

FINDINGS and REFLECTIONS from the

K-12 Teaching in the 21st Century MOOC



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About Michigan Virtual Learning Research Institute

In 2012, the Governor and Michigan Legislature passed legislation requiring the *Michigan Virtual University*[®] (MVU[®]) to establish a center for online learning research and innovation, and through this center, directed MVU to work on a variety of projects. The center, known formally as the *Michigan Virtual Learning Research Institute*[™] (MVLRI[™]), is a natural extension of the work of MVU. Established in 1998, MVU's mission is to serve as a catalyst for change by providing quality Internet-based programs that strengthen teaching and learning for K-12 education. Toward that end, the core strategies of MVLRI are:

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- Research — Expand the K-12 online and blended learning knowledge base through high-quality, high-impact research;
 - Policy — Inform local, state, and national public education policy strategies that reinforce and support online and blended learning opportunities for the K-12 community;
 - Innovation — Experiment with new technologies and online learning models to foster expanded learning opportunities for K-12 students; and
 - Networks — Develop human and web-based applications and infrastructures for sharing information and implementing K-12 online and blended learning best practices.
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MVU dedicates a small number of staff members to MVLRI projects as well as augments its capacity through a Fellows program drawing from state and national experts in K-12 online learning from K-12, higher education, and private industry. These experts work alongside MVU staff to provide research, evaluation, and development expertise and support.

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Abstract & Table of Contents

ABSTRACT

Michigan Virtual University and researchers from Kent State University launched a massive open online course (MOOC) in the Fall of 2013 on the topic of K-12 teaching in the 21st century. With support from partners around the United States as well as co-facilitators from various institutions and organizations, the MOOC was developed and implemented from a connectivist pedagogy. Participants were encouraged to act as both participants and leaders in a conversation about connected learning, personalization, collaboration, and reflection. The course was unique in the sense that its intended audience included K-12 students interested in teaching, preservice teachers, and inservice teachers. The goal of inviting such an audience was to facilitate a conversation that supported learning through collaborative professional development. The paper reports on: a) outcomes for participants; b) categorizations of K-12 students, teachers, and others enrolled in such MOOCs; and c) considerations for future implementations of K-12 MOOCs.

TABLE OF CONTENTS

<i>INTRODUCTION</i>	1
<i>PARTICIPANTS, PURPOSE, & CONTENT</i>	6
<i>RESEARCH METHODOLOGY</i>	8
<i>RESULTS: WHO WERE THEY?</i>	9
<i>RESULTS: WHAT WERE THE OUTCOMES OF THEIR EXPERIENCES?</i>	14
<i>RESULTS: ENGAGING MOOC PARTICIPANTS</i>	20
<i>IMPLICATIONS FOR RESEARCH, POLICY, AND PRACTICE</i>	25
<i>CONCLUSION</i>	28
<i>APPENDIX A: ISTE TEACHER STANDARDS</i>	29
<i>APPENDIX B: ISTE STUDENT STANDARDS</i>	32
<i>ENDNOTES</i>	34

Introduction

INTRODUCTION

Every day people are focused on change and making things better. For some, the reinvention of education is viewed as an impossible feat, an unachievable goal, and an unrealistic hope. Why is that? Personally, I believe that the biggest reason is that we're looking too far ahead. We see the end result, which is good since every dream needs a vision, but we often get overwhelmed at the thought of getting there. How can we jump from A to Z? We can't! You have to take it one step at a time. I think there are some simple steps we can take to begin to change everything, and the key is "begin." (Kari, MOOC participant).

Kari (pseudonym) was a participant enrolled in a five-week, massive open online course (MOOC) titled "K-12 Teaching in the 21st Century." The Fall of 2013 MOOC was offered through a partnership between *Michigan Virtual University* and Kent State University. This particular blog post highlights a broad goal we generally have for teachers and one we had specifically in the development of this MOOC: how can we get teachers to think more deeply about reinventing education? What was fascinating for us about the post, however, is that Kari was not an inservice teacher or even a preservice teacher. Kari was a high school student. The post was part of a larger interaction she had with other K-12 students, preservice and inservice teachers, and others interested in teaching and learning in the 21st century.

Kari's blog post also serves as a great summary of one of the reasons why we launched the MOOC. We live in a global society; people are constantly connected to new ideas, new people, and new media. Technology is changing not only the ways we are educated, but also our definitions of what it means to be literate and how we produce, access, and disseminate new knowledge (see Image 1). We wanted to be able to use that same technology to get people to interact and think more deeply about teaching.

There were three other key reasons we launched the MOOC:

1. *Legitimacy.* Over the past five years, MOOCs have received a tremendous amount of both positive and negative attention. While educators have highlighted the promise of innovation for changing education at multiple levels, others have become disenfranchised by the concept of the MOOC.^{iv,v} It is evident that many of those doing the writing or talking have not taken, taught, or participated in some way in a MOOC. We side with Tom Whitby who suggests that if we proclaim we are experts in the development and delivery of technology, we ought to model this practice by participating in the experiences we are discussing or arguing.^{vi} We wanted to be able to act as experienced and knowledgeable discussants in this important conversation.
2. *Audience.* MOOCs had been around for a few years before they became popular in the media. However, much of the content – and the resulting studies – have focused on professionals and post-secondary audiences. There are a few exceptions where developers have forayed into K-12 teaching and learning. Most notably, Verena Roberts leads a course for students exploring Digital Footprints^{vii}, Wendy Drexler has led a MOOC on exploring engineering^{viii}, and Amplify created an Advanced Placement Computer Science MOOC.^{ix} Relatively speaking, the field knows very little about the use of MOOCs for a K-12 audience; the development of this course provided an opportunity to engage that audience.



Image 1. Visual Representation of 'Connected Learning' licensed CC-BY.ⁱⁱⁱ

Introduction

3. *Frustration.* Many technologists, educators, and journalists interested in educational technology want black and white answers about technological innovations. We have been interviewed by countless reporters who want to know *if MOOCs work*. There are two challenges with such a question. First, not all MOOCs are the same.* Educators have found multiple ways to develop and implement a variety of large online courses that they all label MOOCs (or other terms). There is no way to answer succinctly *if MOOCs work* because there is not one specific implementation of a MOOC.

The second challenge is that researchers have already provided ample evidence that asking if a technology works is the wrong question.^{xi} A more appropriate question is: *under what conditions do certain types of MOOCs work?* All technology implementations bring both opportunities and new challenges. There are unique opportunities and challenges with each type of MOOC^{xii, xiii}; however, that does not mean that MOOCs always work or never work. Our frustration was with educators and journalists who either wanted to capture the promise of MOOCs to radically transform education or who wanted to dismiss MOOCs completely because they had constraints that needed to be addressed. There are positive examples of MOOCs; there are also features of MOOCs (e.g., digital badges) that are worthy of exploration, regardless of the future of MOOCs as we know them.

In sum, we launched our K-12 and teacher education-focused MOOC because we believed that there were some positive aspects about MOOCs that needed to be explored in greater detail with a particular audience. We have written extensively about the promise of MOOCs for K-12 teaching and learning.^{xiv, xv, xvi} For instance, we have pointed to the conceptual value of connected learning, digital badges, open content, and teacher and student creation of artifact repositories. We have also addressed the practical value of using MOOCs for supplementary learning experiences, for cultural and interdisciplinary perspectives, for teacher professional development, and for increasing teacher community. The goal of this report is to highlight outcomes from “K-12 Teaching in the 21st Century,” a MOOC we offered from October 7, 2013, to November 8, 2013. We begin with a description of the factors surrounding the development of the course. We then provide a short description of the course content before exploring the data outcomes of the course. The report concludes with implications for research, policy, and practice.

Technological Design

Our MOOC was developed on the concept of connectivism. Siemens (2005) argues that:

Behaviorism, cognitivism, and constructivism are the three broad learning theories most often utilized in the creation of instructional environments. These theories, however, were developed in a time when learning was not impacted through technology. Over the last twenty years, technology has reorganized how we live, how we communicate, and how we learn... Connectivism is the integration of principles explored by chaos, network, and complexity and self-organization theories. Learning is a process that occurs within nebulous environments of shifting core elements - not entirely under the control of the individual. Learning (defined as actionable knowledge) can reside outside of ourselves (within an organization or a database), is focused on connecting specialized information sets, and the connections that enable us to learn more are more important than our current state of knowing. (n.p.)^{xvii}

There are some MOOCs that are simply online courses with a small number of instructors at the center of traditional educational content delivery (e.g., lectures and quizzes). The goal of the course is dissemination of content. The only thing that has changed is the number of participants in the course and the fact that the course is typically free.

MOOCs based on connectivism look and feel different. The goal of the course is not to disseminate information. Rather, facilitators take on the role of connecting people around an idea for the purpose of bettering our understanding of the idea. A connectivist-based MOOC draws on the extensive number of participants as well as the existing open repository of content to develop an experience. Participants are both teachers and learners in a process - not a product.

Introduction

Selecting this initial design framework for the course had immediate implications for the technological delivery of the content. First, we needed a platform that would host a multitude of participants without them having to be associated with a specific institution and their desired learning or content management system. We also needed a platform that recognized the location of content. Image 2 represents the fact that a connectivist-based MOOC does not artificially locate existing content or newly-created artifacts of learning solely within the CMS. Content to be shared in the course could come from online videos, blogs, articles, websites, discussion forums, etc. Artifacts created by participants as they teach and learn would be hosted on their social media sites (e.g., Twitter, Youtube, blogs, wikis, etc.). All too often courses attempt to collect all the material and student responses in one location. The lifespan of the content and the student responses are tied to the lifespan of the course. Facilitators in connectivist-based MOOCs need platforms that allow for sharing materials in the process of starting conversations that extend beyond artificial course boundaries or deadlines.

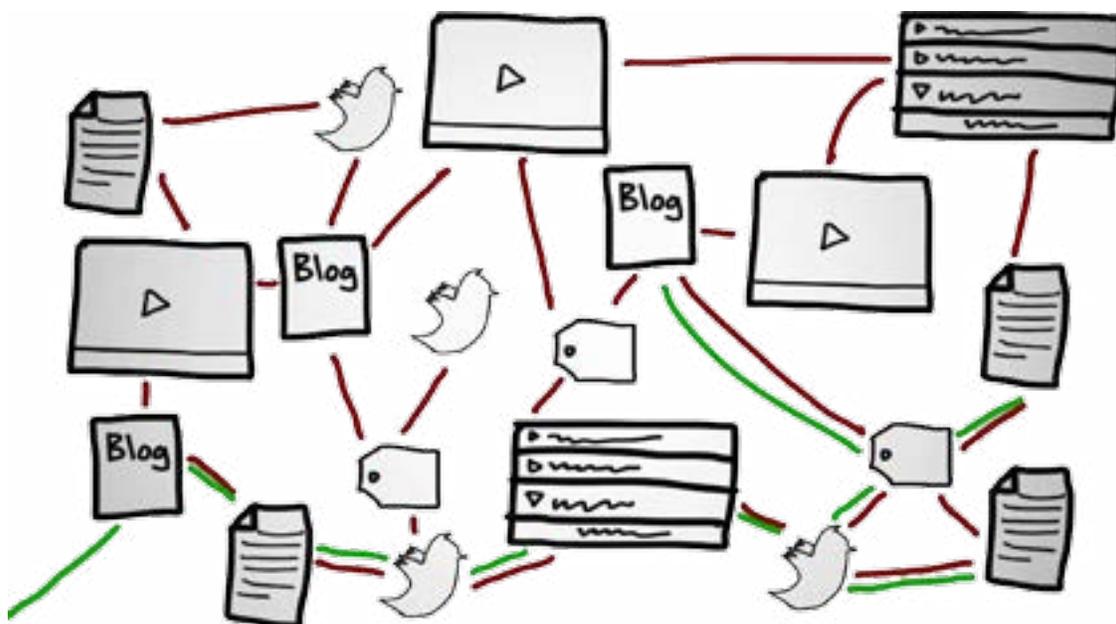


Image 2. Dave Cormier's representation of MOOC content, highlighting multiple paths with and through videos, tweets, blogs, etc.^{xviii} ©Dave Cormier.

Given these needs, we chose to use *Coursesites* by *Blackboard*.^{xix} *Coursesites* allows any user to freely develop up to five courses. Each course can have an unlimited number of participants. It also allowed for the easy integration of tools like digital badges and online certificates. Finally, students could easily register using multiple tools (e.g., *Blackboard*, *Facebook*, *Twitter*, *LinkedIn*, *Microsoft Live*, etc.). There are obviously MOOCs that choose to use solely existing social media platforms without a central learning or content management system. However, using a platform gave us the ability to store data; it also acted as a central location for students to find and post materials, interact in live discussions, etc. In the case of this MOOC, course materials hosted on *Coursesites* were available to students beginning October 7, 2013.

A second design implication was our understanding that this MOOC needed partners. A traditional online course has a small number of instructors who guide students through content (often pre-selected). We saw our role as facilitators leading a discussion about an overarching topic (K-12 teaching in the 21st century). There was an initial understanding of some of the core concepts we wanted to propose, but we wanted participants to have freedom and flexibility in guiding the conversation as they saw fit. To ensure this ability to evolve, we added partners and co-facilitators.

Introduction

We believed partners would help in a number of significant ways:

1. They would be able to promote the opportunity to their constituents. The value of a MOOC and its massive nature is bringing in diverse populations to crowd source teaching and learning. The end outcome is growth of understanding in a given area – not just for participants, but for the field. We wanted a diversity of students and asked partners to share information.
2. We gave partners the broad overview of the course topics and asked them to consider providing materials for course content. The purpose of the MOOC wasn't necessarily to disseminate pre-existing content. Rather the purpose was to engage in conversations around critical topics in education. While we had certain topics (e.g., connected learning, personalization, collaboration, and reflection) that we thought would be interesting to explore, we believed participants, based on their interests and backgrounds, would help shape the content (e.g., readings and digital tools) that was to be consumed, created, and discussed. We saw partners as having the ability to provide suggested content up front as well as content when the course topics evolved.
3. We asked partners to participate in an end of experience executive briefing with other partners and facilitators. We wanted to learn more about the potential for using MOOCs in K-12 settings. An end-of-course briefing would provide a way for project partners to learn what we discovered and to push the field by considering next steps.

Our founding partner on this project was *Michigan Virtual University*. We were pleased to have the support of the following contributors:

- Educator Innovator
- Florida Virtual School
- Georgia Virtual School
- Illinois Virtual School
- Indiana Online Academy
- Michigan Association of Secondary School Principals
- Michigan Education Association
- Montana Digital Academy
- North Carolina Virtual Public School
- REMC Association of Michigan
- The Virtual High School
- Wisconsin Digital Learning Collaborative
- WVIZ PBS IdeaStream

We also believed co-facilitators would significantly improve the learning experience of all participants:

1. We asked co-facilitators to share the experience with their constituents. Our co-facilitators came from multiple university and K-12 education settings. We believed inviting their teachers and students would increase the intellectual and participant diversity in the course.
2. We asked co-facilitators to review the course outline and provide suggested content. Each of the participants we invited were experts in their given fields. We asked them to contribute materials they saw meaningful to the topics at hand.
3. Co-facilitators were asked to be more active in one week of the course. This activity translated into two parts. First, although they were encouraged to provide commentary and stimulate discussion throughout the course, we asked them to take ownership of interacting with participants in a given week. Second, we asked them to work with other co-facilitators in their week to host some sort of event. This was open for co-facilitators, but ended up taking the form of webinars or hosted Twitter Chats.
4. Co-facilitators were invited to write with us if they were interested in publishing their experiences about co-facilitating the MOOC.

Introduction

The course was facilitated by Richard Ferdig and Kristine Pytash with support from William Merchant and Jennifer Nigh. Image 3 highlights our co-facilitators.

ABOUT THE FACILITATORS	
 <p>Dr. Rick Ferdig Summit Professor of Educational Technologies Research Center for Educational Technologies Kent State University</p>	 <p>Dr. Kristy Pytash Assistant Professor, Literacy Education Teaching, Learning & Curricular Studies Kent State University</p>
MEET THE CO-FACILITATORS	
 <p>Dr. Wendy Drexler Director of Online Development Brown University</p>	 <p>Dr. Regina Fails Nelson Professor & Chair, Department of Teaching, Learning & Educational Studies Western Michigan University</p>
 <p>Dr. Troy Hicks Associate Professor of English Director, Chippewa River Writing Project Central Michigan University</p>	 <p>Dr. Kara Sevensma Assistant Professor, Teacher Education Education Department Calvin College</p>
 <p>Dr. Kedmon Hungwe Associate Professor of Teacher Education Michigan Technological University</p>	 <p>Dr. GERALYN E. STEPHENS Associate Professor Clinical Teacher Education/College of Education Wayne State University</p>
 <p>Dr. Leonard R. Johnson Professor of Education & Chair Strategic Planning & Resource Council Ferris State University</p>	 <p>Laurie Switzer PreK-16 Outreach & Special Projects Coordinator WVIZ/PBS Ideastream Education</p>
 <p>Greg Marten Director REMC 19W Educational Technology & Distance Learning Consultant Lenawee Intermediate School District</p>	 <p>Dr. Andrew Topper Associate Professor, Educational Technology, Special Education, Foundations, and Technology College of Education Grand Valley State University</p>

Image 3. Course co-facilitators and their respective affiliations.

Participants, Purpose, & Content

PARTICIPANTS, PURPOSE, & CONTENT

Participants and Purpose

A unique feature of this MOOC was the intended audience. The MOOC was directed at three distinct audiences: high school students interested in becoming teachers, preservice teachers, and inservice teachers in the K-12 system. While we did not directly target other groups, we also had district technology and curriculum directors, school administrators, and teacher educators enroll in the course. The purpose was to provide a space for those passionate about teaching to receive feedback, explore new instructional approaches and digital tools, investigate the transition from theory to practice, and discover the complexities and rewards of teaching.

We hoped existing teachers would receive feedback from high school students and preservice teachers, both on existing practices as well as innovative technological tools. Our desire was also for preservice teachers to receive insight from practicing teachers and current high school students about successful implementation, as those in preparatory programs transition from theory in methods courses to practice during student teaching. Finally, we believed high school students interested in the teaching profession would be able to apprentice with current and future teachers to explore the complexities and rewards of teaching. As discussed later in this document we found, that while the MOOC served as a pathway for each group to continue their growth as learners, the MOOC also allowed these pathways to intersect as participants engaged in critical conversations about education.

Participation

We shared with participants our vision that the MOOC was a place for participants to learn, teach, share, and discuss important topics related to K-12 teaching in the 21st century. However, we also understood that participants might enroll for a variety of reasons. As such, we suggested that they take one of three different approaches in the course:

1. *The Passive Participant.* This participant may have joined solely to consume as much as they could about tools and readings related to teaching in the 21st century and/or to learn more about MOOCs. We encouraged them to feel free to log in whenever they could. Our instructions were to consume and then create and collaborate when they had time or interest in a particular area.
2. *The Engaged Participant.* We also understand that there were some participants who wanted to be able to demonstrate their competency within given areas. We used digital badges as a way for participants to be committed to components of the course without completing the entire MOOC. If participants completed the Consume, Create, and Collaborate activities for each week, they achieved a badge associated with that topic. Participants could earn up to seven badges (the five content areas plus a pre- and post-survey badge). See Table 13 for badges and certificates awarded overall and by group.
3. *The Certificate/CEU Earner.* We created the MOOC to engage participants in a conversation about 21st Century Teaching. However, some teachers were interested in earning a certificate of completion and/or continuing education credits for their work. Anyone who completed all seven badges automatically earned an End of Course Certificate. This took approximately four to six hours a week of work (a total of 25 hours). We also gave participants the opportunity to earn professional development credit. Participants from states who were collaborating partners (e.g., Michigan or Indiana) would earn credit upon request by completing all of the course components; participants from other states could use the syllabus and certificate of completion to seek their own professional development credits.

It is important to note that these participatory roles are not ranked in order with one being more optimal than the other. We wanted participants to engage with the MOOC in the ways that best served their educational and professional goals. We encouraged participants to be involved in ways that were most beneficial for their learning.

Participants, Purpose, & Content

Content Design

The course was designed around four principles often associated with teaching in the 21st century: connected learning, personalization, collaboration, and reflection. While the course topics changed from week to week, the MOOC structure was similar across learning modules. First, each week participants “consumed” information about a particular topic. Participants had opportunities to watch videos, webinars, and *TedTalks*, and read articles and blogs about the weekly-featured topic. We also gathered and shared materials using the social bookmarking tool Delicious, so participants could also access additional information related to the topic. We encouraged participants to share resources about the topic on the course discussion board or via social media, such as Facebook, Twitter, and Delicious. The goal was for participants to gain knowledge about the topic so they were prepared to engage in conversations and create artifacts that represented their knowledge.

Second, after “consuming,” participants collaborated on discussion boards about their learning. Since participants already engaged in an in-depth exploration of that concept, the goal of the collaborate stage was to begin conversations about teaching and learning. Many participants were already active users of social media, including Twitter, Facebook, Delicious, and personal blogs; therefore, participants had the option of using both *Coursesites* and their social media networks to share their thoughts and work. Finally, participants “created” an artifact to represent their learning. For many preservice and inservice teachers this was a lesson plan incorporating a digital tool, while many K-12 students used the digital tools and knowledge of the topic to complete work for their high school classes. Participants provided the link to their artifacts on the discussion forums and on their social media sites. The goal for each week was to continually develop and sustain a community of active and engaged learners.

Week-by-Week Activities

The *International Society for Technology in Education* (ISTE) developed standards for teachers and students. In the beginning of the course, we provided documents to teachers and students to demonstrate standards addressed in the MOOC (by topic) as well as digital tools that might help them achieve those standards. Those documents can be found in Appendix A (teachers) and Appendix B (students).

During the first week of the MOOC, the goal was to begin unpacking what it means to be a teacher in the 21st century. We encouraged participants to consider how rapidly advancing technologies are not only changing the resources and tools we have available, but also how teachers can reimagine the learning opportunities that might take place in their classrooms, both online and face-to-face. As participants began exploring new digital tools, they watched videos and webinars and read articles and websites to explore the notion of connected learning. Participants discussed how digital and social media are changing how we access information and disseminate new knowledge and information. Participants were encouraged to consider how technology might help teachers reimagine their roles as sole proprietors of knowledge as lead learners in a community of learners.

The second week of the MOOC was dedicated to personalized learning. The concept of personalized learning and the benefits of tailoring instruction for individual students are not new; however, participants explored how technology might provide instructional opportunities so that learning could be particularly meaningful and relevant to students’ lives, interests, and goals. Technological tools were examined, specifically identifying how a teacher might use digital media to provide students with choice and ownership during learning experiences.

Social relationships are critical to learning in the 21st century, so during the third week we explored collaboration. Specifically, we asked participants to explore how technology might assist teachers when creating a community of learners in the classroom. Participants shared their own experiences from the MOOC of how technology provided new avenues of community so that they could share ideas, provide feedback, and participate in new learning opportunities. Similar to the previous weeks, participants used digital media and tools to collaborate with others and explored how collaboration was fundamental in helping students meet their learning objectives.

Research Methodology

Although technology often ensures people are constantly “connected,” we know that opportunities for reflection are critical to both teachers’ growth as professionals and students’ growth as learners. The fourth week of the MOOC highlighted ways in which technology provided opportunities for learners to be metacognitive about their learning and engagement. Participants explored specific technological tools for reflection both before and after instruction. During this week, the community shared innovative digital tools to help teachers not only achieve their instructional goals, but also provide reflective moments to focus on pedagogical practices. We also asked participants to consider their growth throughout the MOOC learning experience and ways in which technology allows for professional growth through maintaining professional connections and communities of practice.

	Module 1 - Connectivism	Module 2 – Personalization	Module 3 - Collaboration	Module 4 - Reflection	Module 5 - Implementation
Consume	Articles, Videos, Discussion Forums, Webinars, FAQs, Live Chats				
Create	Blogs, Wikis, Twitter, Facebook, Google Tools, Social Bookmarking	Presentation Tools, Online Content Construction Tools, Classroom Learning Platforms, Screen Capture Tools	Collaborative Learning Platforms, Video and Image Creation, Website Creation	Digital Portfolios, Electronic Journaling, Virtual Rubrics	Lesson plans, CMS content, Portfolios, Web Presence
Collaborate	Blogs, Wikis, Twitter, Discussion Forums, Portfolios, CMS Content				

Table 1. Course layout

RESEARCH METHODOLOGY

As previously noted, we created this course to explore the use of MOOCs in K-12 teaching and learning. While delivering the actual course, we set out to answer three important questions:

1. What does it look like to actively engage K-12 students and teachers in a massive open online course – an environment for which they would volunteer to participate?
2. How can we categorize participant interactions in order to continue to develop and deliver high quality MOOCs for K-12 environments?
3. What are the opportunities and challenges for offering K-12 teachers and students a MOOC, particularly one that is offered from a connectivist approach?

To answer these questions, we relied on four data sources. First, we used Blackboard’s *Coursesites* course management system (CMS). One advantage of using an CMS in MOOCs over solely using social networks is the availability of data. *Coursesites* was able to provide us with data on discussion forum posts, total time online, a catalog of artifacts created, etc. We asked participants to complete a pre-survey with demographics and a post-survey with outcomes related to the course. Our final data source were the course achievements. This included the number of badges participants earned as they progressed through the course.

Results: Who Were They?

RESULTS: WHO WERE THEY?

Participants were asked to complete a pre-survey. The pre-survey contained demographic information as well as other questions that might help identify the types of participants enrolled in the MOOC. These data helped describe the type of participant who enrolled in “K-12 Teaching in the 21st Century”.

How many participants were involved?

The course began on October 7, 2013, with 673 students enrolled. The course ended with 848 participants. Having nearly one fifth of participants join after the course started demonstrated the value of a MOOC developed and delivered using social media. Many students joined when they saw assignments or comments posted on participants’ blogs, *Twitter* feeds or *Facebook* posts. Data presented below were based on the course pre-survey. Given the open nature of the MOOC, not all participants responded to the survey. However, we believe our data sample is representative of the overall population with a response rate of nearly 50% (414 respondents).

Where did they come from?

We requested zip code data in our pre-survey. Many of the participants reported being from the state of Michigan. This is not surprising given the fact that the MOOC was supported by *Michigan Virtual University* and had multiple partners in the state of Michigan. However, participants came from across the United States. We also had at least 12 representatives from Spain, France, and Turkey. In our data collection efforts, we did not make a clear spot for participants to enter country codes; as such, Image 4 and Image 5 on page 10 provide a sense as to the physical location of our participants in the United States who shared their data.^{xx}



Image 4. A representation of count by number of participants in zip codes across the United States. A circular number represents the count in that zip code; an open circle equals one participant only.

Results: Who Were They?

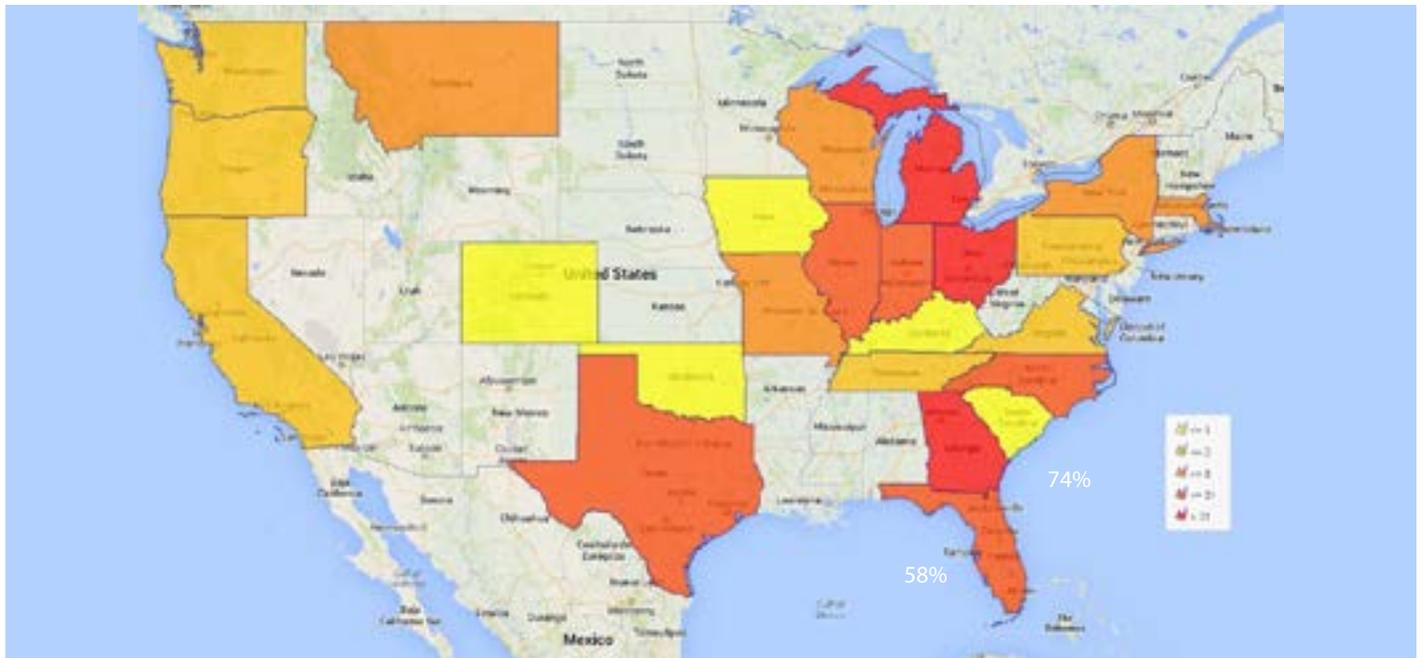


Image 5. A representation of count by state participation across the United States. Yellow<=1; Light Orange<=2; Orange<=8; Light Red<=31; Dark Red>31 participants.

What were the occupational and educational demographics?

This MOOC was targeted specifically towards K-12 students who were interested in teaching, preservice teachers enrolled in teacher education programs, or inservice teachers currently teaching. However, we opened this up to any participant who was interested in the topic of K-12 teaching in the 21st century. The largest group of participants in this MOOC were secondary school teachers (26.6%) followed by K-12 students (22.7%). 14.7% of occupations fell under “other,” 14% were undergraduate students, 10.6% were elementary school teachers, 4.8% administrators, 3.9% university faculty, and 1.7% were graduate students (see Table 2).

The majority of MOOC participants (43%) listed a graduate degree as their highest level of education. The second highest group was made up of individuals who had currently only completed high school level courses. 12.1% had received an undergraduate degree and 10.6% had completed some college courses (See Table 3).

For the remaining analyses in this paper, participants were grouped according to our intended groupings. K-12 students consisted of K-12 students; Preservice participants were those who listed themselves as Undergraduate Students or Graduate Students enrolled in teacher education courses; Inservice teachers were the combined grouping of Elementary School Teacher and Secondary School Teacher; finally, Administrators and University Faculty were rolled into the Others category. There is value in understanding experience broken down into further groupings. However, there were two reasons we grouped these individuals. First, we wanted to understand the intended audiences’ experiences. Second, some of the groupings were too small by themselves to have statistical power.

Results: Who Were They?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Administrator	20	4.8	4.9	0
	University faculty	16	3.9	3.9	8.8
	Graduate student	7	1.7	1.7	10.5
	Undergraduate student	58	14.0	14.1	24.6
	K-12 student	94	22.7	22.9	47.6
	Elementary school teacher	44	10.6	10.7	58.3
	Secondary school teacher	110	26.6	26.8	85.1
	Others	61	14.7	14.9	100.0
	Total	410	99.0	100.0	
Missing	System	4	1.0		
Total		414	100.0		

Table 2. Distribution of participants' occupation.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High school courses	108	26.1	26.3	26.3
	High school diploma/GED	8	1.9	1.9	28.2
	Undergraduate courses	44	10.6	10.7	38.9
	Undergraduate degree	50	12.1	12.2	51.1
	Graduate level courses	23	5.6	5.6	56.7
	Graduate Degree	178	43.0	43.3	100.0
	Total	411	99.3	100.0	
Missing	System	3	.7		
Total		414	100.0		

Table 3. Distribution of participants' education.

Results: Who Were They?

What were the age demographics?

The mean age of participants in the MOOC was 32.39. As can be expected, high school students and preservice teachers had a mean age representative of their typical age groups (16.20 and 22.42 respectively). Inservice teachers and Others had an average age of 39.83 and 42.75 respectively (see Table 4).

	Mean	Std. Deviation
All groups	32.39	15.239
K-12	16.20	1.915
Preservice	22.42	7.564
Inservice	39.83	11.384
Others	42.75	14.775

Table 4. Age representation of participants in the MOOC.

What were the gender demographics? Significantly more females (327; 79.9%) participated in the MOOC than did males (82; 20.1%; $p < .001$)^{xxi}. Females also outnumbered males across all subgroups. There was also significant difference between subgroups ($p < .001$)^{xxii}; most notably, preservice teachers had the highest representation of males of all groups (see Table 5).

	Female	Male
All groups	327 (79.9%)	82 (20.1%)
K-12	83 (88.3%)	11 (11.7%)
Preservice	42 (64.6%)	23 (35.4%)
Inservice	127 (83.0%)	26 (17.0%)
Others	75 (77.3%)	22 (22.7%)

Table 5. Gender representation of participants in the MOOC.

What were the ethnicity demographics?

Significantly more White/Caucasian participants enrolled in the MOOC (354; 86.3%) than other groups ($p < .001$)^{xxiii}. There was also a significant difference between subgroups ($p = .002$)^{xxiv}; most notably, preservice teachers had the highest representation of Hispanic participants while K-12 students had the highest representation of African American participants (see Table 6).

	African American Frequency (Percent)	Asian/Pacific Islander/Others Frequency (Percent)	Hispanic Frequency (Percent)	Native American Frequency (Percent)	White / Caucasian Frequency (Percent)
All groups	17 (4.2%)	15 (3.7%)	20 (4.9%)	4 (0.98%)	354 (86.3%)
K-12	10 (10.6%)	4 (4.3%)	6 (6.4%)	0 (0.0%)	74 (78.7%)
Preservice	2 (3.1%)	3 (3.1%)	8 (12.3%)	1 (1.5%)	52 (80.0%)
Inservice	1 (0.7%)	2 (1.9%)	1 (0.7%)	1 (0.7%)	148 (96.1%)
Others	4 (4.1%)	6 (6.2%)	5 (5.2%)	2 (2.1%)	80 (82.5%)

Table 6. Representation of ethnicity in the MOOC

Results: Who Were They?

Why did participants sign up for the MOOC?

We believed participants would enroll in the MOOC because they wanted to engage others in a conversation about 21st century teaching. However, we understood there were other reasons for enrollment. For instance, some teacher educators or K-12 instructors might assign all or a portion of the MOOC for an assignment or for extra credit. Others might join the MOOC and then make recommendations to their friends or colleagues. We asked participants why they enrolled, allowing them to select multiple reasons. There was an overall significance in reason for enrolling ($p < .001$)^{xxv}, with the top three reasons for enrollment being interest in the topic, professional development credits, and an interest in learning about MOOCs. Data for the question are presented in Table 7; overall percentages are not provided as participants could select more than one item. It is worth noting that there were significant differences between groups in their choices for MOOC enrollment in all areas except for “Suggested by Someone” and “Meeting Others” ($p < .05$)^{xxvi}.

	Course Requirement	Extra Credit	Interested in MOOCs	Interested in Topic	Meeting Others	Prof. Dev. Credits	Suggested by Someone
All groups	80	27	123	285	29	140	87
K-12	36	10	6	67	5	2	9
Preservice	34	13	9	37	3	6	14
Inservice	2	1	54	109	10	110	40
Others	8	3	53	71	11	22	24

Table 7. Reasons for enrolling in the MOOC

What online course experience did participants bring to the course?

A high number of participants had either participated (190) or completed (216) a non-MOOC online learning experience. Ninety-eight participants had also taught in a non-MOOC online experience. For 129 participants, this was their first online experience of any kind. Very few participants had participated in a MOOC (34), completed a MOOC experience (15), or taught a MOOC (2). The complete list of experiences is presented in Table 8; percentages are not included as participants were encouraged to select all the answers that applied. There was a significant difference in overall previous online experience ($p < .001$)^{xxvii}; there were also significant differences between groups in their online experiences with all choices except for “Taught a MOOC” ($p < .05$)^{xxviii}.

	First Online Learning Experience	Participated in Online Experience (not a MOOC)	Completed Online Experience (not a MOOC)	Taught Online (not a MOOC)	Participated in a MOOC	Completed a MOOC	Taught a MOOC
All groups	129	190	216	98	34	15	2
K-12	61	28	21	0	0	0	0
Preservice	18	30	37	3	1	0	1
Inservice	31	73	102	54	7	4	1
Others	19	59	56	41	26	11	0

Table 8. Previous online learning experience

Results: What Were the Outcomes?

How much time did participants typically spend online?

Participants were asked to guess how many hours per day they typically spent online. The overall average was 5.14 hours per week. However, there were differences in the amount of time reported by group (see Table 9). An ANOVA was conducted to determine if these differences were statistically significant. The “Others” group spent a significantly greater amount of time online per day than Inservice teachers and K-12 students ($p < .001$)^{xxix}. Inservice teachers spent significantly less time online than Preservice teachers ($p < .001$).

	Mean	Std. Deviation
All groups	5.14	3.079
K-12	4.17	2.617
Preservice	5.14	3.241
Inservice	4.98	2.854
Others	6.07	2.803

Table 9. Average time spent online each day

RESULTS: WHAT WERE THE OUTCOMES OF THEIR EXPERIENCES?

Participants were asked to complete a post-survey that asked about their experiences in the MOOC. We also collected data from the technologies used to better understand their course experiences. A total of 168 participants completed the post-survey.

Participants enjoyed the course.

Participants were asked to rate their enjoyment of the MOOC experience. They were specifically asked:

On a scale of 1 (Did Not Enjoy It at All) to 7 (Absolutely Loved It), (with 4 being “No feelings one way or the other”), how would you describe your enjoyment of this MOOC? Please enter in a single number.

The average answer was 5.46, indicating participants liked the MOOC. Positive comments noted both the content and the facilitation. Participants shared:

R1: “This is very excellent online course. Especially course materials and new programs were very exciting for me. Moreover, course organizers gave feedback to me every week. This is very positive and developmental for me.”

R2: “This course was very organized and structured in a way that helped me get through it with no problems. I enjoyed all of the content and tools available, and I hope I will be able to access this course site in the future so that I can continue to use the resources it provides.”

Participants who did not think as highly of the experience mainly noted the work that was required. For instance:

R3: “I didn’t like it cause it had so much to do.”

R4: “Thank you! This has been stressful but only because I am so very busy that finding the time to complete the lessons was a challenge but in the end I think I benefitted enough to justify the stress.”

Results: What Were The Outcomes?

Although the negative comments are as valid and as useful as the positive ones, they point to users who seemingly were required to take course content. Indeed, in their descriptions, many preservice teachers and K-12 students shared how they were being required to do the MOOC. That is noteworthy because there were significant differences between groups in their enjoyment of the course.^{xxx} A MANOVA was used to compare occupation means across post-survey outcomes. Data in Table 10 highlight Inservice teachers and Others rating their enjoyment of this MOOC significantly higher than both K-12 students and Preservice teachers ($p < .05$).

	Mean	Std. Deviation
All groups	5.46	1.296
K-12	4.82	1.362
Preservice	4.66	1.546
Inservice	5.94	1.022
Others	5.73	.844

Table 10. Course enjoyment as indicated by users (1=low and 7=high).

What is also notable in the qualitative data that supported these comments is that some people's enjoyment of the course was directly related to how we were changing learning in this environment. Sometimes this was positive; other times it was obviously breaking people out of their comfort zone:

R5: *"I really liked the wide variety of choices we had each week to learn and create in ways that were meaningful to us."*

R6: *"Somehow, I would prefer to know in the discussion blog who are teachers (adults) and who are the high school students. The responses are entertaining from both; however, the students were, well, students, and it might help to know that difference."*

The first four comments above from participants highlight the kind of reactions posited by the quantitative data. Conversely, with the second two comments, we are not trying to make a qualitative claim that the change in learning environment (from a traditional learning environment to a MOOC) caused a positive or negative change in behavior. However, the comments are provided to suggest a need for further investigation based on qualitative post-survey responses.

Most participants would be interested in doing another MOOC.

We asked participants whether they would be willing to participate in another MOOC. We asked them in both a yes/no format as well as providing them a chance to explain their choice. Some participants, regardless of the yes or no answer, suggested that it was a difficult question to answer without understanding the content of the MOOC. However, a significant number of respondents said they would participate in another MOOC ($p < .001$).^{xxxi} This overall positive attitude did not hold true when broken down into groups. There was a significant difference in group responses ($p < .001$).^{xxxi} Most notably, K-12 students and Preservice teachers were relatively divided on their desire to join another MOOC. These results are similar to the results of the enjoyment question where Preservice and K-12 students did not enjoy the MOOC as much as their counterparts (see Table 11 on page 16).

Results: What Were The Outcomes?

	Yes	No
All groups	92 (75.8%)	31 (25.2%)
K-12	13 (46.4%)	15 (53.6%)
Preservice	9 (47.4%)	10 (52.6%)
Inservice	58 (95.1%)	3 (4.9%)
Others	12 (80.0%)	3 (20.0%)

Table 11. Participants' desire to participate in another MOOC

Participants spent a significantly different amount of time in the MOOC.

Some participants logged in, checked out the material the first day, and never returned to the course management system. Other participants logged as much as 69.4 hours online during the five-week course. These numbers and any numbers representing time in the course management system are a little misleading. This course was created as a connectivist learning experience. As such, participants were asked to consume materials outside the course shell. They were asked to produce and store artifacts using tools and hosting sites outside of the CMS. Finally, although they were asked to converse with others and given discussion forums to catalog those conversations, they were also encouraged to use their own social media (e.g., *Twitter*, blogs, *Facebook*, *Delicious*, etc.).

In sum, we projected participants would spend 25 hours in this five-week experience. The average for all users was 16.73 hours logged in the course management system. Individual group means ranged from 9.26 hours to 20.64 hours (see Table 12). There were significant differences between groups ($p < .001$).^{xxxiii} Although we cannot make a definitive statement about time spent with the course materials due to the social nature of our content, we do know that Inservice teachers and Others spent significantly more time within the course management system than K-12 students.

	Mean	Std. Deviation
All groups	16.732	12.716
K-12	9.259	4.528
Preservice	13.290	9.936
Inservice	20.640	13.333
Others	18.630	16.281

Table 12. Total time spent in the *Coursesites* learning course system

Results: What Were the Outcomes?

People participated in multiple ways.

An obvious outcome measure is to determine whether participants completed badges, the end-of-course certificate, or (for teachers) the request for CEUs. Table 13 represents badge and certificate awards as well as the distribution of those awards by grouping. There were also approximately 30 inservice teachers who requested CEU credit. The CEU credit can be misleading because of the way it was offered. *Michigan Virtual University*, as the sponsor behind this MOOC, offered to award Michigan State Continuing Education Clock Hours (SCECH) to Michigan teachers. We also had participation from other states (e.g., Indiana). Teachers in other states were provided with the syllabus in order to request credits from their own districts or states outside of Michigan. As such, we have no clear indication of the total number of teachers requesting CEU hours.

	Pre-survey	Connected Learning	Personalization	Collaboration	Reflection	Implementation	Post-survey	Certificate
All groups	442	182	171	168	157	139	168	130
K-12	74	36	36	37	35	26	31	24
Preservice	31	26	24	26	22	22	31	18
Inservice	156	103	95	89	87	78	90	77
Others	181	17	16	16	13	13	16	11

Table 13. Badges and certificates awarded overall and by groups

Participants got actively involved in discussions.

One of the challenges with measuring outcomes by badge or certificate completion is that we told participants that receiving a badge was merely one way to participate in the course. Everyone was invited to participate in the discussion when and where they found time and relevance. The badge and certificate numbers, which in some sense remained flat outside of the pre- and post-surveys, reflect participants who wanted to be active in that manner.

Therefore, in addition to measuring time in the course management system and badge completion, we examined participation in the course discussion forums. As can be expected from supplementary experiences, most of the discussion forum interactions happened on weekends (Chart 1 on page 18). The exception was at the beginning of the course when participants were getting to know the environment and the requirements and at the end of the course when participants were finishing their work.

Results: What Were the Outcomes?

Unique Users Visits to the Discussion Forums

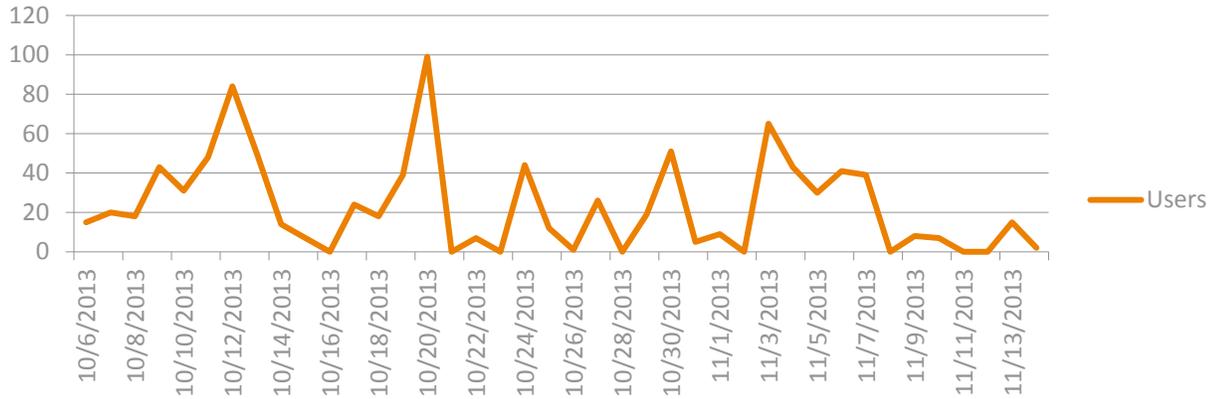


Chart 1. Representation of the unique daily user visits to any of the discussion forums.

A goal for this course was to facilitate conversation around the topic of K-12 teaching in the 21st century. We were amazed to discover that in the short period of five weeks, there were over 65,000 hits in the discussion forum (Chart 2). In that same time period, there were over 6,000 posts (Chart 3). Participants not only got involved by posting their thoughts, they also spent a significant amount of time reading what others had to say. Table 14 and Chart 4 on page 19 document the percentage of participants in each group who posted and the number of times they posted.

Discussion Forum Visits: 65,248 Total

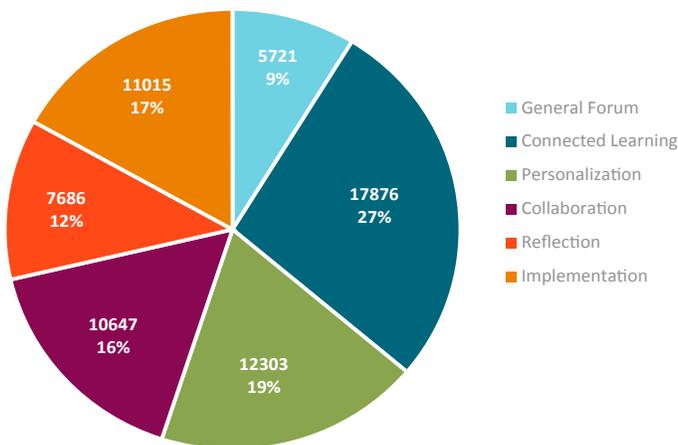


Chart 2. Total discussion forum visits.

Discussion Forum Posts: 6,084 Total

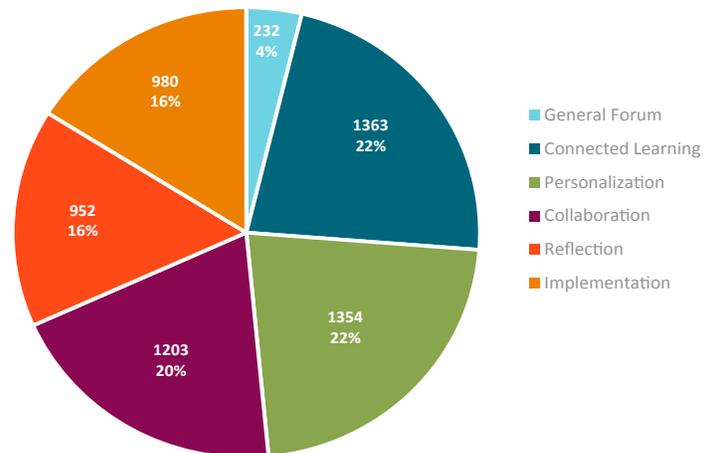


Chart 3. Total discussion forum posts.

Results: Engaging MOOC Participants

	0	1-5	6-10	11-19	20+
K-12 Students	10.1%	22.8%	19.0%	30.4%	17.7%
Preservice	11.8%	2.9%	11.8%	26.5%	47.1%
Inservice	18.4%	20.5%	11.1%	14.7%	35.3%
Others	89.2%	3.9%	1.5%	3.1%	2.4%

Table 14. Percentages of participants who posted by number of posts and group type

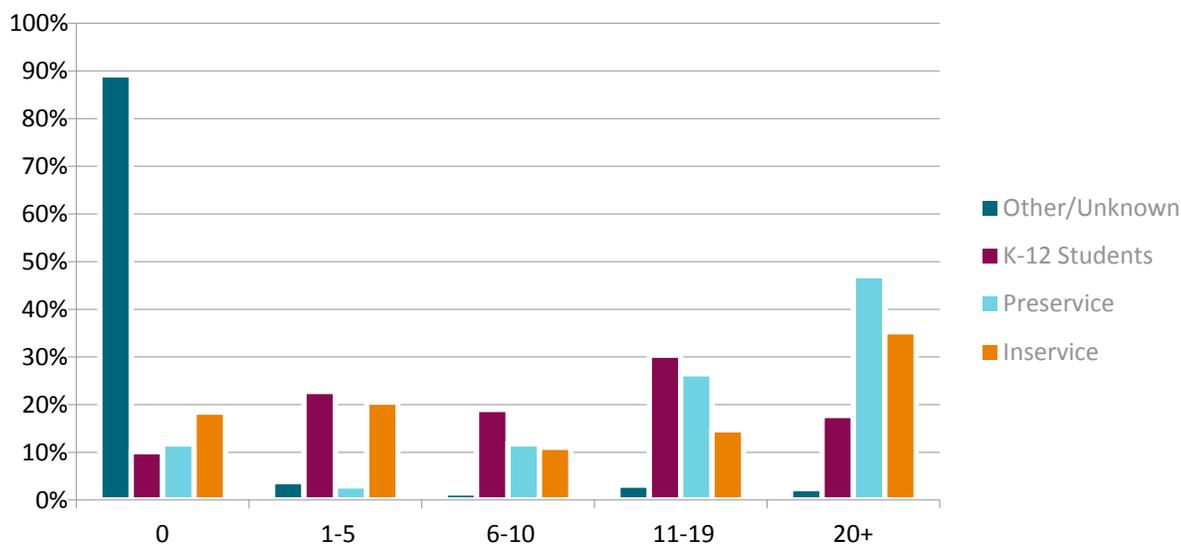


Chart 4. Bar graph representation of participants who posted by number of posts and group type

The above charts and tables highlight discussion forum postings within one of six forums. There were only five forums that were related to obtaining a badge. There was also a general forum that had no specific requirements for anyone to post. However, people still chose to engage others within this general forum. This participation was spread across group type. A total of 36.3% of Inservice teachers, 8.9% of K-12 students, 8.8% of Preservice teachers, and 2.8% of Others chose to post in the general forum.

Participants utilized and valued technology for teaching.

Participants were asked in the pre- and post-survey to identify their technology expertise. They were also asked about whether they thought technology was important to teaching. The questions asked:

On a scale of 1 (Novice) to 7 (Expert), (with 4 being an “average” user), how would you describe your technology expertise? Please enter in a single number.

On a scale of 1 (Not True of Me At All) to 7 (Very True of Me), (with 4 being Neither True or Untrue of Me), how would you rate this statement? “I believe technology is critical to teaching.”

Results: Engaging MOOC Participants

Participants rated themselves as a 5.30 for technology expertise in the pre-survey and a 5.34 in the post-survey. There were no statistically significant differences in the pre- and post-surveys or between groups. Participants said that they valued the role of technology in education. There was an average of 6.17 in the pre-survey and a 6.30 in the post-survey. There were no statistically significant differences in the pre- and post-surveys or between groups. Neither result is that surprising. We would expect participants who are enrolling in an online learning experience to have an above-average, self-reported level of technology use. Additionally, if they are enrolling in a MOOC on the role of technology in 21st century instruction, we would expect them to have a relatively high rating for the role of technology in teaching and learning.

RESULTS: ENGAGING MOOC PARTICIPANTS

The previous two sections of this report described who was involved in the MOOC and the outcomes they experienced – thus addressing the first research question (“What does it look like to engage K-12 students and teachers in a MOOC?”). Our second research question dealt with exploring the types of participants and their interactions within a K-12 MOOC.

We offered the MOOC as a way to facilitate a community of practitioners dedicated to studying pedagogical practices and technology. We hoped the MOOC could be a way for students, future educators, and current teachers to engage in conversations about instructional approaches and digital media. We gave participants broad guidelines for ways they could partake in the MOOC. Because participants could engage in ways best suited to their learning and professional goals, participants took on a variety of roles within the MOOC community. We noticed K-12 students, preservice teachers, and inservice teachers ranged from seemingly not engaged at all to being very active participants.

We characterized participants’ activity and engagement in three different ways. The following sections offer overviews of how participants engaged in the MOOC with specific case studies featuring participants who best exemplified each category. (Pseudonyms are used when describing the participants.)

Lurkers

Of the 848 participants in the MOOC, 533 did not post in discussion forums but rather could be described as “lurkers.” They observed the interactions taking place in *Coursesites* rather than actively participating. It is important to acknowledge that we did let participants know that they could be as active or passive as they would like. While we were constantly trying to encourage active participation, there was no attempt to *force* participants to actively engage. We hoped participants would make decisions that best reflected their needs as future and current educators.

Also, a lurker does not necessarily indicate that they lacked engagement; it just means they were not participating in ways that allowed us to interact with them. For instance, they may have been using the material to engage their own students or to inform their own practice outside of our MOOC-inspired assignments and instructions. The total number of discussion forum views, as well as the *Coursesites* time online data presented above, provide evidence that these lurkers were often accessing course materials and resources without posting on the forum or attempting to achieve badges.

Data to support the active role of lurkers was also provided through social media. The course was built to utilize participants’ existing social media and their social networks (e.g., blogs, *Facebook*, *Twitter*, *Delicious*, etc.). In order to facilitate this process, we created new *Facebook*, *Twitter*, *Delicious*, and blog accounts. We asked people to connect to us, and we would connect to them. In that way, posts they made to various accounts, either in response to course assignments or as a part of their normal activities, would become part of our social network.

An immediate outcome is that we developed a new network of existing user accounts. There were 62 *Twitter*, 59 *Facebook*, 20 *Delicious*, and 15 blog connections made. (Connections here refer to users in our course who had existing accounts prior to the course now being connected to our network.) This course also encouraged people to explore social media.

Results: Engaging MOOC Participants

There were new accounts created: 22 *Twitter*, 37 *Delicious*, and seven blog. This refers to people who did not have accounts before the course but created them because of the course. The number here could be higher; we only have access to those participants who told us they created a new account or created a new account and then connected to our course accounts.

Finally, it is worth noting that this course created connections to participants outside of the course materials. In other words, there were 23 *Twitter*, 18 *Facebook*, 11 *Delicious*, and three blog accounts that connected to our course accounts even though they were not course participants. This provided some evidence of the fact that the course had become both a resource and part of a social network for course participants and for those who simply saw the material we had created as meaningful resources.

Passive Participants

Ownership and choice are key factors that contribute to motivation. While MOOCs may be a new way to engage people in a learning experience, if participants are unwilling participants or unmotivated by the subject matter, they may not be actively engaged no matter how great the opportunity. For our purposes, passive participation was defined as doing the minimum amount of work required to complete the course. We encouraged participants to be as active as possible; however, we did let participants know that they could work at their own pace and that they did not have to complete each module in order to engage in the MOOC and access course resources.

We noticed that some of the passive participants were K-12 students forced to complete the MOOC for a class requirement. “I think this is a great idea” or “I really like this video” were typical comments found on the discussion board every Monday between the hours of 8:00 a.m. and 9:00 a.m. These posts were from a group of students who were participating in the MOOC as part of a requirement for their high school educational technology class. Their teacher had signed up for the MOOC and decided to include his or her students as participants, thinking that this would allow them to explore new digital tools and a possible career choice and provide them the opportunity to participate in an online learning experience. While the students participated in the MOOC, they seemed to do so without much interest or enthusiasm. The only time they were active in the MOOC is when they were physically in their educational technology class. They neither logged into the discussion boards nor posted at any times other than Monday from 8-9, nor did they participate in the social media initiatives. Rather than engage in conversations with other participants, their activity on the discussion boards was limited to interactions amongst each other. Even then, their comments were mostly brief statements responding to one of their classmate’s work, usually a generic “nice job” or “I really like this.” Overall, the comments were superficial without any evidence of deep thinking about the course materials or discussions. The artifacts students created were also limited by their seeming lack of enthusiasm. Many of these students relied on the same tools, such as Prezi, week after week to showcase their learning.

Despite the course being designed around topics important in education, there were also preservice teachers and inservice teachers who could be described as passive participants. These participants often completed the course; however, much like the high school students, their posts were limited to one or two sentences per posts. Their comments were also superficial, for example, “Nice job” or “I like what you did.” Their engagement may have been influenced by forced participation. For example, there were preservice teachers completing the MOOC as an assignment in a college course, or teachers completing the MOOC as part of a professional development experience. While we do not know the exact reason, these participants did not demonstrate in *Coursesites* that they were actively engaged in the course material.

The finding that lack of engagement may be influenced by forced participation is not a new finding in research related to online learning; however, it does provide implications for educators interested in having K-12 students and preservice teachers participate in MOOCs and for professional development for teachers. MOOC facilitators should be cognizant that participants may neither immediately see the potential benefits nor be active participants. This isn’t necessarily something that should stop facilitators from developing MOOCs, but it should influence decision-making.

First, it is important to recognize that even when a topic might be important to them, MOOCs may not engage all participants. It is important for facilitators to have a strong rationale when encouraging participants to engage in a MOOC and attempting to make the content relevant to participants’ lives. Even if the participant does not have choice in

Results: Engaging MOOC Participants

participating, facilitators can design the MOOC to provide choice in other ways, either through course readings, materials, variety of assignments, or types of tools or platforms that participants can use during the MOOC. Second, it is important for facilitators to help participants create communities within the MOOCs. If possible, facilitators should take an active role in the course, modeling not only their thinking about content, but also how to interact in an online forum. As much as facilitators might want active engagement and participation, it is important to recognize that there might be participants who, for a variety of reasons, may not be as engaged as one would like; however, this does not indicate that they aren't learning from the experience.

Active participants

The category of active participants refers to four different ways in which participants were highly engaged with the course materials. It is important to note that these are not distinct categories in which we can easily quantify how many people acted in certain ways. Rather these are flexible categories that we watched participants move in and out of depending on their needs, goals, and values.

Informing Personal Practice. We expected to see preservice and inservice teachers exploring new pedagogical practices and digital media since the MOOC could potentially inform their current practices; however, we found it interesting that there were K-12 students who viewed the MOOC as a way to learn about teaching practices that they might use in the future. For example, Amy, a ninth grade student, participated in the MOOC because she knew she wanted to be a teacher. Amy worked each week on creating lesson plans so she could “have as much as experience as possible.” She frequently posted responses and questions to preservice and inservice teachers’ posts explaining she was “learning how to communicate with other teachers and aspiring teachers.” She also specifically asked for feedback so she could consider how to strengthen her work. Her enthusiasm for teaching and the MOOC was evident, specifically at the end of the course when she posted on the discussion board, “Hey guys, I finished up my final project and got my certificate and everything! Thanks again to all of the people who have been with me throughout this MOOC!”

While students like Amy wanted to learn more about education from course materials, many of the preservice teachers who participated viewed “making connections” with other teachers as critical to their gaining knowledge about teaching. Caitlin, a junior in a teacher education program, specifically sought out teachers’ posts, often leaving detailed feedback and questions to prompt conversations. Many of the teachers engaged in dialogue with Caitlin, providing specific rationales, feedback, and encouraging her as a preservice teacher. For example, when exploring reflection, Caitlin posted a detailed response to a teacher highlighting specifically what she liked (e.g., “I loved how you reflected on your practices and assessments and found ways to make it better.”) and connecting her experiences to the teacher’s experiences (e.g., “As a preservice teacher, you made me realize that even when I enter the field it is okay to change and adjust in order to do what is best for students.”). The teacher and Caitlin had four exchanges about the reflection module; the teacher not only offered insight into her teaching practices, but she also provided encouragement, telling Caitlin, “teaching is absolutely a process and a craft. The only way to get better is to learn from experience.” At the completion of the MOOC, Caitlin specifically discussed the fact that she liked participating because she not only had the opportunity to learn about pedagogical practices, but also she was learning from teachers in the field.

Similar to students and preservice teachers, teachers were involved in the MOOC to continue learning about educational practices, specifically integrating technology. Many teachers introduced themselves and explained they were “here to learn about technology and how to use technology in their classrooms.” Similar to K-12 students and preservice teachers, teachers sought not only the resources available through the MOOC but also created communities within the MOOC to help them learn about course material. Every weekend a group of five inservice teachers participated in the MOOC. Because they were all inservice teachers, they expressed that they didn’t often have time during the week to participate, but the weekend was ideal for them to engage in the MOOC. This group of teachers began calling themselves “weekend warriors.” They often posted responses to each other’s work and engaged in conversations about the weekly topic. The “weekend warriors” discussed “trying out” the technology and practices during the week and then would discuss what went well, what they learned, and any issues that might have occurred.

Results: Engaging MOOC Participants

The desire to learn more with the goal of informing practice was evident across K-12 students and inservice and preservice teachers. Participants viewed the MOOC as a way to learn new information that they could take to their classrooms. Integral to the learning experience, participants worked to create and establish communities within the MOOCs. This allowed them to share resources and learn more about particular instructional approaches and technological tools. While the K-12 students and preservice teachers often imagined what these practices would look like in the classroom setting, inservice teachers frequently discussed taking their learning back to their classrooms to try with their students immediately. This provided K-12 students and preservice teachers the opportunity to discuss with inservice teachers the benefits and challenges of the instructional approach. This rich dialogue was important in helping form communities of practice. These interactions created opportunities for informal mentoring initiated by the participants. This not only allowed for professional growth but also relationships built on shared interests and goals.

Sharing the MOOC with their communities. Inservice teachers in the MOOC would share their experiences as they incorporated pedagogical practices or certain technological tools into their teaching. However, there were instances where participants shared that the true value of the MOOC came from their interactions not with the MOOC community, but with their colleagues in schools.

K-12 students enrolled in the MOOC discussed how they informed their current teachers about new technology to include in the classroom. For example, when describing how to use Prezi, Jane, a high school student, explained how much she enjoyed creating her own presentation. She explained, “After researching Prezi, I created a account and enjoy it very much. I also showed it to one of my teachers who’s always teaching using PowerPoints. She now uses Prezi instead of her PowerPoints. Not only does she enjoy using it, but the class as a whole prefers Prezi.”

While K-12 students made suggestions to their current teachers in school, inservice teachers also took their learning back to their classrooms. For most of the course, Tara, an inservice teacher, was very involved in the discussion boards. Her posts were on average three paragraphs in length and contained insights into course materials or the technological tools featured. We encouraged participants, especially during the implementation stage, to create materials that they could use in their classrooms, schools, or communities. Because of this, on the Implementation discussion board, Tara wrote, “I hope it is ok that I did my collaboration and creation with my actual content area team in my workplace as opposed to discussing it with others here in the MOOC.” While she went on to describe her work and provide a link, she acknowledged that actual collaboration occurred in her school community. These moments seemed to be indicators that participants were truly engaged in the material presented and discussed during the MOOC.

There are two implications that can be drawn from these experiences. First, MOOCs are most relevant when participants can apply or use their learning and the material in their daily lives. Tara and Jane both brought their learning back to the classroom setting and applied it to their learning and teaching. Second, there may have been other participants who might have been considered “passive” but in reality were engaged in the MOOC so they could take these pedagogical practices and tools back to their school communities. A lack of active participation in the main MOOC platform (*Coursesites*) did not necessarily mean participants weren’t active, engaged learners in other areas and forums.

Leadership within the MOOC Community. A connectivist MOOC is developed to connect members of a community so that all participants are viewed as both learners and experts. There were certain K-12 students, preservice teachers, and inservice teachers in the MOOC who exemplified this idea, actively taking on both roles. These participants introduced outside ideas, materials, and resources to others in the MOOC. They also shared new digital tools and provided guidance and examples for how to teach with the technology, or they encouraged participants to think about pedagogical practices.

The first indication of Kari’s enthusiasm about the MOOC was when she sent us an email weeks prior to the starting date to share her excitement, ask questions and voice her hesitations. As a K-12 student she wanted to be involved as fully as possible in the MOOC but was concerned that her school schedule and calendar filled with after-school activities might over-extend her, causing her not to excel in the MOOC. After an email that reassured Kari she could participate as much or as little as her schedule allowed, we were a little surprised that she was not only an active participant, but also involved

Results: Engaging MOOC Participants

in almost every other social media initiative, including a *Twitter* chat and webinar. Despite being still in high school and her initial reservations, Kari responded thoughtfully to the videos and articles, often choosing to read or watch more than one material posted for the course. When responding, her posts were on average four paragraphs in length. She was fully engaged in the discussions on the forum and even shared blog posts on a blog she created for the course. Kari even took time to help other participants use the technological tools. For example, a teacher created a *Google Form* to give her students as an exit slip. She posted it to the discussion forum asking for feedback. Kari responded, "I love your idea and can't wait to see your form, the only thing is that you need to make it so anyone who has the link can view...right now it is private. You can change the setting on the top right, where it says 'share.' Awesome idea, can't wait to see it."

Sienna, a preservice teacher, stated that she enjoyed participating in the MOOC specifically because she was able to consider how technological tools could be used in her future classroom. Each week she tried new tools, noting that she liked to "play" with the tools and learn how they "really" worked. Her enthusiasm for exploring new technology extended to sharing her knowledge with other participants. The first week Sienna emailed and asked if she could use a course tool outside of the MOOC-recommended tools to create her first learning artifact. After receiving encouragement, Sienna introduced the MOOC community to Jux. In her post she explained that Jux was her "favorite blogging tool;" and if participants were interested in blogging during the course, they should consider this platform. Sienna received positive feedback about her Jux blog and throughout the course continued to explore and seek new digital tools to share with other MOOC participants.

While Sienna introduced the community to a specific tool, Tom's posts often encouraged participants to examine and reflect on the pedagogical practices being discussed. A district administrator with years of experience in the classroom, Tom brought insight into conversations about curriculum and approaches considered "best" practices. Tom often created artifacts that could be used by both students in K-12 classrooms and teachers engaged in professional development. One of his creations was a digital footprint shared as a model for other teachers interested in having students explore their digital footprints, the data trail they leave when they interact and participate in digital environments. Tom was active on social media and participated in *Twitter* chats and webinars. He also often encouraged other participants to engage in social media resources.

These experiences provide implications for how MOOCs are conceptualized and designed. This MOOC was designed so teachers and students could not only learn about new pedagogical practices and tools, but also use their existing knowledge to share with others. Because they had specific knowledge to share with other participants, Kari, Sienna, and Tom are examples of how participants became active leaders within the MOOC community.

Critical Colleagues. It was important for participants to encourage and to help each other reflect critically on classroom practices. There were certain times participants challenged the community's thinking about particular instructional approaches. These challenges were often a call to create changes and spark enthusiasm for ways technology might improve classroom practices.

Michelle entered the MOOC as a "learner;" however, she immediately demonstrated that she had quite a few things to teach the community. For the first two weeks of the MOOC, participants and co-facilitators assumed Michelle was a K-12 teacher. It wasn't until she shared a post that highlighted an artifact she created for her high school AP math course that everyone realized she was actually 16 and a junior in high school. The assumption of Michelle's age and experience was based not only on the quality of her work, but also her interactions with participants on the discussion boards. Michelle often created artifacts based on work she was doing for her high school classes; and while her posts and responses to other participants included her experiences as a learner, they also included specific recommendations for teachers' pedagogical practices. She often critiqued the instruction she was receiving in school highlighting particular instructional approaches that she liked and didn't like while explaining why the practice helped or hindered her learning. After sharing an experience about a teacher-led discussion from her high school literature course, Michelle ended a post by writing, "If everything is given to us, there is no room for innovation."

Other participants also made calls for teachers to critically examine their classroom practices. Melissa was a teacher of students who are deaf and hard of hearing. During the course, Melissa reminded participants about creating lessons and materials for presentations that were accessible to all learners. Melissa shared her work about closed-captioning and how

Implications for Research, Policy, and Practice

technology can provide all students ways to learn, be engaged, and demonstrate their knowledge. Her posts revealed she was an advocate in her school community and in the MOOC community. After sharing an experience about a professional development presentation, Melissa said, "I proposed that we should all share the videos that we caption and offer the 'database' to teachers." Melissa highlighted that even in our MOOC there were a number of videos used and yet nothing was closed-captioned. Melissa encouraged the group to consider how technology might provide all students accessibility to a quality education.

The open nature of the MOOC allowed participants to engage in critical thinking, practice, and reflection. Participants could draw on their current practices and provide specific recommendations about pedagogical practices. These participants not only took leadership roles by providing additional knowledge and resources, but they also pushed the community to take a more critical stance when discussing educational practices and technologies.

IMPLICATIONS FOR RESEARCH, POLICY, AND PRACTICE

Our third and final research investigation focused on attempting to understand the opportunities and challenges for offering K-12 teachers and students a MOOC, particularly one that is offered from a connectivist approach. Some implications have already been addressed in the context of the results and findings. However, there are five additional implications for research, policy, and practice that can be derived from the data.

MOOCs are worthy of further exploration for K-12 instruction.

There is not one type of MOOC. Mathieu Plourde made that point in his 2013 MOOC poster (see Image 6). MOOCs change based on the size, their openness, their audience, and the course goals. Each MOOC brings its own set of promises and problems. Some MOOCs that are more focused on 'dissemination of knowledge' have to deal with issues of course completion rates or student authentication.^{xxxiv} Others that are more focused on knowledge construction and connection have to deal with issues of revenue generation and sustainability.

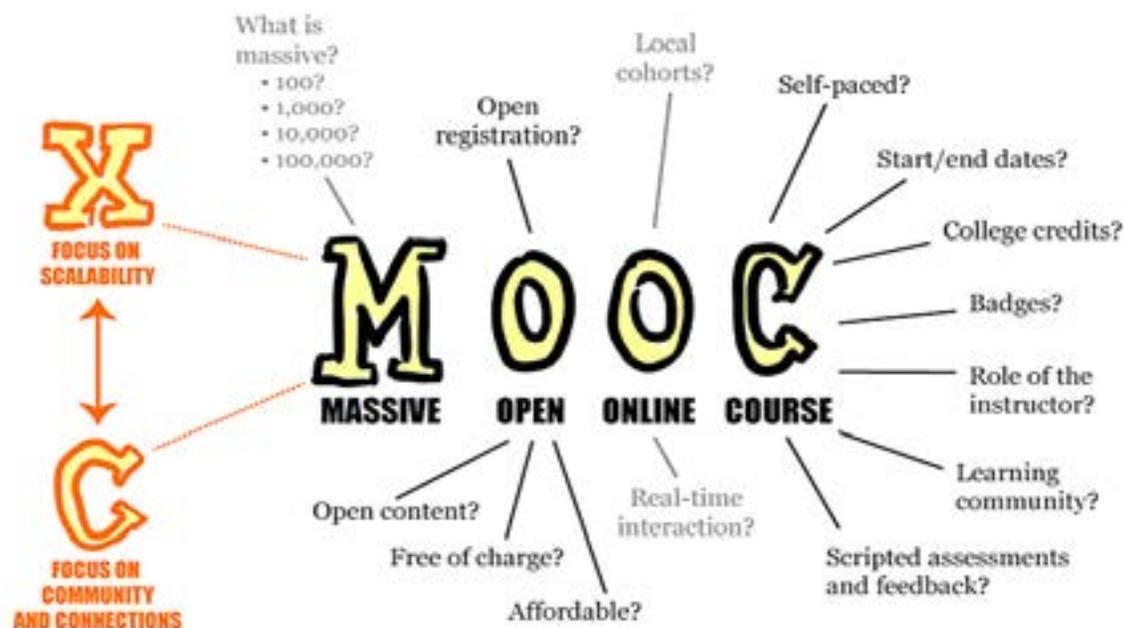


Image 6. MOOC poster April 4, 2013, by Mathieu Plourde; licensed CC-BY.^{xxxv}

Implications for Research, Policy, and Practice

Our MOOC was designed so participants could learn more about a specific topic, create an artifact to demonstrate their knowledge, and participate in discussion forums. As facilitators we hoped participants would be able to implement specific pedagogical practices to strengthen their current practices. In delivering this MOOC, there is evidence that participants gained knowledge, taught others, and learned new ways to connect. One of the most beneficial outcomes of this MOOC is introducing online learning to 129 participants.

There are a number of questions that remain. For instance, our inservice teachers and other participants seemed to engage in this MOOC from a voluntary perspective. Many of our preservice students and K-12 students were engaged as part of a class assignment. This may have had an impact on their desire to learn this content, their willingness to actively participate, and their desire to take a future MOOC. Further research needs to dig deeper into a variety of ways in which content can be offered to students. What happens when individual audiences work alone (e.g., only K-12 students in a MOOC) vs. working together (e.g., K-12 students working with teachers)? What happens when teachers integrate MOOCs into existing content vs. offering them as extracurricular activities?

However, it is worth noting that most of the previous research has not included K-12 students. The fact that this course successfully engaged at least some K-12 students (as measured by participation data, course outcomes, and course feedback) suggests this could be a meaningful way to offer content. Future courses could explore other topics that address topics of importance to K-12 students. Future research could also explore nuances of offering such interaction to lower grades. Finally, states could explore the use of MOOCs to introduce students to online learning.

Connectivist MOOCs are difficult to evaluate.

Connectivist MOOCs have a goal of connecting people around knowledge in a way that leads to knowledge construction. In a broader sense, one could analyze the topic to see if the field was more advanced because of the MOOC. One could ask whether we know more about digital badges because of a MOOC on the content (e.g., crowd-sourcing of knowledge building).

It becomes a little more difficult to measure individual outcomes. First, data collection is difficult as there is no central repository. If you are encouraging participants to engage their social networks with yours, it becomes less obvious how to gauge outcomes. There are providers that are attempting to address this need. For instance, Harvard and MIT recently released both open source tools and data to examine MOOCs.^{xxxvi} It is worth noting that many of these courses are more traditional in nature (less connectivist-focused).

Second, because MOOCs are voluntary in nature, participants do not have to respond to surveys, assignments, tests, or other requests for information. As such, even the best created data collection plans may not come to fruition. Third, how do you measure the impact of created artifacts that go back into the repository of learning objects? Participants in this course were encouraged to create materials that would inform their own practice (as existing or future teachers and professional development leaders). We can measure the number of lessons and lesson content/artifacts created, but it is difficult to measure the lasting impact of those artifacts or the connections that have been made in the process of creating those artifacts.

That does not mean that researchers should stop trying. It just means that asking “how many students completed your course?” is not the right question to understand the impact of connectivist MOOCs. First, course completion rates can be misleading.^{xxxvii} Second, it is important to remember that in a connectivist MOOC, participants decide their level of engagement and what completion means to them. Researchers need to work to develop new tools for collection and analyses of social data which will help support these understandings. Additionally, researchers, teachers, and policymakers need to understand differences in MOOC creation and delivery. Those developing MOOCs need to work carefully with constituents and stakeholders to have a clear and shared definition or redefinition of success and valued outcomes. DeBoer,

Implications for Research, Policy, and Practice

Ho, Stump, and Breslow (2014) summarized one such set of redefinitions:

(W)e show that enrollment, traditionally measured as the number of students registered as a proxy for students who commit to complete a class, can be reconceptualized as differentiated tracts reflecting users' individual goals. Participation can be reconceptualized according to the diverse ways it occurs and could be an outcome in its own right. Curriculum can be reconceptualized as individual, asynchronous pathways, for which there is no correct, prescribed way to proceed. Finally, achievement can be reconceptualized relevant to individual goals (p. 83).^{xxxviii}

Developers need to work to broaden participation in MOOCs.

A majority of our MOOC participants were white females. One could easily argue that the content of the course was teaching; such numbers often represent the distribution of gender and ethnicity in teacher education writ large. That may or may not be true. However, the fact that there was so little diversity in the MOOC needs to be addressed. Diversity here does not just refer to race and gender. One participant stated:

It is also worth noting that a challenge with I'll get on my soapbox - the media you use is not accessible to the Deaf/Hard of Hearing population. I would strongly urge you to use captioned media. I'm Hard of Hearing myself and I had to search for the various materials elsewhere in hopes of finding some sort of captions. It would be great to have this available for your streamed conferences.

There would be a manageable solution to this comment if we owned all of our content. However, certain MOOCs benefit from drawing in content from multiple locations. Our own MOOC consisted of a launch pad to content throughout the globe. We could have only selected content that was accessible. The challenge is that some of the key resources that exist in our topic area were not accessible. That is not an excuse; it is a problem that potentially reflects to a broader concern with online content.

Researchers and teachers should further explore the roles that exist within various MOOCs.

There is an unfortunate tendency with MOOCs to base success on completion rates. This course consisted of 848 participants. Many of those participants completed the entire MOOC. Even more completed badges. Data presented here make it clear that we also had a substantial number of lurkers. However, data also make it clear that lurkers were not simply participants who signed up and never visited again. These participants viewed postings and spent time online with course content. We encouraged such participation. Participants who took our materials and learned on their own or shared our content with others in their own settings successfully completed the overarching course objectives of educating people about teaching in the 21st century. We need to change this persona of the inactive and non-participatory lurker – particularly in connectivist MOOCs.

There were also a number of passive participants, mainly in our K-12 student and preservice teacher populations. Our hypothesis is that many of these students were forced to take the MOOC as part of a face-to-face or online course experience in their home school. Evidence to support this theory comes from their course introductions or their end-of-course feedback. More research needs to examine the ways in which MOOCs are used as supplementary material in K-12 classrooms.

Finally, we presented four ways in which active participants engaged with each other. We did not present statistics on these four categories – participants often floated in and out of leadership, community building, critiquing, and informing practice as their time or knowledge of the technology and content changed. An obvious research question is to further explore whether these are the correct delineations and whether others exist. Research on practice should examine how to provide opportunities for participants to develop communities and gain leadership opportunities. Research on practice should examine how to provide opportunities for development of those skills. Research should also examine the kinds of relationships that develop when participants from multiple education levels (those in training vs. those in practice) engage with each other online.

Conclusion

CONCLUSION

We live in a connected society. People seek and share text, pictures, movies, thoughts, and emotions with and through multiple technologies. While it might not necessarily mean that people are ready to translate that into 21st century teaching and learning, it does indicate that technology is most likely shaping people's educational experiences, their thoughts on how education should be structured, and their access to educational experiences. The seeking and sharing of digital media highlights that people want to form and engage in communities, and the growing interest in MOOCs shows this is true of educational communities as well.

To conclude, we return to an exchange between Kari (our K-12 student) and Anne (inservice teacher):

Anne: *"I think there is value to collaborative learning, especially when everyone is in a shared learning situation."*

Kari: *"It's all about community. People help each other out, share ideas, debate on things, and, through that, really connect with what they're learning. It is built around community, helping each other, and growing through a mix of knowledge, ideas, and opinions."*

One of our goals for the MOOC was to start a conversation about pedagogical practices and the role of technology in education. Our hope was that by creating a space for this conversation, a community of educators would form to encourage, support, and spark each other's knowledge and passion for teaching. Learning takes place in communities; depending on the implementation, technology has the capability to create and sustain the communities' learning and practice. Evidence in this report suggests that such activities can lead to positive outcomes, particularly as they relate to getting teachers to think more deeply about teaching and learning in the 21st century.

Appendix A: ISTE Teacher Standards

The [International Society for Technology in Education \(ISTE\)](#) has developed standards for teachers to showcase best practices in “[learning, teaching, and leading with technology in education](#).” This document serves as a guide to help you consider how the concepts and digital tools explored in this course might align with the ISTE Standards for Teachers. This document is divided into four topics aligned with the course: Connected Learning, Personalization, Collaboration, and Reflection. After each ISTE Standard and Description is a digital tool (in parentheses) that might help you design instructional opportunities to meet the Standard.

The following are ISTE Teacher Standards divided by course topics.

Connected Learning

Standard 2. Design and Develop Digital Age Learning Experiences and Assessments: Teachers design, develop, and evaluate authentic learning experiences and assessment incorporating contemporary tools and resources to maximize content learning in context and to develop the knowledge, skills, and attitudes identified in the NETS•S. (*Kidblog, PopcornMaker*)

2a. Design or adapt relevant learning experiences that incorporate digital tools and resources to promote student learning and creativity (*Kidblog, PopcornMaker, ePals*)

Standard 3. Model Digital Age Work and Learning: Teachers exhibit knowledge, skills, and work processes representative of an innovative professional in a global and digital society.

3a. Demonstrate fluency in technology systems and the transfer of current knowledge to new technologies and situations (*Kidblog, PopcornMaker, ePals, Delicious*)

3c. Communicate relevant information and ideas effectively to students, parents, and peers using a variety of digital age media and formats (*Delicious*)

3d. Model and facilitate effective use of current and emerging digital tools to locate, analyze, evaluate, and use information resources to support research and learning (*Delicious*)

Standard 4. Promote and Model Digital Citizenship and Responsibility: Teachers understand local and global societal issues and responsibilities in an evolving digital culture and exhibit legal and ethical behavior in their professional practices. (*ePals, Delicious*)

Standard 5. Engage in Professional Growth and Leadership: Teachers continuously improve their professional practice, model lifelong learning, and exhibit leadership in their school and professional community by promoting and demonstrating the effective use of digital tools and resources.

5a. Participate in local and global learning communities to explore creative applications of technology to improve student learning (*Kidblog, ePals, Delicious*)

Appendix A: ISTE Teacher Standards

Personalization

Standard 1. Facilitate and Inspire Student Learning and Creativity: Teachers use their knowledge of subject matter, teaching and learning, and technology to facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments. (*Prezi, Weebly, Voki, DIY, Meograph*)

1b. Engage students in exploring real-world issues and solving authentic problems using digital tools and resources (*Prezi, DIY*)

Standard 2. Design and Develop Digital Age Learning Experiences and Assessments: Teachers design, develop, and evaluate authentic learning experiences and assessment incorporating contemporary tools and resources to maximize content learning in context and to develop the knowledge, skills, and attitudes identified in the NETS•S.

2b. Develop technology-enriched learning environments that enable all students to pursue their individual curiosities and become active participants in setting their own educational goals, managing their own learning, and assessing their own progress (*DIY, Prezi, Weebly*)

2c. Customize and personalize learning activities to address students' diverse learning styles, working strategies, and abilities using digital tools and resources (*DIY, Voki, Meograph*)

Standard 4: Promote and Model Digital Citizenship and Responsibility: Teachers understand local and global societal issues and responsibilities in an evolving digital culture and exhibit legal and ethical behavior in their professional practices.

4b. Address the diverse needs of all learners by using learner-centered strategies providing equitable access to appropriate digital tools and resources (*DIY, Meograph*)

Standard 5: Engage in Professional Growth and Leadership: Teachers continuously improve their professional practice, model lifelong learning, and exhibit leadership in their school and professional community by promoting and demonstrating the effective use of digital tools and resources.

5d. Contribute to the effectiveness, vitality, and self-renewal of the teaching profession and of their school and community (*Weebly*)

Collaboration

Standard 1. Facilitate and Inspire Student Learning and Creativity: Teachers use their knowledge of subject matter, teaching and learning, and technology to facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments.

1d. Model collaborative knowledge construction by engaging in learning with students, colleagues, and others in face-to-face and virtual environments (*Collaborize Classroom, Padlet, PBWorks*)

Standard 3. Model Digital Age Work and Learning: Teachers exhibit knowledge, skills, and work processes representative of an innovative professional in a global and digital society. (*Collaborize Classroom, Instagram/Flickr, Padlet, Storybird, PBWorks Education Basic Edition*)

3b. Collaborate with students, peers, parents, and community members using digital tools and resources to support student success and innovation (*Instagram/Flickr, Collaborize Classroom, Padlet PBWorks Education*)

Appendix A: ISTE Teacher Standards

Standard 4: Promote and Model Digital Citizenship and Responsibility: Teachers understand local and global societal issues and responsibilities in an evolving digital culture and exhibit legal and ethical behavior in their professional practices.

4c. Promote and model digital etiquette and responsible social interactions related to the use of technology and information (*Collaborize Classroom, Padlet, PBWorks*)

4d. Develop and model cultural understanding and global awareness by engaging with colleagues and students of other cultures using digital age communication and collaboration tools (*Padlet, Collaborize Classroom, PBWorks*)

Standard 5: Engage in Professional Growth and Leadership: Teachers continuously improve their professional practice, model lifelong learning, and exhibit leadership in their school and professional community by promoting and demonstrating the effective use of digital tools and resources.

5b. Exhibit leadership by demonstrating a vision of technology infusion, participating in shared decision making and community building, and developing the leadership and technology skills of others (*Storybird*)

Reflection

5. Engage in Professional Growth and Leadership: Teachers continuously improve their professional practice, model lifelong learning, and exhibit leadership in their school and professional community by promoting and demonstrating the effective use of digital tools and resources. (*Poplet, Slidshare, Foliospaces, Jing, Vialogues*)

5c. Evaluate and reflect on current research and professional practice on a regular basis to make effective use of existing and emerging digital tools and resources in support of student learning (*Poplet, Slidshare, Foliospaces, Jing, Vialogues*)

Standard 1. Facilitate and Inspire Student Learning and Creativity: Teachers use their knowledge of subject matter, teaching and learning, and technology to facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments.

1c. Promote student reflection using collaborative tools to reveal and clarify students' conceptual understanding and thinking, planning, and creative processes (*Poplet, Slidshare, Foliospaces, Jing, Vialogues*)

Appendix B: ISTE Student Standards

The following are ISTE Student Standards divided by course topics.

Connected Learning

Standard 1. Creativity and Innovation: Students demonstrate creative thinking, construct knowledge, and develop innovative products and processing using technology. (*Kidblog*)

Standard 2. Communication and Collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.

2c. Develop cultural understanding and global awareness by engaging with learners of other cultures. (*Kidblog, ePals*)

Standard 3. Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information.

3a. Plan strategies to guide inquiry (*Mozilla Popcorn Maker, Delicious*)

Standard 4. Critical Thinking, Problem Solving, and Decision Making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

4b. Plan and manage activities to develop a solution or complete a project (*Delicious*)

4c. Collect and analyze data to identify solutions and/or make informed decisions (*Delicious*)

4d. Use multiple processes and diverse perspectives to explore alternative solutions (*Kidblogs, ePals*)

Standard 5. Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior. (*ePals*)

Standard 6. Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems, and operations.

6a. Understand and use technology systems (*Kidblog, Mozilla PopcornMaker, Delicious, ePals*)

6b. Select and use applications effectively and productively (*Kidblog, Mozilla PopcornMaker, Delicious, ePals*)

6c. Troubleshoot systems and applications (*Kidblog, Mozilla PopcornMaker, Delicious, ePals*)

6d. Transfer current knowledge to learning of new technologies (*Kidblog, Mozilla PopcornMaker, Delicious, ePals*)

Personalization

Standard 4. Critical Thinking, Problem Solving, and Decision Making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources. (*Prezi, Weebly, Voki, DIY, Meograph*)

4a. Identify and define authentic problems and significant questions for investigation (*Prezi, DIY*)

Standard 5. Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.

5c. Demonstrate personal responsibility for lifelong learning (*Prezi, Weebly, Voki, DIY, Meograph*)

5d. Exhibit leadership for digital citizenship (*Prezi, Voki, Meograph*)

Appendix B: ISTE Student Standards

Collaboration

Standard 1. Creativity and Innovation: Students demonstrate creative thinking, construct knowledge, and develop innovative products and processing using technology.

1b. Create original works as a means of personal or group expression (*Instagram/Flickr, Storyboard*)

Standard 2. Communication and Collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others. (*Padlet, Instagram/Flickr, Collaborize Classroom, Storyboard, PBWorks Education Basic Edition*)

2a. Interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media (*Padlet, Collaborize Classroom, Instagram/Flickr, Storyboard, PBWorks Education Basic Edition*)

2d. Contribute to project teams to produce original works or solve problems (*Padlet, Collaborize Classroom, Storyboard, PBWorks Education Basic Edition*)

Reflection

Standard 1. Creativity and Innovation: Students demonstrate creative thinking, construct knowledge, and develop innovative products and processing using technology.

1d. Identify trends and forecast possibilities (*Slideshare*)

Standard 3. Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information.

3b. Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media (*Popplet, Slideshare, Jing, Vialogues*)

3c. Evaluate and select information sources and digital tools based on the appropriateness to specific tasks (*Foliospaces, Slideshare, Vialogues*)

Standard 6: Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems, and operations. (*Popplet, Slideshare, Foliospaces, Jing, Vialogues*)

Endnotes

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- ⁱⁱTeaching, Learning and Curriculum Studies; kpytash@kent.edu
- ⁱⁱⁱ<http://connectedlearning.tv/infographic>
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- ^{xviii}Permission to share this photo provided by Dave Cormier.
- ^{xix}<http://www.coursesites.com/>
- ^{xx}Maps were created using eSpatial, which is available online at: <http://eSpatial.com>
- ^{xxi} $\chi^2(1, N = 409) = 147.6, p < .001$
- ^{xxii} $\chi^2(6, N = 409) = 17.97, p < .001$
- ^{xxiii} $\chi^2(1, N = 409) = 1133.5, p < .001$
- ^{xxiv} $\chi^2(15, N = 409) = 15, p = .002$
- ^{xxv} $\chi^2(6, N = 414) = 153.27, p < .001$
- ^{xxvi} $\chi^2, N=300, p < .05$
- ^{xxvii} $\chi^2(6, N = 414) = 445.51, p < .001$
- ^{xxviii} $\chi^2, N=300, p < .05$
- ^{xxix} $F(3,297)=8.074, p < .001$
- ^{xxx} $F(3,127)=12.93, p < .001$
- ^{xxxi} $\chi^2(1, N = 127) = 30.25, p < .001$
- ^{xxxii} $\chi^2(3, N = 127) = 33.06, p < .001$

Endnotes

^{xxxiii} $F(3,127)=985.31$, $p<0.001$

^{xxxiv} <http://mfeldstein.com/four-barriers-that-moocs-must-overcome-to-become-sustainable-model/>

^{xxxv} <http://www.flickr.com/photos/mathplourde/8620174342/sizes/l/in/photostream/>

^{xxxvi} <http://web.mit.edu/newsoffice/2014/mitx-and-harvardx-release-mooc-datasets-and-vizualization-tools.html>

^{xxxvii} Ho, A. D., Reich, J., Nesterko, S., Seaton, D. T., Mullaney, T., Waldo, J., & Chuang, I. (2014). HarvardX and MITx: The first year of open online courses (HarvardX and MITx working paper No. 1).

^{xxxviii} DeBoer, J., Ho, A.D., Stump, G.S., & Breslow, L. (2014). Changing “course”: Reconceptualizing educational variables for Massive Open Online Courses. *Educational Researcher*, 43, 74-84.



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