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Metaliteracy as Pedagogical Framework for Learner-Centered Design in Three MOOC Platforms: Connectivist, Coursera and Canvas

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Abstract

This article examines metaliteracy as a pedagogical model that leverages the assets of MOOC platforms to enhance self-regulated and self-empowered learning. Between 2013 and 2015, a collaborative teaching team within the State University of New York (SUNY) developed three MOOCs on three different platforms—connectivist, Coursera and Canvas—to engage with learners about metaliteracy. As a reframing of information literacy, metaliteracy envisions the learner as an active and metacognitive producer of digital information in online communities and social media environments (Mackey & Jacobson, 2011; 2014). This team of educators, which constitutes the core of the Metaliteracy Learning Collaborative, used metaliteracy as a lens for applied teaching and learning strategies in the development of a cMOOC and two xMOOCs. The metaliteracy MOOCs pushed against the dominant trends of lecture-based, automated MOOC design towards a more learner-centered pedagogy that aligns with key components of metaliteracy.

Keywords: Massive Open Online Courses; MOOCs; metaliteracy; pedagogy

Introduction

Since the coining of the term "Massive Open Online Course" (MOOC) nearly a decade ago (Siemens, 2012), MOOCs have unlocked countless learning experiences, breaking down geographic and socioeconomic barriers to connect a global classroom of learners. Likewise, MOOCs have provided exciting opportunities for educators to extend their reach and broaden their instructional impact beyond the walls of the classroom. Despite the technological evolution of MOOCs, however, the pedagogy supported by MOOC platforms suggests a more backward trajectory from student-centered, networked learning to a more traditional hub-and-spoke model that revolves around the instructor. How might educators leverage the unique assets of MOOC platforms to enhance and transform, rather than compromise, our teaching?

An examination of the connectivist theory that propelled the creation of the first MOOCs provides insight into their potential. Connectivism is a "network-based pedagogy" underpinned by the theory that "knowledge is distributed across a network of connections, and therefore that learning consists of the ability to construct and traverse those networks" (Downes, 2007). While the original connectivist or "cMOOCs" were decentralized models that encouraged collective participatory learning and user-generated content, the university-sponsored "xMOOC" platforms that became prominent in 2012, such as edX, Coursera and Udacity, diverged from cMOOCs in their focus on scalable content delivery using video lectures, automated assessments, and quizzes (Siemens, 2012; Pappano, 2012). In contrast to the organic, collaborative, and fluid nature of cMOOCs, the structured, centralized, and presentation-oriented environments perpetuated by dominant xMOOC platforms overlook the opportunities envisioned by the original MOOCs to engage students in valuable self-directed learning practices.

Scholarship on hybrid and blended MOOCs (Anders, 2015; Fidalgo-Blanco, Sein-Echaluce, & García-Peñalvo, 2016; Dubosson & Emad, 2015) and emerging MOOC taxonomies (Pilli & Admiraal, 2016) demonstrates a growing awareness of the need to revisit and re-incorporate foundational connectivist features into the prominent xMOOC platforms. Leveraging the networked nature of MOOCs, scholars have identified the value of decentralized learning models for fostering self-regulation competencies such as evaluative decision-making, adaptability and self-reflective learning (Siemens, 2012; Littlejohn, Hood, Milligan, & Mustain, 2016; Terras & Ramsay, 2015). However, they have also identified a lack of self-regulated learning skills as a potential barrier to student success in these environments (Terras & Ramsay, 2015; Littlejohn et al., 2016).

Thus, the globally interconnected nature of MOOCs provides a promising, but troublesome learning environment. When designed with students as the central drivers of their learning, MOOCs can foster important lifelong learning competencies related to self-regulation and learner agency. This decentralized learning model, however, calls for a supportive pedagogy that addresses the learning processes needed for students to take on active roles as participants, contributors and teachers.

In this paper we build on the argument for self-regulation not only as a means to an end (i.e. MOOC completion), but as an important lifelong learning skill that can be fostered and practiced through learner-centered participation in MOOCs. We use metaliteracy as a framework to address the challenges of learner-centered MOOC design through a consideration of the following research questions:

1. How can we leverage MOOC platforms to promote learner-centered pedagogy based on a metaliteracy framework?
2. How might metaliteracy be applied as a pedagogical strategy for supporting self-regulated learning in MOOCs?

In exploration of these questions we draw from our experiences designing and implementing three metaliteracy MOOCs on three different platforms—connectivist, Coursera, and Canvas—that pushed against the dominant trends of lecture-based, automated MOOC design.

Metaliteracy, which emerged around the same time that MOOCs were beginning to gain mainstream appeal (Pappano, 2012), offers a valuable framework for empowered learning in complex interconnected learning environments. According to the initial conception of this framework, "Metaliteracy expands the scope of information literacy as more than a set of discrete skills, challenging us to rethink information literacy as active knowledge production and distribution in collaborative online communities" (Mackey & Jacobson, 2011, p. 64). The emergence of social media and online networks influenced this theoretical shift from the skills development generally associated with traditional approaches to information literacy, to knowledge acquisition in collaborative and participatory environments. Rather than simply create a new literacy type for an isolated purpose or based on the emergence of a specific technology, metaliteracy redefines information literacy as an overarching and fluid model that prepares learners to engage as critical and adaptive participants in an expanding landscape of socially constructed and technology-mediated information environments. While connectivism frames the learning processes that occur in networked environments, metaliteracy can support this framework to inform teaching practices across myriad interconnected learning landscapes (Dunaway, 2011, p.680).

The creation of three Massive Open Online Courses (MOOCs) based on the metaliteracy framework provides a unique opportunity to trace the arc of metaliterate teaching and learning in

these collaborative spaces. What began as an exploration of MOOCs ultimately led to a comparison of pedagogical experiences in three different MOOC platforms. In 2013, core members of the Metaliteracy Learning Collaborative developed the original *Metaliteracy MOOC*, a connectivist MOOC created in-house using Stephen Downes' open gRSShopper programming (http://metaliteracy. cdlprojects.com). We followed this project in 2014 with a Coursera MOOC entitled *Metaliteracy: Empowering Yourself in a Connected World* (https://www.coursera.org/learn/metaliteracy), as well as a Canvas MOOC, *Empowering Yourself as a Digital Citizen* (https://learn.canvas.net/courses/591).

The first half of this paper applies metaliteracy as a conceptual framework to address the challenges of learner-centered MOOC design. In the second section, we offer specific examples of how we applied metaliteracy as a pedagogical strategy in both cMOOC and xMOOC platforms to enhance the engaged and participatory components of metaliterate learning.

The Value of Learner-Centered MOOC Design

Connectivism: from cMOOCs to xMOOCs

Connectivism served as both the content and the underlying pedagogy for the original MOOC, *Connectivism and Connective Knowledge*, offered by George Siemens and Stephen Downes in 2008 (Siemens, 2012). Siemens' (2005) connectivist learning theory asserts that the fluidity and transience of online environments challenge the learner to continuously adapt to changing technologies and to make meaning from multiple resources. Learning in this context requires both an awareness of the space itself as well as critical thinking about information sources.

According to Siemens (2012), the MOOCs he developed with Stephen Downes "are informed by connectivist views of learning, namely, that knowledge is distributed and learning is the process of navigating, growing, and pruning connections" (section 1). In this context, individuals make meaning through the critical navigation of these decentralized spaces while connecting information and gaining knowledge with others. According to Downes, the distinctive value of MOOCs originated not from the content, but in the learning processes themselves. Therefore, connectivism asserts that educators should "treat learning as the formation of connections" as opposed to the acquisition of knowledge (Downes, 2011, para. 6).

With the emergence of university-sponsored MOOC platforms in 2012, a distinction was made between the original connectivist or "cMOOCs," and "xMOOCs" such as Coursera, Udacity and edX that served as extensions of core university offerings (Pappano, 2012; Downes, 2013). While xMOOCs, as defined by Downes (2013), include open resources intended to reach wide audiences, the pedagogical approach is not inherently networked, collaborative, or adaptive in the same way as in cMOOCs. According to Siemens (2012), "The Coursera/EDx MOOCs adopt a traditional view of knowledge and learning" that is not reflected in the networked pedagogy of cMOOCs. Siemens argued that "Instead of distributed knowledge networks, their MOOCs are based on a hub and spoke model: the faculty/knowledge at the centre and the learners are replicators or duplicators of knowledge" (section 2).

Thus, despite the continuing advancement of MOOC technology, xMOOC platforms tend to remain fixed in the authoritarian, prescriptive banking model against which Paulo Freire (1970/2000) famously argued nearly a half-century ago. The lecture-focused structure of xMOOCs situates students as passive "'receptacles' to be 'filled' by the teacher," perpetuating what Freire referred to as the mechanical memorization of narrated content (p. 72). Freire proposed that authentic learning is not passive skills acquisition, but rather a dialogue in which learners connect to each other and to the world around them, working in collaboration with their teachers as co-creators of knowledge.

The connected nature of cMOOCs thus better supports Freire's thinking that "Knowledge emerges only through invention and re-invention, through the restless, impatient, continuing, hopeful inquiry human beings pursue in the world, with the world, and with each other" (p. 72).

In his milestone piece on connectivism, Siemens (2005) identifies 21st century learning competencies that can be fostered through connectivist learning, particularly decision-making, adaptability to changing information landscapes, and pattern-recognition between ideas, concepts and fields of knowledge (Connectivism section). Downes (2011) reinforced this framework and its specific application to MOOC platforms, pointing out the value of learners as practitioners and teachers, and emphasizing that "the *process* of taking the course is itself much more important than the content participants may happen to learn in the course" (para. 9).

In the transition from cMOOCs to xMOOCs, the main dilemma lies in the fact that students are not making these connections themselves. Siemens (2012) asserted that "When an instructor does for learners what learners do for themselves, the learning experience is incomplete" (section 8). As opposed to the aggregated format of connectivist MOOCs that facilitate distributed knowledge networks, the dominant MOOC delivery platforms are more focused on scalable content delivery, and are structured around video lectures or "talking heads" that leave little room for learner interaction and agency. As Downes (2011) asserted, "When we focus on the content of a discipline...we learn the words, but not the dance" (final para.).

The driving question of cMOOCs, according to Siemens (2012), is "What can learners do for themselves with digital tools and networks?" (section 8). If MOOCs provide a unique opportunity for students to practice self-regulation and self-directed learning, the applied pedagogy should focus less on content delivery and more on learning processes, or, in other words, *helping students learn how to learn*. This distinction necessitates a shift beyond the teacher-centered hub-and-spoke model to a pedagogy that maximizes the networked nature of MOOCs and allows students to make their own connections.

Hybrid MOOCs: shifting towards learner-centered design

Emerging blended MOOC taxonomies that incorporate connectivist features into xMOOC platforms acknowledge the necessary shift towards a more learner-centered MOOC design. The literature examines a taxonomy of MOOCs that includes both cMOOC and xMOOC modes, among others (Pilli & Admiraal, 2016), and hybrid MOOC design (Anders, 2015; Fidalgo-Blanco et al., 2016). Additionally, distinct elements of the MOOC environment, such as the online forum, were studied as connectivist features that support community building and collaborative knowledge creation in the xMOOC platform (Dubosson & Emad, 2015).

A review of the literature reveals both the promising potential and the complex challenges of student-centered learning in MOOCs. Researchers identified the need for learner support in cMOOCs (Li, Tang, & Zhang, 2016), and the changing role of facilitators in the connectivist modality (Skrypnyk, Joksimović, Kovanović, Gašević & Dawson, 2015). Researchers also conducted a comparative analysis of popular xMOOC formats (Conache, Dima & Mutu, 2016; Funieru & Lăzăroiu, 2016), but this work has not always included cMOOCs as part of the evaluation. While the literature tends to focus on the features and characteristics of the cMOOC or xMOOC formats, with some exploration of hybrid design and completion rates, an analysis of one specific theme or pedagogical model across these three distinct platforms does not exist. Furthermore, while the trends towards more learner-centered MOOC design point to the potential benefits of this model, there is a need for further analysis on the *abilities,* as described by Downes (2011), required to make meaningful connections in these environments.

Learner agency and self-regulation: opportunities and challenges

Siemens (2012) asserted that "MOOCs foster not only a particular type of knowledge in a particular area of inquiry; they also foster a self-regulated, motivated, and autonomous learner" (section 8). These same competencies, however, can also serve as barriers to learning in MOOCs.

Self-regulated learning is identified as a key determinant for student success in MOOCs (Terras & Ramsay, 2015; Littlejohn et al., 2016). Terras and Ramsay (2015) addressed the psychological challenges of MOOCs, asserting that "the greater autonomy that e-learning offers also presents challenges to the e-learner as the burden of regulating learning is carried by the student rather than the instructor" (p.478). The flexible nature of MOOCs, lack of direct instructor feedback, and distractions of other online activities (Terras & Ramsay, 2015; Littlejohn et al., 2016) "places the onus on individual learners to create and navigate their own learning journey" (Littlejohn et al., 2016, p. 40).

Terras and Ramsay (2015) advocated for a heutagogical approach to MOOC pedagogy, as defined by Hase and Kenyon (2007) in which the learner is conceptualized "as the major agent in their own learning" (Terras & Ramsay, p. 480). Due to the wide variability of learner profiles and motivations, exacerbated by massive enrollments, it is impossible for the instructor to address the needs of every learner; therefore the pedagogy calls for the learner to take more responsibility for their own learning (Terras & Ramsay, 2015, p. 480).

It follows then that students with strong self-regulation skills are more likely to be successful in MOOCs. Littlejohn et al.'s (2016) study found that students who scored higher on self-regulated learning (SRL) assessments tended to be more successful and satisfied with their learning experiences. For example, students with higher SRL scores used assignments and peer discussions to reflect on their learning processes, and measured their achievements based on knowledge and expertise development rather than on completion and assessment scores (p. 46). This example illustrates the benefits of self-regulated learning not only for completion, but also for the quality of the learning experience.

However, some base level of self-regulation is needed in order to glean the benefits of student-driven learning. Students enter MOOCs with varying self-regulation abilities (Littlejohn et al., 2016) and psychosocial and cognitive characteristics related to engagement, motivation, and ability to self-monitor (Terras & Ramsay, 2015, p. 477). Therefore, the self-regulating competencies that can be fostered by learner-centered MOOCs can also act as barriers when they are absent from a learner's baseline abilities.

Given the potential benefits and challenges related to self-regulation, learner-centered MOOCs require a pedagogy that not only enables learner self-agency, but also provides scaffolding and support for the learning processes involved, regardless of a learner's baseline abilities. As disparate yet connected resources external to the individual, MOOCs require the learner to make ongoing associations within these spaces, including dialogue with other participants. This approach reflects the nature of the Web as a hyper-connected and social environment, inspiring an associated pedagogy that is facilitated on a larger scale with a community of users interacting with each other and contributing to a collective learning space.

The ability to navigate complex learning environments, differentiate between dissimilar forms of information, and promote critical thinking are fundamental tenets both of information literacy, and of the successive conception of metaliteracy. However, metaliteracy shifts the focus not only to more active learner roles, but also more directly onto the learning itself. In the following sections, we propose metaliteracy as a lens for critically exploring an enhanced MOOC pedagogy that places students at the center and empowers them to make connections to their learning.

Applying Metaliteracy as Learner-Centered Pedagogy

Metacognition and self-regulation

In *Metaliteracy: Reinventing Information Literacy to Empower Learners*, Mackey and Jacobson (2014) argue that: "A metacognitive approach to information literacy allows us to move beyond rudimentary skills development and prepares students to dig deeper and assess their own learning" (p. 13). This approach extends metacognitive learning to social media environments and open learning spaces, including MOOCs, as a strategy for success that allows one to continuously reflect and learn, and not just gain skills. Terras and Ramsay (2015) call for prioritized research on metacognition in MOOCs (p. 484), citing its importance in relation to self-regulation: "Meta-cognition captures the ability to reflect on how we think and learn, and students who apply metacognitive reflection, especially those who are highly self-regulated and accept responsibility for directing their own learning are more effective learners" (p. 479).

As a pedagogy, metaliteracy encourages learners to claim ownership of their learning as they take on more active roles in online environments. Paul Prinsloo (2016) has discussed metaliteracy in relation to Freire's concept of praxis (Freire, 1970/2000, p. 52):

> "...metaliteracy-as-praxis can benefit from creating and being a space for different voices from different disciplinary backgrounds who question, engage, critique, and make sense of what it means to be human, participate in the discourses of the day, and live dignified lives" (Prinsloo, 2016, p. 191).

As such, the online environment itself is a reflective space for individuals to create and share ideas while gaining critical thinking perspectives about their learning. Doing so also expands understanding about our network of ever-changing information technologies and how to effectively adapt to and navigate within these environments as active participants. Rather than simply teaching students how to use a particular technology, for instance, metaliteracy promotes a deeper approach to learning through collaboration, reflection, and critical thinking.

Metacognition is a key learning domain within metaliteracy. Metaliteracy as a pedagogy can therefore support the connectivist focus on autonomous and self-regulated learners, as learners who do not reflect on their thinking and learning are incapable of self-regulation.

Metaliteracy and connectivism

Siemens (2012) explores eight areas in which connectivist MOOCs differ from those that are offered by platforms such as Coursera and edX. The overlap between some of these areas and metaliteracy in general is striking. Leaving aside the first area, which emphasizes the connectivist component whose relationship to metaliteracy was addressed above, other areas with correspondences include generative knowledge; distributed, multi-spaced interactions; and autonomous and self-regulated learners.

Connectivism and metaliteracy are similar from a pedagogical perspective because of the shared emphasis on the critical evaluation of information in open and social media environments, and the active role that participants play as knowledge creators in these spaces. According to Michelle Kathleen Dunaway (2011),

> "the parallels between the principles of connectivism and emerging frameworks for information literacy suggest that connectivism as a theory of learning and information literacy as a concept may exist in a synergetic relationship, in which each is strengthened by the other" (p. 683).

The author describes this association between connectivism as a learning theory and metaliteracy as an emerging framework (along with transliteracy) that has reimagined the conception of information literacy in digital environments. Dunaway argues:

> "Metaliteracy and transliteracy are frameworks for understanding information literacy that emphasize the importance of communities, connections, information networks, and information technologies; these concepts are central to the principal of the theory of connectivism, which postulates that communities, connections, information networks, and information technologies are central to the learning process" (p. 680).

Metaliteracy also shares an affinity with connectivism in its emphasis on the collaborative nature of technology-mediated environments that feature open resources and social media. Distributed, multi-spaced interactions are central to connectivist MOOCs, and to connectivism itself, as it sees learning as "a process of connecting specialized nodes or information sources" (Siemens, 2005). Metaliteracy highlights the importance of being able to navigate information environments regardless of format, and having the ability to operate fluently within them. Metaliterate learners in these connected spaces need to be empowered critical thinkers that adapt to changing technologies, evaluate a variety of information sources, and learn to produce and share original and repurposed information.

The common threads found in both metaliteracy and connectivism influenced the selection of the cMOOC format as the first Metaliteracy MOOC. At the same time, the xMOOCs also offered promising features that allowed the ongoing development of metaliteracy to expand in two additional open online environments that offered distinct challenges and learning opportunities. In the following sections, we provide examples of how the tenants of metaliteracy were applied to enhance pedagogical design and practices in three MOOCs on three different platforms.

Metaliteracy MOOCs: Overview

In late spring, 2013, members of the Metaliteracy Learning Collaborative, a SUNY-wide think tank and incubator for investigating and promoting metaliteracy, began to explore the development of a MOOC focused on metaliteracy. The open nature of a MOOC with the opportunity to disseminate information about metaliteracy was appealing. Our goal was to provide an opportunity for learners to become familiar with the new concept of metaliteracy, while at the same time developing their own metaliterate abilities.

The original *Metaliteracy MOOC* (http://metaliteracy.cdlprojects.com) was a connectivist MOOC that used the gRSShopper programming created by MOOC pioneer Stephen Downes to aggregate participant blog postings and other social media contributions within daily news feeds. The cMOOC's front end web site provided information about the MOOC itself, the schedule associated with the course, a list of blogs established by course participants, a feedlist, which harvested posts from those blogs as well as Diigo posts tagged for the course, and Twitter messages tagged with the metaliteracy hashtag. This MOOC was used as the basis for credit-bearing courses at the two institutions represented by the authors: one undergraduate, and one graduate. This decision required a structured course overlay not usually associated with the open connectivist format, including a learning contract that fulfilled some elements of a course syllabus (http://metaliteracy.cdlprojects.com/week9.htm). The MOOC, which focused on eight topics, ran from September to mid-December in order to mirror an academic semester.

We followed and expanded on this project with a 2014 Coursera MOOC entitled *Metaliteracy: Empowering Yourself in a Connected World* (https://www.coursera.org/learn/metaliteracy). At the time, the State University of New York system and Coursera were negotiating the role SUNY would

play in Coursera offerings. While there were other MOOC platforms from which to choose, we were aware that Coursera was well established, and had considerably influenced the design, pedagogy, and delivery of xMOOCs worldwide. Thus the xMOOC format expanded opportunities for engaging with metaliteracy concepts to a more global audience. The Coursera platform was a relatively straightforward and somewhat prescriptive design venture, with options for video, discussions, peer assignments, and integrated quizzes. The final MOOC design included ten modules, each one week long, with topical readings and multi-format videos created by the design team.

The third metaliteracy MOOC, *Empowering Yourself as a Digital Citizen* (https://learn.canvas. net/courses/591), emerged out of an unexpected setback in the creation of the Coursera MOOC. Although we planned to integrate an existing competency-based digital badging system (https:// metaliteracybadges.org) into the Coursera MOOC, we were unable to do so based on technical limitations of the Coursera platform. Canvas's flexible pedagogical approach and modular design structure provided the ideal platform for experimenting with badge integration. The third-party Canvabadges app (since replaced by Badgr) enabled students to earn a digital token of achievement for each successfully completed module. While the ten-week Coursera MOOC guided learners through the full spectrum of metaliteracy learning objectives, the Canvas MOOC was oriented more specifically around the theme of digital citizenship, and was condensed to six weeks.

MOOCs offer the opportunity to work with a wide spectrum of learners, and each metaliteracy MOOC attracted its own unique learning community. Most participants in the cMOOC were academic librarians interested in enhancing their knowledge of metaliteracy, smaller numbers of other educators, and members of the general public. The participants in this first MOOC came primarily from English-speaking countries, and totaled 554 enrollments. (Mackey, Forte, Allain, Jacobson & Pitera, 2015, p. 34) We were eager to explore the potential interaction of intergenerational learners, planning to combine a professional audience with traditional age undergraduates at The University at Albany and adult learners from Empire State College.

The international reach of xMOOC platforms engendered a diverse learner demographic. The first iteration of the Coursera MOOC included over 5,000 learners from 142 different countries. To accommodate earning the Digital Citizen badge, registration for the Canvas MOOC was closed after one week, limiting enrollment to approximately 300 learners. About half of the Canvas participants self-identified as international learners, and ranged from high school students to adult learners and professionals.

Our journey from cMOOC to xMOOC paralleled the emergence of MOOCs into the learning landscape. Yet as MOOCs became more automated and less learner-centered, we pushed against these trends, and set out to create engaged, decentralized learning communities that aligned with the tenants of metaliteracy.

Designing for Student-Centered Learning

The design of the metaliteracy MOOCs was influenced by the underlying connectivist assertion that technology not only creates the circumstances under which connectedness flourishes, but also invites learners to critically consider and engage their centrality in the perpetuation and creation of these new learning spaces. Metaliteracy challenges learners to take ownership of their learning, which is realized through a deeper understanding of how they learn and translate learning into action, and self-reflection on their learning as a continuous process. These practices are particularly pertinent to online environments in which learners are at once both consumers and producers of digital information in open and collaborative spaces (Mackey & Jacobson, 2014). Thus, like connectivism, metaliteracy
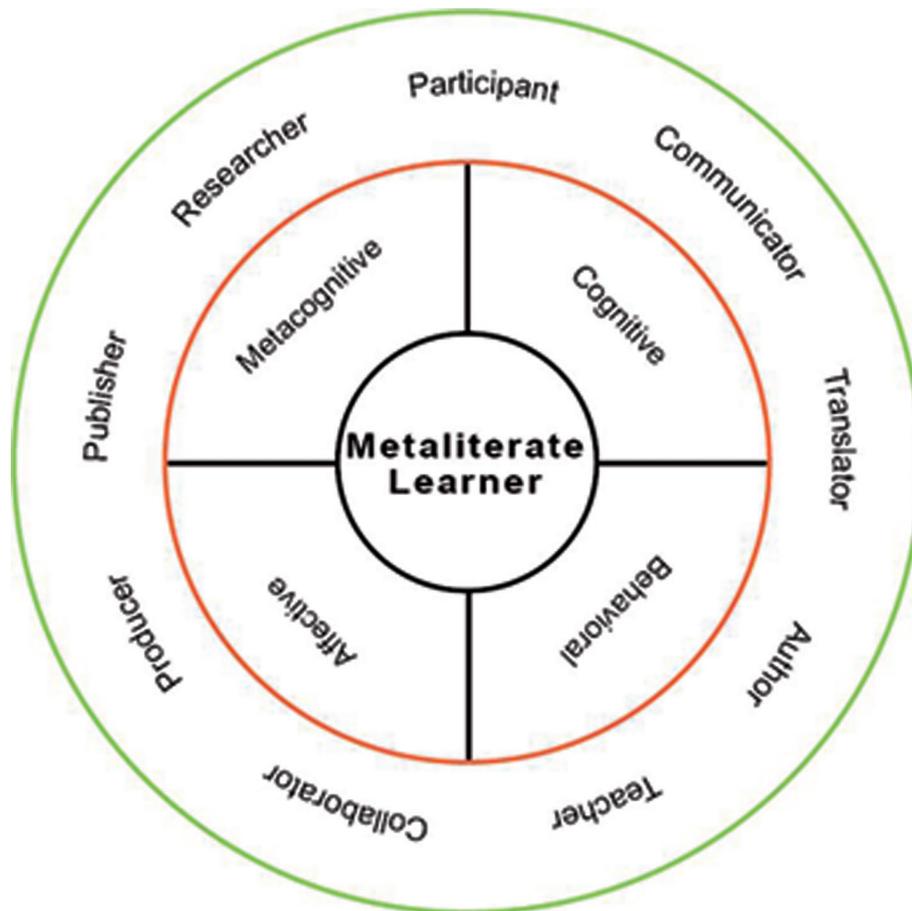
Figure 1: The Metaliterate Learner Figure by Tom Mackey, Trudi Jacobson, and Roger Lipera

promotes a decentralized learning environment in which learners have greater agency in their own learning. As illustrated by Figure 1, and drawing comparisons to connectivism's "personal learning networks" (Dunaway, 2011, p.682), metaliteracy situates learners at the center of four interrelated domains of learning as they take on myriad active roles in the processes of evaluating, producing and sharing information (Mackey & Jacobson, 2014). In the sections that follow we describe how we leveraged the distinct assets of each of the three MOOC platforms to support students in these active learning roles as participants, contributors and teachers.

Learner as Participant

Downes (2011) described the first connectivist MOOCs as a "community of practitioners" who are "introduced to ways of doing the sorts of things practitioners do, and through that practice, becomes more similar in act, thought and values to members of that community" (para. 9). In the same vein, our goal was for participants not only to learn metaliteracy, but to practice being self-directed and self-reflective metaliterate learners. Rather than privileging the instructors as the sole authorities on metaliteracy, we envisioned learners and instructors engaging together in collaborative meaning-making. This participatory environment necessitated a removal of instructors from the proverbial lectern in order to provide learners with opportunities to actively engage, interpret and respond to the content to make their own connections.

cMOOC

In the style of the original connectivist MOOCs, *Metaliteracy MOOC* disrupted the teacher-centered learning environment by integrating various user-generated components. Content in the MOOC was organized into topics, and each topic included an overview and key readings that served as a jumping off point for deeper engagement. The course was focused less on the instructors' definitions of metaliteracy, and more on the interpretations of the participants. While there were required readings, students were instructed to select additional resources in order to shape the learning that would be most meaningful to them. Students were encouraged to keep personal blogs as a space to grapple with the content and incorporate concepts into their own context of understanding. They were also tasked with remixing, repurposing and making meaning of the metaliteracy concepts, and tracking and sharing these interpretations through social media outlets. The gRSShopper programming aggregated the contributions of course facilitators, guest speakers, and course participants within daily newsletters, which provided a new springboard for continued conversations. Rather than simply presenting information, the cMOOC sought to engage participants in critical conversations around metaliteracy concepts.

The cMOOC featured synchronous online webinars called "MOOC Talks," so named to encompass the non-division between teacher and learner, which encouraged active engagement with the course content. The themed talks, which were also recorded for later viewing, captured conversations with national and international scholars from various disciplines, and explored topics such as metacognition, visual literacy, open learning, global perspectives related to literacy, media and news literacy, digital storytelling, and technobiophilia (Thomas, 2013). Learners who attended the live webinar or who submitted queries in advance could have their questions answered in "real time," creating opportunities for formative feedback and dialogue. Because metaliteracy was still a new concept at the time, there was no pool of metaliteracy experts to call upon beyond the MOOC developers. Inviting speakers from a variety of backgrounds, however, emphasized the range of theoretical perspectives and real world situations in which metaliteracy is pertinent (Mackey et al., 2015, p. 34–40). In contrast with the passive and stagnant nature of pre-recorded lecture videos, MOOC Talks offered students opportunities for active engagement with guest speakers who represented a range of disciplines and approaches to elements of metaliteracy or related literacies. Along with the user-generated components of the course, the MOOC Talks modeled the decentralization of the "expert voice" within a given discipline, and afforded learners a pathway to contribute to this emerging community.

Coursera

In contrast to the inherently decentralized structure of the cMOOC, the Coursera platform was more linear and lecture-oriented. We made the deliberate decision, however, that videos would not constitute the main content of our first xMOOC, *Metaliteracy: Empowering Yourself in a Connected World*. While Coursera's navigation menu was organized by video lecture, we worked around this video-centric platform by hard-coding a navigation panel and creating landing pages for each module. We chose to avoid the "talking head" video that replicates lecture-based lesson delivery, and instead used the videos as engaging entry points to the main course content, which mostly consisted of readings that students were expected to critically engage with and respond to. The videos were intentionally varied by style, content and length and included animations, interviews, short introductory lectures, and pecha-kucha-style narrations accompanied by photo slideshows. We used various tools to develop the videos as well, including Animoto, GoAnimate, and the production studio at Empire State College. Compared to the passive experience of watching a video lecture, the brief introductory

videos prompted learners to engage in a variety of instructor-generated documents and open source articles. The instructional design decision to vary the video style and format aligned with the fluid nature of the course. Pre-recorded videos of professors sitting behind a desk leave no opportunity for student contributions.

As in the cMOOC, the Coursera MOOC encouraged students to interrogate and reflect on the course concepts for their assignments and in open discussion forums. While participation in the forums was not required, this is where we saw the deepest engagement as students grappled with the metaliteracy concepts. Students started their own threads, clarified each other's questions, and offered their own interpretations of the course content. As the course played out the Coursera discussion forums took on a life of their own, and were a driving force in terms of direction, content, and scope. In this sense, the course content had an opportunity to evolve as a diverse community of students engaged with and reinterpreted the content according to their own diverse perspectives.

Canvas

Using the Coursera MOOC as a model, the Canvas MOOC, *Empowering Yourself as a Digital Citizen*, used videos as engaging introductions to the course content, which consisted of instructor-generated readings and open source articles and videos. Canvas promotes the "flexible pedagogy" of its platform, and the simple modular format was essentially a blank slate that could be modified with third-party applications according to the preferences of the instructors. To complement the gamified style of this MOOC, we created all of the videos with GoAnimate, including animated skits with characters voiced by many of the course instructors, and celebratory video clips that acknowledged students' completion of each module.

Modules in the Canvas MOOC consisted of weekly quests and challenges that culminated in the Digital Citizen badge, which earners could choose to display on social networks and digital portfolios. The digital badge served as an incentive for engaged participation in the MOOC, especially since Canvas did not award its own certificates. In addition, tokens of achievement were awarded for successful completion of a module, and served as visual milestones throughout the course. The badges recognized students' active participation in the course, and promoted their thoughtful engagement with the course concepts, as opposed to their duplication of instructor definitions of these concepts.

While we attempted to replicate Coursera's discussion forums in the Canvas MOOC, we struggled to create the same level of active engagement. Despite prompts and encouragement from the course instructors, the students in the Canvas course mainly used the discussion forums as a place to ask questions about assignments or course navigation, and were resistant to participate in deeper dialogue. This tendency may have been related either to the smaller numbers of participants, or to the types of participants, as many students described themselves as new to the MOOC environment.

Learner as Contributor

Metaliteracy fosters the learner's role not only as a consumer, but also a creator of information, recognizing that in networked learning environments the lines between consumer and creator are often blurred. This goal aligns with Siemens' (2012) promotion of the generative nature of knowledge, asserting that "learners need to create and share stuff," and not simply rely on information supplied by instructors (section 2). MOOCs provide learners with opportunities to generate knowledge by forming their own personal learning networks that integrate various nodes of learning into the context of their own interpretations. Furthermore, they offer opportunities to "feed forward" by connecting

their individual "small worlds of knowledge" with a diverse peer network (Downes, 2011, section 4; Siemens, 2005). The learner-centered course design in each of the MOOCs facilitated each participant's role as contributor to a wider network of learners, as they engaged with the content individually, in small groups, and with the wider course community. Additionally, as learners engaged with open readings and media as part of their course assignments, the courses themselves were also openly licensed, encouraging participants to share and repurpose the course content beyond the MOOC itself.

cMOOC

The cMOOC employed the four types of activities established by the first connectivist MOOCs: aggregate, remix, repurpose and feed forward (http://metaliteracy.cdlprojects.com/how.htm). Learners were tasked with reading pertinent materials aggregated in the newsletter, working to understand the connections, and repurposing and sharing their interpretations in their own blog posts and tweets. As learners in the cMOOC generated course dialogue via blogs, social networking, and engagement in the MOOC talks, they took on a leading role in the creation of course content. The RSS feed collected this user-generated content and made it readily visible in order to "feed forward" in the practice of collective knowledge cultivation. However, we found that most students who were participating in the MOOC as a course requirement were focused less on meaningful engagement, and more on doing the minimum amount required to pass the course. While prompts encouraged students to comment on each other's posts, few chose to do so. Thus, while the cMOOC supported learners as they formed their own personal learning networks to make "connections between various perspectives, opinions and concepts" (Dunaway p. 676), it was less successful in facilitating connections between individual learning networks.

Coursera

While the circuitous nature of the cMOOC better aligned with a decentralized learning environment, we found that the embedded tools in the Coursera MOOC helped to facilitate the generative roles that students hesitated to take on in the cMOOC. The assignments in the Coursera MOOC consisted of reflective essays completed at the end of each module, and the content often mirrored the processes being practiced in the course, such as remixing open content. Coursera's integrated assignment tool clearly guided students through the three steps of the peer-assessed assignments: a written reflection, an optional self-assessment, and the assessment of two peers. We used the peer assessment tool to replicate the networked processes of the cMOOC as students engaged the content individually, in smaller peer groups, and with the wider course community. The tool was designed in such a way that students were required to review the work of their peers in order to receive a grade on their own work. The "feeding forward" phase was extended in the discussion forums where students shared their experiences with the assignments and further engaged with the metaliteracy concepts. Thus, the embedded constructs of the Coursera platform supported a generative, networked learning process as students formed their own individual as well as collective interpretations with their peers.

Canvas

Assignments in the Canvas MOOC were largely focused on the responsible creation, sharing and remixing of open content, and the culminating Digital Citizen badge validated these processes. However, while the participatory features from the Coursera MOOC were replicated in the design

of the Canvas MOOC, they were not nearly as successful. This was primarily due to issues with Canvas's peer assessment functionality. While Coursera's assignment tool walked students through the peer assessment process, Canvas did not integrate the peer review step into the assignments; therefore, while students could review each other's work, the review step was not automatically factored into the grade, requiring the instructors both to remind students to grade each other and ultimately to assign the official grade. When students were late in grading their peers, it held the ungraded students back from making progress in the course. Furthermore, if students chose not to complete the review step at all their peers were left without an assignment grade and the system was essentially broken. Consequently, and combined with their lack of engagement in the discussion forums, students in the Canvas MOOC practiced remixing content in open learning spaces, but in the MOOC itself they tended to remain siloed within their own learning networks.

Learner as Teacher

Metaliteracy envisions the full decentralization of learning as the exchange of learner and teacher roles. Downes (2011), likewise, expanded on his idea of a community of participants, explaining that "what a connectivist course becomes is a community of educators attempting to learn how it is that they learn, with the objective of allowing them to be able to help other people learn. We are all educators, or at least, learning to be educators, creating and promoting the (connective) practice of education by actually practicing it" (para. 11). Metaliteracy asserts that learners have expertise to share with others. By motivating learners to take on participatory, collaborative roles, we also encouraged them to recognize, embrace, and hone their roles as teachers.

cMOOC

In the cMOOC, we invited learners into a space wherein their voices could frame the course. While participants in the cMOOC readily assumed a participatory role in the generation of course content, they were hesitant to take on a formal role in teaching their peers. The instructors found that the information professionals participating in the cMOOC more robustly adopted the role of learner as teacher than did the university students enrolled in the course. This was not surprising, given the information literacy background the information professionals brought to the experience, and their comfort operating in a milieu of what could be considered colleagues. The undergraduate learners, however, lacked the confidence to participate independently, waiting for explicit permission or for defined roles to be explained to them. Thus, even when we made sincere pedagogical attempts to upend and challenge the traditional classroom the majority of learners remained predictably invested in viewing teacher as authority.

Coursera

Coursera's peer review tool opened up new possibilities for learners to take on the teacher role as they assigned grades and provided constructive feedback to their peers. The instructors developed rubrics that carefully aligned with the metaliteracy objectives, which served both to ensure the validity of the assessments and to facilitate the learner as teacher role. We found the comment section in Coursera's rubric builder to be especially useful in encouraging thoughtful feedback, requiring students to explain their reasoning rather than absently assigning a grade.

   While the peer assessment tool presented the most obvious application of teaching practices, the learner-as-teacher role was most fully realized in the discussion forums. Students critically engaged

with the content and asked important questions that led to deeper understanding, effectively helping each other learn. Many students shared relevant outside resources in the discussion forums to help their peers understand difficult concepts. It is important to note that this activity occurred with very little prompting by course instructors, suggesting that given the opportunity and the tools to do so, students are very willing to help their peers in a collective learning space.

Learners learning from each other is a hallmark of metaliteracy learning goals and objectives. However, scaling the peer assessment process within the MOOC environment brought layered challenges, including the results of expanded learner empowerment. Instructors had less "control" over the ways in which learning activities were assessed, and as such put into practice one of the many tenets of metaliteracy which challenge the traditional, top-down distribution of power in the classroom – virtual or otherwise.

Just as learners took on the role of teacher, the course instructors embraced the role of learner by encouraging and responding to course feedback and allowing the course to evolve accordingly. For instance, we modified the assignment rubric based on input from a student about the language barrier of global participants.

Canvas

The challenges with the peer assessment functionality in Canvas limited participants' roles as teachers. As in Coursera, rubrics that aligned with course objectives guided students in the reviewing of their peers' work. However, due to confusion about the peer assessment tool and the resulting delayed feedback, conversations around assignments were stalled and did not have an opportunity to organically evolve.

Learner Roles Across MOOCs

Overall, the cMOOC served as the foundational metaliteracy MOOC that allowed for the exploration of connectivist features that are aligned effectively with the participatory and collaborative goals of metaliteracy. The decentralized nature of the cMOOC better engendered the complex networks and user-generated content explored in metaliteracy. While xMOOCs are more structured and familiar to students accustomed to traditional learning management systems, cMOOCs challenge learners to choose their own learning avenues and to connect with others in a decentralized environment in which "teacher-student and the students-teachers reflect simultaneously on themselves and the world" (Freire, 1970/2000, p. 83). The cMOOC promoted participant interactivity, one of the central tenets of metaliteracy, by integrating various social media tools, and providing each user with a voice as content creators.

Coursera functioned as a well-oiled machine with embedded templates and thorough guidelines that facilitated a smooth and efficient course development process, and a structured and familiar environment for learners; this template could also feel constraining, however, when we tried to move outside of Coursera's prescriptive box. Coursera's lecture-oriented platform relies on the traditional "banking model" of education, which is in direct contrast to the fluid and participatory nature of the cMOOC that encourages and invites content from users. While Coursera and Canvas both promoted the production of high-quality video learning objects, these materials favor the instructor point of view and do not systematically support the kind of learner-centered narratives we experienced through the participant blog posts compiled and shared in the cMOOC. We succeeded in engaging learners through the interactive discussions in Coursera, but had to work against the linear grain of the Coursera platform to involve learners in the collaborative production and sharing of their own work in this space.

Canvas's "blank slate" offered more flexibility and possibilities for designing the course around the pedagogy. Canvas's philosophy is to be a "sounding board" for instructors, providing room for academic freedom and pedagogical creativity. Starting with a blank page, a simple web editing interface, and third party applications as building blocks, it is up to the instructor to decide how to build the course. Canvas offered a great deal of flexibility in course design, and the modular structure enabled the integration of badging elements, which was not possible with Coursera's fixed template. However, the course tools meant to foster student engagement - particularly the peer assessment functionality - were not as well polished in Canvas as those in the Coursera platform, which limited students in realizing their roles as contributors and teachers.

Each of the MOOCs offered varied opportunities for communication and deep learning in a global context. In the cMOOC learners had the chance to engage with guest speakers from diverse disciplines, perspectives, and geographic locations. Both xMOOCs attracted a diversity of learners from a range of backgrounds and locations around the world, offering unique opportunities for global communication. The strong international presence in the Coursera MOOC generated especially engaging conversations around course content and pedagogy. In addition, language differences led to enlightening discussions highlighting the challenges of non-native English speakers, and several international learners remarked that the course gave them an opportunity to practice their English language skills. These experiences reinforced the learner's role as contributor and teacher, encouraging development of the critical consciousness (Freire, 1970/2000) that results from deep reflection and engagement with the world.

Empowered Learning and Self-Regulation

All three metaliteracy MOOCs invited learners to take on more active learning roles as participants, contributors and teachers. However, as highlighted in the literature, students require support in order to be successful in these roles.

The connectivist MOOC enabled a situation in which learners interacted with information presented in disorderly ways, as evidenced by the disparate social media platforms or the selection of optional, rather than required, readings. This format reflected the circuitous nature of online search navigation and participatory social media environments, yet proved too unstructured for some. While a course that allows students to decide what they would read, what content or social media connections they would engage with, and whether they would watch the weekly MOOC Talks might work for advanced students, we found this approach challenging for learners new to blended or online study. They were not used to the extraordinary amount of self-direction allowed, indeed demanded, by the course (Mackey et al., 2015, p. 37).

Metaliteracy seeks to address the broader issue of learners overwhelmed by complex online information. Thus, its strategies promote intricate—and therefore supportive and collegial—connectivist interactions. Ironically, while the cMOOC sought to provide the opportunity for learners to both understand metaliteracy and become more practiced and proficient in its tenets, many of the participants would have benefitted from a more structured metaliteracy learning environment before they delved into what they saw as the anarchy of a cMOOC.

To help acclimate students to the decentralized MOOC environments, we provided navigational constructs that supported self-directed learning practices. The learning contract in the cMOOC, for example, was developed to provide support and guidance for students who were enrolled in the accompanying credit courses. The contract fulfilled some of the elements of a course syllabus, and included methods and criteria for evaluation, a plan for formative assessment, and assignment and scheduling details. Likewise, in the Coursera MOOC we worked against the lecture-oriented platform

to create clear, straightforward navigation with weekly descriptions, learning objectives, videos, readings, discussion links, and assessments. The modular structure of the Canvas MOOC facilitated a similar structure, with designated landing pages for each module. The peer assessment tool guided students through learning activities in the Coursera MOOC. Thus, MOOCs can serve as exploratory spaces that replicate complex, interconnected learning environments, but also provide safety nets in the form of facilitator guidelines and assessment tools.

Striking the right balance can be challenging, however. Due to the credit course overlay of the cMOOC, students' expectations aligned with a more traditional course structure, and assumed that there would be a clear route to successful completion of the course. They became anxious that, rather than being told what they needed to do to reach that goal, they were asked to choose their own learning pathways. In addition, students could become preoccupied with the learning activities that were required for the grade, rather than focusing on making meaningful connections to others engaged in the MOOC (Mackey et al., 2015, p. 41). It is therefore essential to reinforce in learners a sense of ownership and empowerment as they actively engage and think critically in collaborative social spaces.

As illustrated by the four inter-related domains of learning (Figure 1), metaliteracy addresses the needs of the whole person in today's interactive social spaces. While the cognitive and behavioral domains are important for learning, the metacognitive and affective domains are especially pertinent to the self-regulation challenges and opportunities presented by complex, decentralized MOOC environments.

As discussed earlier, the metacognitive domain, central to metaliteracy, encourages learners to reflect on how and what they learn. As such, the content of all three MOOCs fostered the practices of self-reflection and self-assessment. In their written assignments and blog posts, students in each of the MOOCs were asked to reflect not only on the concepts, but also on their learning processes. Ungraded quizzes in the xMOOCs and the self-assessment component in Coursera's peer review tool provided learners with the opportunity to reflect on their own work along with the work of their peers. Additionally, in the Canvas MOOC the culminating exercise for the Digital Citizen badge required participants to think back on their learning throughout the course, and to assess for themselves the extent to which they felt they had met the course learning objectives.

Furthermore, we designed the assignments to develop habits of self-regulation, encouraging participants to periodically revisit and reinterpret their understanding of the key concepts. For example, in each of the MOOCs we presented learners with the metaliterate learner figure (Figure 1) at the beginning of the course, and asked them to reflect on how they had developed in their active learning roles as the course progressed. Similarly, in the xMOOCs we presented the learning objectives at the beginning of each module, and asked students to revisit them at end of the module in alignment with the peer assessment rubrics. The digital badging element in the Canvas MOOC visualized and celebrated this reflective process throughout the course, with tokens of achievement symbolizing completion of each module, and encouraged students to periodically reflect on their progress and set goals towards earning the sharable course badge.

While the metacognitive domain encourages students to think deeply about their own learning, the affective domain addresses the emotions and attitudes of learners during a particular learning activity. Terras & Ramsay (2015) described "the *burden* of regulating learning [that] is carried by the student" (p. 478, emphasis ours) and further iterated the "importance of considering how learners cope and how they can be supported in dealing with the increased autonomy and flexibility that they encounter in e-learning environments" (p. 475). Addressing the affective domain requires a human element that cannot be achieved with an automated, pre-recorded format. In each of the MOOCs, we used a team-based approach to create a strong instructor presence, striving to address

student concerns and to commend their achievements. In smaller teams, and based on interest and content expertise, we collaboratively designed and facilitated each module, ensuring that the discussion forums were consistently monitored for any issues or interesting discussion that should be encouraged. Each team was responsible for weekly announcements, which guided learners in terms of next steps, forthcoming modules, or transitions from one week to the next.

The discussion forums provided opportunities for instructors to engage with and support students as they came to their own conceptual understandings, and allowed for formative feedback that is often missing in MOOCs. Our team routinely struggled with Coursera's pedagogical recommendation to remain slightly disengaged from the discussions. The instructor documentation in Coursera recommended that we not "apologize" for enquiries regarding design decisions, including peer assessments and feedback therein. As a team, however, we were nonetheless compelled to directly engage students in dialogue about the important issues they raised in discussion; this approach more honestly captured the tenets of metaliterate pedagogy, and mirrored the learning engendered by MOOC content and design. As learners developed competence in the teacher role we followed Coursera's advice and avoided the impulse to respond to every posting, letting the conversations play out with targeted instructor facilitation. However, in order to ensure that we taught towards the fullest expression of metaliterate learning and teaching, we chose to actively validate learner mastery of topics, reinforce progress, and encourage learners to move through course milestones towards course completion and recognition of said completion.

Deep engagement with the course content cannot be forced, and indeed conversations in the Coursera MOOC seemed to benefit from being allowed to evolve organically. However, instructor presence in the course encourages these conversations to flourish, provides a reassuring authority that was missing from the cMOOC, and helps to ensure that opportunities for sparking conversation or addressing challenging concepts are not missed.

Conclusion

This article presented metaliteracy as a pedagogical framework that encourages more reflective, student-centered learning and critical engagement in MOOCs. Metaliteracy aligns with key tenets of connectivism, and prepares learners to take on active, collaborative roles in complex online learning environments. It complements the connectivist model in that it focuses less on content, and more on the connections that students are making to the content. Metaliteracy not only promotes active learner roles, but addresses the learning processes themselves. Furthermore, it acknowledges the many dimensions of student learning, including the metacognitive and affective domains that are especially pertinent to self-regulation challenges and opportunities presented by complex, decentralized MOOC environments.

We explored the integration of metaliteracy-based pedagogical techniques across three distinct MOOC formats, from the original connectivist MOOC to the subsequent Coursera and Canvas xMOOCs. This trajectory of MOOC development in all three spaces coincided with the advancement of metaliteracy itself and the ways that our first cMOOC informed and challenged the design of the xMOOCs that followed. The original connectivist MOOC had a significant impact on how we envisioned and designed the two subsequent xMOOCs produced in Coursera and Canvas. We found a strong association between the original metaliteracy goals and learning objectives and the structure of a connectivist MOOC. This alliance was evident in the cMOOC format and in the theoretical underpinnings of both metaliteracy and connectivism. While the flexible, open, and participatory metaliteracy framework challenged outdated definitions of information literacy, the revolutionary connectivist MOOCs defied the bounds of closed classrooms and traditional approaches to online

learning. At the same time, the conceptual understanding of the cMOOC was often in conflict with how this format played out in actually teaching metaliteracy. The theoretical alignment between metaliteracy and connectivism appealed to us as course designers and instructors but did not always provide the level of access we hoped for in practice when trying to include a wide spectrum of learners in the collaborative MOOC experience.

Using examples from three MOOCs designed on three different platforms—cMOOC, Coursera, and Canvas—we showed that despite the lecture-oriented format of dominant xMOOCs, the platform need not dictate the pedagogy. Rather, educators can leverage the unique characteristics and assets of MOOC platforms to create student-centered learning environments that empower learners to make their own connections and drive their own learning. MOOCs that allow for learner agency provide opportunities for fostering self-directed and self-regulated learning. The globally networked nature of MOOCs mirrors the complex interconnected nature of online environments, and thus presents opportunities for students to practice important lifelong learning skills for interacting in these environments. However, in order for students to reap the benefits of decentralized learning spaces, they need to be able to self-regulate their learning. Therefore, MOOC pedagogy must not only enable student agency, but also support students as they take on more active roles as participants, contributors and teachers. As envisioned by the original connectivist MOOCs, this pedagogy should focus less on content delivery, and more on learning processes.

While prominent MOOC platforms favor lecture-based formats, educators can and should push against the platforms' embedded structures in consideration of strong pedagogical practices. In our experience, we found that xMOOCs are generally more restrictive than cMOOCs, less nimble, and therefore the full expression of metaliteracy could not be exactly captured either in Coursera or Canvas. Each of the two xMOOC platforms limited some of our pedagogical approaches and intended design decisions, but also pushed us to adapt new techniques that advanced the practice and tenets of metaliteracy. By supporting hybrid design that combines the best of cMOOC and xMOOC pedagogy, the connectivist aspects of MOOCs will best serve and support metaliteracy in practice.

Based on the findings explored in this article, the authors would like to offer a hybrid Metaliteracy MOOC that would focus less on the lectures found in xMOOCs, and more on user-generated content, collaborative knowledge creation, and student-driven learning promoted in cMOOCs, while supporting learners as teachers and contributors to the course. In addition, mechanisms would be incorporated to support and assess student learning and self-regulation. Since the original authoring of this article the Coursera MOOC has been modified in accordance with Coursera's new on-demand format. The self-paced nature of the course requires more advanced self-regulation capabilities by participating students. While the new platform has in many ways become more flexible, we have noticed a significant drop in discussion forum activity. We have attempted to increase instructor presence with weekly emails that correspond to relevant current topics, but further research is needed to explore how we can integrate scaffolding mechanisms that support self-regulation and encourage students to help each other learn.

Our analysis of the three MOOCs has been offered through the lens of course design and its potential to convey not just content, but the learning opportunities that enable the formation of metaliterate practices and knowledge. Further research is needed to assess the extent to which learners in decentralized MOOC environments achieve this complex set of goals and objectives. An examination of the student experience in MOOCs, particularly in relation to their affective and metacognitive experiences, could provide valuable insight into both the challenges and opportunities for self-regulated and self-directed learning in MOOCs.

We recognize that institutionalized power structures resist challenges to the ubiquitous and insistent, codified nature of roles, responsibilities, and assessment, and therefore do not romanticize the degree to which a blurring of learner and teacher roles can be fully realized. The academy

authorizes teachers to make decisions, to create learning opportunities, and to assess, and learners capitulate, to some degree, to that relationship. Even when we make sincere pedagogical attempts to upend and challenge the traditional classroom—either via nature and design of MOOCs or peer assessments or learner-led sessions (to name just a few examples) —learners remain predictably (and perhaps necessarily) invested in viewing teacher as authority. It does not exactly matter how instructors self-identify; even the "facilitator" of the course has to make decisions about course length, structure, themes, and so forth. These are not decisions to which learners are generally privy, and the power therein signals a necessary authority.

While students tend to defer to the historical authority of teacher within the academy, we, ironically, did as well. On the one hand, we deliberately asked students to take on the "role" of "teacher". On the other hand, we were positioned to do so—we had the authority to give it away in the first place, and in effect only felt comfortable giving away just so much. For instance, as course facilitators, we felt a responsibility to not let student concerns go unanswered and unresolved. While we did invite robust integration of learner perspectives, we were ultimately responsible for determining assessments and organizing access. Pedagogically, we need to recognize this inevitability, and support students if their participation signals discomfort with taking on the role of teacher. We also need to recognize that this discomfort may signal either lack of confidence and/or lack of experience. To dismiss the competencies embedded in taking on this role diminishes the concerns and needs of a learner and the potential for new learning through metaliteracy.

We encourage educators to examine their own MOOC pedagogies using metaliteracy as a lens for enhancing and supporting the multiple domains of student-centered learning. There is no ideal platform that delivers the best MOOC. Rather, instructors must consider pedagogy first, and push the platform as far as it will go in service of that pedagogy. When thoughtfully implemented, we can leverage the unique assets of MOOCs, particularly their global scale and open networked structure, to empower learners in an increasingly interconnected world.

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