person and in online environments.

One criticism of massive courses is the severe loss of learners through the length of the course. A modest "completion" rate is the norm for most MOOCs, and it is a critique of this form of education (Friedrichs, 2014; Reinhardt, 2014). The percentage of students

Table 1. Educational distribution/employment status of participants.

Education	Percent	Employment	Percent
Doctorate	4%	Employed full time	52%
Professional degree	4%	Employed part time	8%
Master's degree	33%	Self-employed full time	6%
Bachelor's degree	36%	Self-employed part time	5%
Associate degree	4%	Not employed, looking	15%
Some college	9%	Not employed, not looking	9%
High school diploma	8%	Other	5%

completing the course is comparable to the completion rate for courses offered through EdX by Harvard University, at 3.13% (Bombardieri, 2014). "Completion" remains narrowly defined by many as fulfilling almost all requirements of a given course by a set time. See *Figure 1*.

For this course, Coursera-supplied data showed a maximum total enrollment of 52,000, with 35,000 people accessing the site at least one time and at least 23,000 watching at least one lecture. About 10,000 were active on a weekly basis in some form, and about 5000 completed one or more of the weekly assignments. Some 900 students earned a certificate of completion; those paying for a Coursera "Signature" certificate had higher rates of involvement and completion.

Within a massive course, some may enroll, wishful and optimistic, but without commitment, they might not attend the course after registration. Many participate as they are interested, but often only as passive learners, viewing the materials, the discussions, and the work of others. Others are heavily engaged, diligent in completing the full work of the course, and there is a range of students in between both extremes. How success or completion is defined will vary between student and provider, as the same criteria cannot apply with such a diverse and massive audience.

As a colleague in educational technology has remarked, people enroll in the course for many reasons,

Table 2. Geographic distribution of course enrollment.

Continent	Percent	Country	Percent
Europe	33%	USA	21%
Asia	28%	India	11%
North America	27%	China	4%
South America	6%	United Kingdom	4%
Africa	4%	Spain	3%
Oceania	2%	Brazil	3%

and when those reasons are completed, there is no reason to remain in the course (Reinartz, 2014). Enrolling in a massive course is far different from enrollment in a face-to-face or online class. The commitments, interest, and audience all differ from a physical classroom or a for-credit online course. Data from the University of Minnesota student survey (Walker, 2014) mirrors this concept, with highly positive reviews being received from students who completed less than the full set of assignments for the course. A recognition of this pragmatic choice may also reveal ways to improve the educational experience of MOOCs, and by extension, other forms of education.

There are also major demographic differences between a traditional university course and a massive course. Walker (2014) also notes the age of the participants is much higher (mean age ≥ 31 years old); the gender breakdown for the course was 55% female and 45% male. The participants have a high level of prior educational achievement, with over 70% holding a bachelor's degree and 4% an earned doctorate; most are employed (70%), and are doing this for their own personal interest or improvement. See *Table 1*.

And, logically, most live far from the university, with over 79% percent enrolled from outside the United States. Students from 182 countries were enrolled in the course. Developed countries in Europe and Asia constituted most of the enrolled students. (An interactive map of participants is visible at <http://z.umn.edu/cpsmoocmap>). See *Table 2*.

As with any other class format or instructional design project, it is important to understand the nature of the audience, and in the case of a MOOC, the diversity of learners who enroll. Cultural differences were evident in student performance, but less easily noticeable than language challenges. More conservative cultures or fully-employed learners may have been constrained in their ability to be publicly creative, making it important for learners to explain the context of their work.

There remains, at the time of this writing, a strong interest in the course and the connections formed from the course. In one seven-day period, eight weeks after the conclusion of the course (as shown in **Figure 1**), over 180 students accessed the online materials and over 350 videos were viewed; the course materials have become a resource for many participants. Over 10,000 are on the waiting list for the next version.

A significant question for institutions and instructors is whether or not we are seeking to fully educate each and everyone of the people signing up for the course, or the few finishing to the standards we expect, or that we find some way to identify if we met their varied needs in taking the course. We also must examine the concept of time and flexible scheduling of any massive public course.

Conclusion

Massive courses may be a “disruptive technology” for higher education; they could substantially change the ways we teach, learn, and develop educational materials (Christensen, Horn, & Johnson, 2008). Their use and the technologies of MOOCs will affect institutions of higher education, academic programs, faculty, and the practice of instructional design.

Institutions may view the new massive courses as ways to advance their brand, a means to serve the public and greater good as a form of outreach, or as a fast way to educate at much lower cost. With enrollments which “make any dean salivate” the capability to generate tuition from hundreds or thousands of students is very appealing (Fisher, 2014, personal communication). In contrast, as a form of outreach, the ability to serve the public with learning focused on broadly needed skills is also compelling. For example, courses on radon mitigation or sustainable agriculture could directly help a large audience at low cost.

Academic programs in many fields may find the resources provided by MOOCs to be a significant aid to developing their learners through the use of this free, public resource. As with the development of skills through online media venues, such as *Lynda.com* or Kahn Academy, a wide variety of topics can be presented, in depth, with some rigor, improving student baseline knowledge. We may also see developed “semi-massive” courses, focusing and developing on a single group of learners, such as the entire entering freshman class of a university. Similarly, we may find businesses using MOOCs as a resource to train and socialize their employees. Most of the learners from outside the United States in our MOOC cited ‘professional development’ as the reason for their enrolling.

Faculty may see the most substantial impact on their work, with pressure to move online, address larger classes, and engage more students. As faculty, our response can be one of viewing the new technology as

one representing a decline in the quality of education, or another way to devalue teaching itself, or, of course, as just another technological fad that will not affect our profession. Harvard Business School’s recent move toward a mindful use of online education may shed some light on these choices, coming from a strong debate among their faculty (Christensen, Alcorn, & Emanuel, 2014). Harvard made well-considered, rational choices to use the new technologies and to improve their brand and their quality. As faculty, we can also examine the capabilities and learn from the massive courses; perhaps using peer evaluation to help build learning in even the smallest classes, or by better understanding the cultural differences that exist in any classroom.

For faculty contemplating a MOOC, we would recommend including a shift in thinking beyond instruction based on the individual and to attend to the organization and direction of a large group. It really is a shift in mental orientation in one’s teaching, changing from personal intervention to a larger view of the learning experience. Clearly, this is an area for further research.

Instructional designers may need to re-conceptualize massive courses in how they can be applied or used, and in what ways they *could* be used. Significantly, the untapped resource of the participants, the learning though peer-evaluation, and the global reach of the course are all advantages. If we, as instructional designers, view MOOCs as simply a very large online course, we are limiting the ways we can use this technology/channel. For example, as book publishers are moving towards more interactive, electronic textbooks, there will be a convergence between MOOCs and textbooks, changing the reach and scope of instructional design (Coursera, 2014). In the end, the massive form of learning could approach Comenius’s 17th century goal of assisting learning through books, but extended through to include the value of the most socially connected class in the world.

Massive courses could be viewed as a form of social media, with sharing and organizing by the users, and including the ability to address larger, more complex global issues. Or museums could present their exhibitions through a MOOC, with work and exhibitions flowing and shared across continents. Our own plans include integrating our next MOOC into the online credit classroom, essentially inviting 3,000 guest critics to come and participate in our course.

As a venue and as a teaching and designing experience, our MOOC was an exceptional opportunity, and one we will build upon in the future, using many of the details and nuances of the experience. The value of MOOCs can be found in the scale and the choices it enables, including peer-evaluation, media support, and a focus on motivation and the

use of social networking tools.

MOOCs do have the potential for real educational value—not on the simplistic level of teaching everyone for free—but in understanding the modes of learning triggered by education on a large scale. Through the use of guided social structures, we can make learning better and more broadly inclusive. These are concepts which can be extended to other, smaller scales of instruction, the seminar and the (what used to be considered) large lecture class. These ideas will affect our online courses as well as our small, focused seminars, and our view on learning and technology. Our experience with a massive course was about what we really could come to understand how we help people learn and how we could improve education. □

Visual materials from the course are visible at http://www.instagram.com/cps_mooc and <http://z.umn.edu/cpsyoutube>. Social media use is visible at: <https://www.facebook.com/creativitymooc>.

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PowerPoint: An Overused Technology Deserving of Criticism, but Indispensable

Keith B. Hopper
Jonathan B. Waugh

PowerPoint is roundly reviled and ridiculed, yet this technology enjoys universal popularity. This article reviews the criticisms of PowerPoint and its peer technologies, describes its affordances and advantages, and suggests innovative PowerPoint applications in instruction. Beyond garden-variety applications of PowerPoint, it may also be used to develop streaming movies for mobile use, create online topical archives in stable content, and even serve as a media-rich simulation platform.

Introduction

PowerPoint* bashing is universal. It rivals compulsive e-mailing, intrusive online social networking, and smartphone tinkering as corporate and academic workplace discussion pursuits. This is allied to bashing

* This article refers to Microsoft PowerPoint, the worldwide standard presentation application. We acknowledge that there are similar products (e.g., OpenOffice Impress, Google Docs Presentations, Slidrocket, Zoho Show, Prezi, Apple Keynote, LaTeX Beamer, and others) and intend our comments to apply to this entire genre in the general sense.

Keith B. Hopper is Professor of Information and Instructional Design, Southern Polytechnic State University, Marietta, Georgia. He earned his Ph.D. in instructional technology at Georgia State University. His research focus is on technology integration in higher education and in the medical industry (e-mail: khopper@spsu.edu). **Jonathan B. Waugh** is Professor of Respiratory Therapy and faculty director of the Center for Teaching and Learning, University of Alabama at Birmingham. He earned his Ph.D. in cardiopulmonary science at Ohio State University. His research interests include tobacco education, simulation for learning, and ventilation monitoring (e-mail: waughj@uab.edu).