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Essays by:

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Constructivists Online: Reimagining Progressive Practice

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Notes from the Special Issue Editors

Helen Freidus, Mollie Welsh Kruger & Steven Goss

> *Rationalists wearing square hats,*
> *Think, in square rooms,*
> *Looking at the floor,*
> *Looking at the ceiling.*
> *They confine themselves to right-angled triangles.*
> *If they tried rhomboids,*
> *Cones, waving lines ellipses—*
> *As, for example, the ellipse of the half-moon—*
> *Rationalists would wear sombreros.*
> *—Wallace Stevens, Landscape VI from*
> *"Six Significant Landscapes" (Greene, 1996)*

In 1996, Maxine Greene shared these lines with educators to awaken them to a sense of possibility. She noted that Wallace Stevens does not strike out at rationalists for what they do but uses metaphor to orient readers "to fresh vantage points even in square rooms" (Greene, 1996). Today, digital pedagogy and online education offer new opportunities for possibility, once again calling us out of square rooms.

These new tools and spaces encourage us to "re-vision" our practice, connect with a wider audience of learners, and move away from the traditional confines of the square room. They do not diminish the value of the face-to-face classroom, but they do encourage new habits of mind that make it possible to engage learners of all ages.

In this issue of the Occasional Paper Series, we reimagine progressive pedagogy within the framework of digital pedagogy and online practice. Like Maxine Greene, **Ellen Meier** calls for educators to move beyond the familiar. In her essay, *Beyond a Digital Status Quo: Re-conceptualizing Online Learning Opportunities,* she suggests that new spaces are needed, spaces in which practices will allow teachers to do what they do best, teach to the needs and interests of all students. While the current state of online teaching poses very real challenges, it also provides opportunities for extending and re-conceptualizing practice in exciting and generative ways.

In the first set of essays, **Inside the Online Classroom**, we present the experiences of educators who have entered the square room but have refused to be limited by its constraints. These are teacher educators who have designed their courses for the online venue. Some enthusiastically chose to teach online; others were mandated to do so.

Regardless of how their journey began, each author describes the work she or he is doing to bring constructivist practice online. To the surprise of each of these educators, they find that not only is the work possible, but it leads them to reframe the ways in which they approach their face-to-face teaching:

- **Tamara Spencer**, in *Preparing Teachers as Literacy Leaders in a Hybrid Classroom*, documents the process of taking new literacies and innovative pedagogy online, moving from a face-to-face to a hybrid course, she details the learning of both students and educator.

- **Robin Isserles**, in *Fostering Student Engagement: Creating a "Culture of Learning" Online*, addresses the ways in which distance learning offers possibilities for mitigating inequitable access to higher education — supporting community college students' ability to take ownership of their learning, and encouraging them to think critically about what they are learning.

- In **Fred Freking** & **Jenny Ingber**'s *Teaching Science Teachers in an Online Context with a Constructivist Approach*, the authors discuss the development of an online STEM-based teacher education program, providing a template for the inclusion of constructivist practices, such as course activities and student teaching

- **Ramona Cutri**, **Erin Whiting** & **Stefinee Pinnegar**, in *Activating Students' Emotional and Analytic Engagement with a Blended Learning Format Multicultural Education Course*, activate students' emotional and analytic engagement with multicultural education through online classrooms.

- In *Creating Meaningful Learning Opportunities Online*, **Hafdís Guðjónsdóttir**, **Karen Gísladottir** & **Svanborg Jonsdottir** describe the ways in which they have used digital pedagogy to address the loneliness of the distance learner by making their online course more inclusive and interactive.

In the second set of essays, **Beyond the Online Classroom**, authors describe their experiences in a range of online contexts. These authors came to their work with a vision of how technology might offer new pathways for learning. They ask: what do K-12 classrooms, business school courses, teacher communities of practice, and museum spaces look like when infused with the new opportunities technologies offer?

The authors included in this section use constructivist practices to bring new visions to traditional experiences. They find that the outcomes are even richer than they had anticipated:

- In *Operations Management Outside of the Classroom: An Experiential Approach to Teaching Enabled by Online Learning*, **Kristen Sosulski** & **Harry Chernoff** employ online learning as a way to free their students from the confines of the lecture-based classroom.

- In *Reflection & Technology in Theory and Practice: Teen Engagement in Art Museums*, **Chelsea Kelly** discusses her experience using digital technologies to extend the young museumgoer's voice beyond the walls of the museum and into online communities.

- In *Technology as a Tool for Collaboration, Understanding & Engagement*, **Kai Johnson** incorporates multimodal online inquiry to deepen the thinking of children in his elementary classroom. When he sees how engaged his students are in their work, he realizes that this is a true picture of constructivist learning.

- **Marvin Cohen**, **Babette Moeller** & **Michelle Cerrone** document the ways in which online communities of practice enable teachers to have meaningful conversations sharing practices and discussing the nuances of teaching math in *Constructing Online Communities of Practice*.

Across these articles, we find educators engaging with the challenges they encountered and emerging with new visions of constructivist practice. Authors who began as skeptics discovered possibilities. Authors who thought they understood the potential of online practice were struck by their students' and their own increased insight. The energy in these articles is palpable.

As you read about the journeys these educators took into rooms of different shapes, spaces, and sizes, we encourage you to look with new eyes and attend with open minds. Our hope is that the ideas presented in this edition of the Occasional Paper Series will encourage you to experiment with and document your own forays into online practice. We need more examples of teachers who have journeyed online to create constructivist classrooms and are willing to come back and share what they have discovered.

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Beyond a Digital Status Quo: Re-conceptualizing Online Learning Opportunities

Ellen B. Meier

According to the popular press and many policy pundits, online learning represents the next educational leap forward. Extraordinary claims have been made in the name of e-learning, including the assurance of educational equity, personalized learning for all, and significant cost savings for students — to name just a few. At the same time however, few policymakers are asking substantive questions about the educational nature of online learning environments. How are the classes organized, and what learning theories shape the design of these digital environments? What skills are needed to teach online and how are instructors prepared to teach in these new environments?

Online approaches are increasingly criticized because they often simply replicate current class structures, without taking full advantage of the affordances of technology or of the emerging understandings of learning (Hemmi, Bayne, & Landt, 2009; Watters, 2014). Over the last twenty years, researchers have advanced our understanding of the learning sciences, motivating educators to move from simple "transmission" teaching approaches toward the creation of environments that encourage learner-centered, knowledge-centered classrooms (Bransford, Brown, & Cocking, 2000). This shift has significant implications for online learning.

In the design of online courses, there are three critical questions directly related to this shift:

1. Is the course based on learning theories that reflect developments in our understanding of learning?
2. Does the course design reflect these underlying theories to address the needs of a range of learners?
3. Are instructors adequately prepared for teaching and facilitating in new learning environments?

These questions are key to advancing the field of academic online learning. Online programs that miss the opportunity to re-imagine online environments run the risk of codifying past educational practice in a digital form — merely digitizing the status quo.

Background

The recent growth in online courses for higher education has been explosive. In 2014 the World Bank estimated that the global online higher education population was increasing annually at a 25% rate, from 200 to 250 million (Johnson, Adams Becker, Estrada, & Freeman, 2014). As undergraduate and

graduate students continue to enroll in online courses, it is increasingly important for educators to address the question of the educational nature of the online experience.

One of the great promises of online learning is that more students — a broader range of students — will have increased access to higher education. These students must also have access to engaging online learning opportunities, which requires creating learning environments that can address a range of student needs..

Typically, higher education online courses are offered through learning management systems (LMSs), which most often structure a course by breaking up subject "content" into small pieces and supplementing it with additional activities (e.g., discussion boards) as part of the student-teacher interaction (Watters, 2014). On the one hand, this makes perfect sense; educators are repackaging traditional "chalk and talk" educational courses in a recognizable form, accessible to students who are not able to travel to campus, or who want to take a course not offered in their college or university. Materials are available any time the student logs into the course. Making courses accessible is desirable because the learning is not limited by time and place, giving students more options and opportunities.

On the other hand, simply providing access does not represent an evolution in education.

> *[O]nline learning has been poorly defined and theorized, with little explication of which pedagogies, approaches, tools and environments should be used, under what conditions, for the best results. (Harasim, 2012, p. 87)*

Putting traditionally organized classes online — classes that often follow a basic transmission approach to learning — fails to take advantage of what educators have learned about learning and the use of technology.

At the turn of the century, Scardamalia & Bereiter (1999; 2006) identified the importance of moving beyond a conceptualization of education as "knowledge transmission" to define education as "knowledge building." They stress the importance of students working together to address issues and problems of substance. They delineate a three-stage progression: knowledge acquisition, knowledge-building, and knowledge refinement, using scaffolding approaches to learning (Scardamalia & Bereiter, 1994).

Sustained knowledge advancement is seen as essential for social progress of all kinds and for the solution of societal problems. From this standpoint the fundamental task of education is to enculturate youth into [a] knowledge-creating civilization and to help them find a place in it. (Scardamalia & Bereiter, 2006, p. 98)

Students who are expected to "build" knowledge need different learning environments, however, from students in the traditional, more passive online role of knowledge consumers. In Scardamalia

& Bereiter's framework, students are considered to be active participants in their own learning, using technology to create learning communities. With help, educators can shift the learning paradigm to empower students as active knowledge creators

Many claims have been made about the benefits of online learning, yet few studies address the fundamental elements crucial to achieving paradigm shifts in online classes. These shifts are fundamental to address our changing expectations for learning (Bransford et al., 2000; Darling-Hammond & Bransford, 2005). Educators will need support in order to move away from "business as usual" transmission teaching and learning — away from digitizing the status quo — to build creative online learning opportunities for all students. More investment is needed to explore innovative digital environments that can scaffold knowledge-building effectively.

Definitions, Parameters, and Perspectives

Brown, Charlier, & Pierotti (2012) identified a total of 46 different, overlapping expressions used in descriptions of online learning. For the sake of this discussion, online learning is defined as an educational environment that uses technology to some degree to enhance learning. Online learning in this sense includes both "blended learning" (environments that use technology for some part of the teaching experience) and learning that takes place entirely online. Massive Open Online Communities (MOOCs) are not specifically addressed in this discussion because of the differences in scale. Although the general critique of online courses offered in this analysis may apply to MOOCs, the design implications may be different. Distinct design considerations may be necessary when building a learning environment for a class with thousands of students.

Assumptions about Learning

Learning theories are often implicit in the work of educators; this seems to be particularly true with online learning. Today's instructional designers, instructors, and even the learning management systems (LMSs) themselves incorporate a veritable potpourri of learning activities, typically without an explicit theoretical rationale.

In their seminal book on learning, Bransford, Brown, & Cocking (2000) trace the historical evolution of learning theories, from behaviorism, to cognitivist approaches, to constructivism. They explain that:

[T]he new science of learning is beginning to provide knowledge to improve significantly people's abilities to become active learners who seek to understand complex subject matter and are better prepared to transfer what they have learned to new problems and settings. (p. 13)

Various learning theories bring with them different ways of looking at the learning process and different approaches for using technology. Chris Dede (2008), drawing on the work of Dabbagh (2006), identifies these same three theoretical perspectives – behaviorist, cognitivist, and constructivist —

and describes the use of technology associated with each approach.

Behaviorist approaches assume a reality that is objective and external: learning is achieved through experience. Dede (2008) notes that, from a behaviorist perspective, the purpose of education is for students to learn to discriminate, generalize, associate, and automatically perform a specific procedure (p. 46), often through some sort of reinforcement. He identifies computer-assisted instruction (CAI), and learning management systems (LMSs) as closely associated with this behaviorist approach.

Cognitivist approaches, according to Dabbagh (2006) and Dede (2008), while also based on the assumption that there is an objective reality, assume that students acquire knowledge by building on "preexisting relationships among content and skills" (Dede, p. 48). Instructors present knowledge in ways that help students to retrieve and apply information, and to set their own learning goals and monitor their personal progress. Intelligent tutoring systems are an example of technology based on this cognitivist approach (Dede, 2008, p. 49).

Constructivist approaches assume that students themselves will create meaning as they actively work to integrate their experiences (Siemens, 2005). Students develop new knowledge based on their existing knowledge, including sociocultural perspectives (Dede, 2008, p. 50). They are motivated to learn because of curiosity, interest in the subject and the potential for exploration. Here, the learning activities are authentic, and the teacher serves as a guide. From this learning perspective, technology tools (e.g., science probes) often are used to do simple tasks to help students "focus on complex skills" (p. 52).

Scardamalia & Bereiter (2006) claim that they go beyond this constructivist approach, identifying students as active participants in the larger societal enterprise of building our understandings as a society.

> Knowledge building… represents an attempt to refashion education in a fundamental way, so that it becomes a coherent effort to initiate students into a knowledge creating culture. Accordingly, it involves students not only developing knowledge-building competencies but also coming to see themselves and their work as part of the civilization-wide effort to advance knowledge frontiers. In this context, the Internet becomes more than a desktop library and a rapid mail-delivery system. It becomes the first realistic means for students to connect with civilization-wide knowledge building and to make their classroom work a part of it. (p. 98)

From this perspective, students occupy the center of a learning process that includes all of society. The teachers have the important responsibility of scaffolding the learning. They consider the Internet critical to linking the students to resources, including content experts and peers. Learning is structured through thoughtful exchanges with the students, as students are helped to pursue their investigations, identify important data sources, organize the data, and present their iterative understandings of a problem — thus building their knowledge within a community of learners.

Some have credited Scardamalia & Bereiter with essentially defining a fourth, emerging learning theory for the twenty-first century. Harasim (2012), for instance, describes "Online Collaborative Learning" as a direct outgrowth of Scardamalia & Bereiter's work, which uses collaborative community tools in online environments. Others have named some of these same ideas "Connectivism" (Downes, 2004; Siemens, 2004). Kop & Hill (2008) note that Connectivism wants to be understood as "a learning theory for the digital age" replacing older theories that are no longer adequate to explain developments in learning (p. 1). The heart of Connectivism is the belief that knowledge is fluid and distributed among the online learning community, where individuals can work together on learning issues. Siemens (2004) argues that with the introduction of digital technology a new learning theory is needed:

Over the last twenty years, technology has reorganized how we live, how we communicate, and how we learn. Learning needs and theories that describe learning principles and processes should be reflective of underlying social environments. (para. 1)

However, there is ongoing debate as to whether the time is right for such a paradigm shift. Although the work of Siemens (2004) and Downes (2004), for example, reflects an attempt to use this emerging theoretical paradigm to better explain design considerations in online learning environments, others claim that further work is needed (Kop & Hill, 2008). Still others note that, "[Connectivism] is a tool to be used in the learning process for instruction or curriculum rather than a stand-alone learning theory" (Duke, Harper, & Johnston, 2013, p. 10).

In summary, different learning approaches lead to different uses of technology. An awareness of one's underlying instructional beliefs is critical for instructors and others identifying appropriate use of technology, particularly in learning environments where students are sometimes left with only the technology to guide them. What are the instructor's assumptions about learning, and how are these assumptions supported through the design of the overall experience? Beliefs about learning theory will guide the conceptualization of the learning process, shape the design process, and inform decisions made about the role of the instructor.

Centrality of Design

The design process is a second critical element in online learning. The overall goal is to identify and apply design approaches that allow students with various backgrounds to interact and build knowledge in ways that are equitable and personalized. Design choices are built on learning theories, so before designing, the theory must be considered (Bednar, Cunningham, Duffy, & Perry, 1992): "Instructional design and development must be based upon some theory of learning and/or cognition; effective design is possible only if the developer has developed reflexive awareness of the theoretical basis underlying the design" (p. 19).

Bell & Federmann (2014), in their review of three meta-analyses of e-learning studies, note that the "characteristics of the instructional design, such as the instructional methods used, the feedback pro-

vided, and the degree of learning engagement, create the conditions within which learning occurs" (emphasis added, p. 175). Wallace (2004) notes that technology all by itself does not "provide a map for its use… teachers in effect become curriculum makers" (p. 451).

If educators want to help students move from being merely passive consumers of information to being active learners, it is important to create environments where students can construct knowledge (Johnson et al., 2014). Based in part on Vygotsky's (1978) perspectives on the importance of scaffolding knowledge-building in social situations, Scardamalia & Bereiter (1999; 2006) emphasize the social nature of learning and introduce the idea of building knowledge in both face-to-face and online social situations.

Bransford et al. (2000) present an overall schema for a balanced "learning environment" which involves overlapping circles to capture learner-centered, knowledge-centered, and assessment-centered perspectives, all within a community circle. Although the authors note that the literature on learning does not provide "recipes for designing effective learning environments," they underscore the value of ensuring that these four perspectives are explicitly addressed in the design of any learning environment (p. 153).

Wiggins & McTighe (2005) provide more concrete design advice and establish "student understanding" as a learning goal. They define "understanding" as the ability to transfer knowledge to new situations and as "the ability to marshal skills and facts wisely and appropriately, through effective application, analysis, synthesis, and evaluation" (Wiggins & McTighe, 2005, p. 39). They contrast "understanding" with "knowledge" in a useful chart (see Table 1).

Table 1: Understanding vs. Knowing

Knowledge	**Understanding**
The facts	*The meaning of the facts*
A body of coherent facts	*The "theory" that provides coherence and meaning to those facts*
Verifiable claims	*Fallible, in-process theories*
Right or wrong	*A matter of degree or sophistication*
I know something to be true	*I understand why it is, what makes it knowledge*
I respond on cue with what I know	*I judge when and when not to use what I know*

Source: Wiggins & McTighe, 2005, p. 38

This explicit contrast of knowledge and understanding clearly establishes the importance of understanding and helps to define the need for developing deep content proficiency and insight, an appropriate knowledge-building goal for course design work.

Wiggins & McTighe (2005) propose a specific design process with understanding as the overarching

goal. This process, which was developed for instructors, has three steps:

1. the definition of an overall learning goal (framed with an essential question);
2. the definition of an assessment process (innovatively defined in six facets); and
3. a design of a learning environment that provides learners multiple entry points to address the learning goal.

The overall process aims to empower the student, as well as the instructor, to define the learning goal in this "backward" design process.

Even though this design process was developed for teachers teaching face-to-face, and not for online learning per se, it is a good example of a design framework for elementary- through university-level teachers and instructors. The authors claim that it represents "a way of thinking more purposefully and carefully about the nature of any design that has understanding as the goal" (Wiggins & McTighe, 2005, p. 7).

For designing online environments, Morgan & Adams (2009) contrast "first" and "second" generation design approaches, comparing the more common, didactic learning procedures ("start here, end there" in linear learning paths) to a "self-organizing" model that features an open-ended "ecology of content" (p. 136). The self-organizing approach encourages students to pursue non-linear learning. It can begin where the student decides (perhaps based on some assessed need), and proceed on the basis of student choice, allowing the learner to determine a non-linear learning progression (p. 137). The authors claim that their design provides a means of individualizing learning and puts more of the learning trajectory in the hands of the student (see Figure 1). Although from this perspective, the instructor is crafting the learning ecology for the student, subsequent design models might better reflect Scardamalia and Bereiter's more open-ended use of the Internet to provide even more student independence.

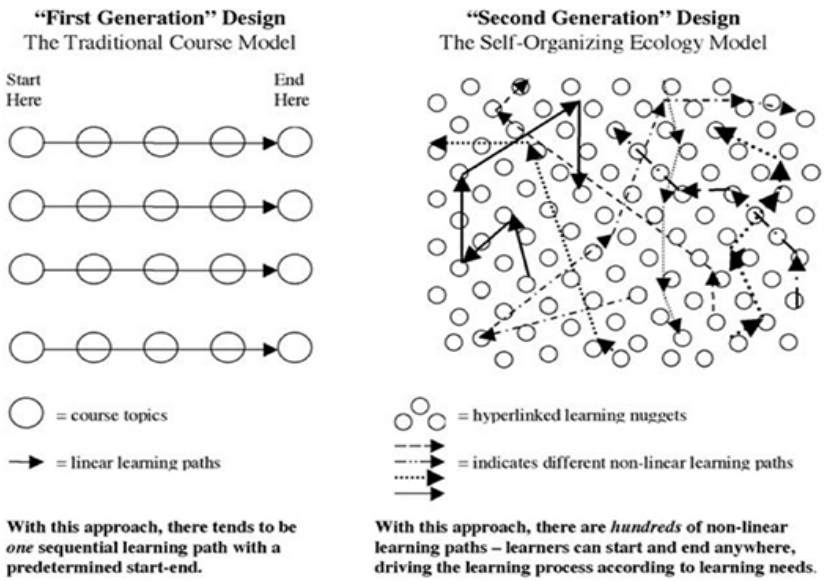

Figure 1. First and Second Generation Design (Morgan & Adams, 2009, p. 136)

Media Plays a Role

Media is a central aspect of online learning design. While an exploration of the contribution of multi-modal learning is beyond the scope of this discussion, it should be noted that pictures, graphics, and visual and auditory learning of all sorts can play an important role in the learning process, and could, from a design perspective, create more equitable opportunities for learning by providing different pathways, different mediums for learning. Malamed's (2011) recent work on visual language notes the importance of this "hidden language" and the importance of understanding how individuals process visual information. Assumptions about the learning process should come first, however, and guide the appropriate use of graphics, pictures, and auditory data.

Dede (2008), in his paper on theoretical perspectives that influence the use of technology, presents one other "instructional opportunity," a so-called "Next Generation Pedagogical Media" involving the use of media in new immersive technologies such as simulations and augmented realities. As technology continues to evolve, these new immersive learning interfaces provide exciting prospects for learning. However, the design of immersive technologies and their use will require the same thoughtful consideration of learning perspectives, lest these media be used in support of status quo approaches to learning.

Learning Platforms

In 1983, Richard Clark famously declared that, "consistent evidence is found for the generalization that there are no learning benefits to be gained from employing any specific medium to deliver instruction" (p. 445). Further, he claimed that media was simply a "neutral delivery system" that did not influence learning, at least as reflected in the research on outcomes. Students can learn with various media, such as iPads, Nooks, and Kindles, according to Bell & Federman (2013), however "Ultimately, research needs to move beyond the 'does it work' question toward a better understanding of exactly what does influence the effectiveness of e-learning and thus of the conditions under which e-learning is likely to be most effective" (p. 175).

Learning management systems encompass and define today's learning experience for most students taking formalized online courses in higher education (Means, Bakia, & Murphy, 2014). The LMSs effectively shape what is and is not possible to do online. Educators need a better understanding of the function of these LMS platforms — including their implicit assumptions about learning theories and design.

Audrey Watters (2014) is critical of the role of LMSs. Comparing them to "technological silos," she noted:

> *The LMS... has profoundly shaped how schools interact with the Internet. The LMS is a piece of administrative software... software that purports to address questions about teaching and learning but that*

> *really works to "manage" and administer, in turn often circumscribing pedagogical possibilities. (p. 19)*

For the most part, LMSs reflect traditional behaviorist transmission models of learning, as Dede (2008) notes, essentially recreating conditions in many face-to-face classrooms. The appeal of the LMSs to schools and universities is undoubtedly related to their replication of so many traditional classroom activities (Watters, 2014).

Going forward, it will be important to continue to investigate key design aspects of the online learning process. Anderson (2003), for instance, explored the issue of "interaction" and attempted to develop an "Equivalency Theorem" for online learning, putting interaction at the center of meaningful learning. According to Anderson (2003), getting the right mix of independent study and interactive learning activities can simply be seen as creating the highest possible interaction between student-teacher, student-student, or student-content work (p. 4).

Similarly, Deanna Kuhn, known for her work on inquiry and argument, recently wrote on the issue of collaboration, and the conditions under which collaboration can be judged as truly collaborative (Kuhn, 2015). Focused on a K-12 audience, her article "Thinking Together and Alone" ends with a critical research-based conclusion, with implications for older learners:

> *[I]ntellectual collaboration does not come naturally. A sociocultural perspective regards all individual cognition as social in origin (Vygotsky, 1978; Wertsch, 1979). Nonetheless, it is not enough simply to put individuals in a context that allows for collaboration and expect them to engage in it effectively. Intellectual collaboration is a skill, learned through engagement and practice and much trial and error (Ladd et al., 2013). p. 51*

Thus, many pieces of the overall design process and LMSs in particular bear closer scrutiny. LMSs continue to evolve and the assumptions about learning seem to be diversifying (Means et al., 2014). Even though a standard group of activities are still at the heart of the design process for most LMSs (e.g., video lectures or written presentations, discussions, quizzes, group work), there is discussion regarding the importance of building course materials *without* using an LMS, per se (Kroner, 2014).

Alternatives to Learning Management Systems

Not all educators working online assume that LMSs should be the organizing vehicle for their online class. A growing number have been involved in rethinking the online instructional process. For instance, Siemens imagines a more fluid structure:

In the learning process we need different cycles of scaffolding – there are times when you come across a new idea completely and you can't really create and socialize around it effectively because you just

don't know anything. So, there may be a cycle by which the learner follows a traditional structure or pathway but as soon as they become more confident they move into social and more emerging formats. (Siemens, 2014, para. 12)

Some pioneers, such as a group of researchers at the University of Alberta, Canada (Garrison, Cleveland-Innes, & Vaughan, 2015), are building new online spaces. They studied computer-mediated communication and created a model for developing a "Community of Inquiry" (COI) made up of three elements: cognitive presence, social presence, and teaching presence (https://coi.athabascau.ca/). The more complete model that has subsequently evolved is represented in Figure 2.

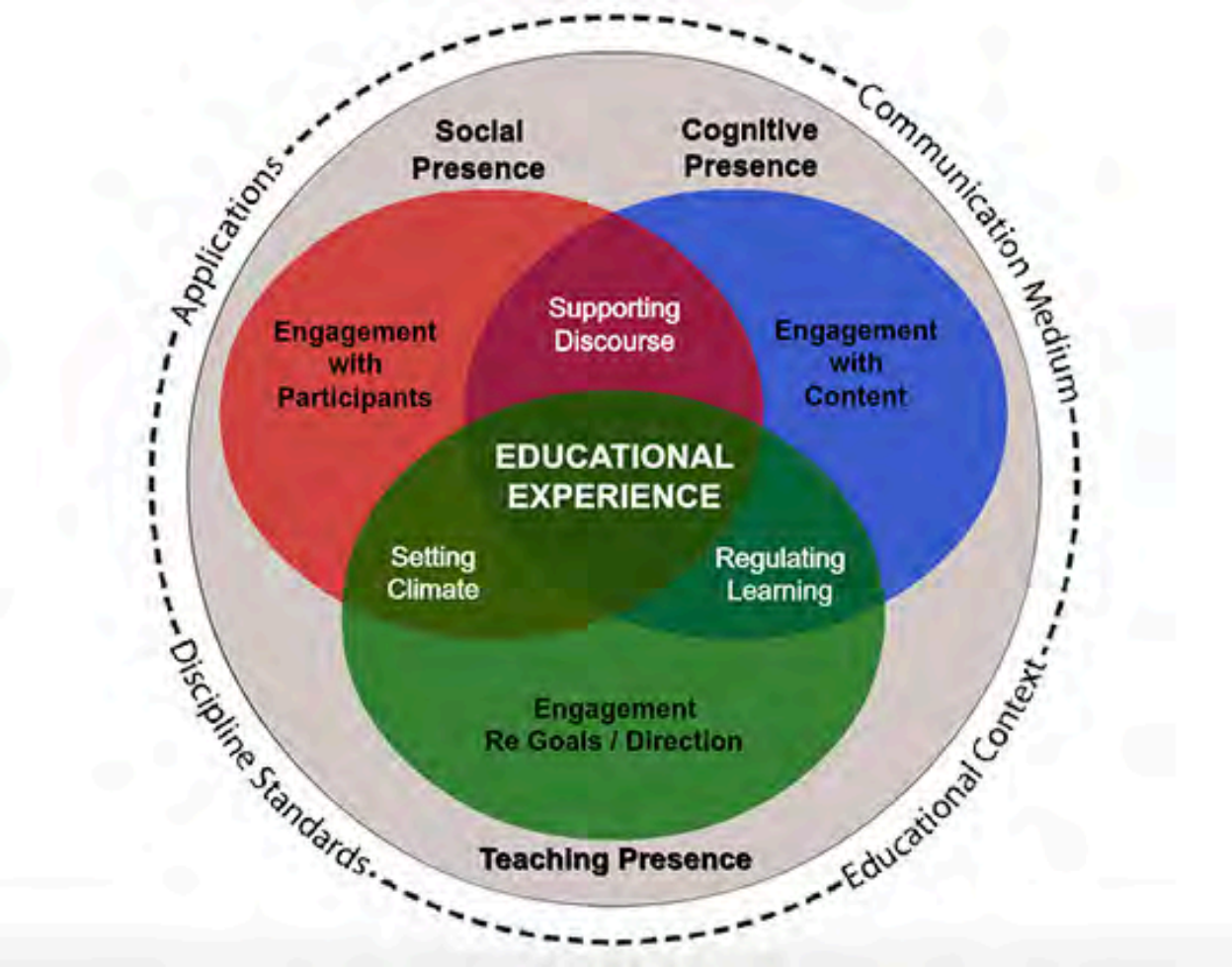

Figure 2. Community of Inquiry: https://coi.athabascau.ca/

Instructor Preparation

Online instructors play a central role in the effectiveness of online instruction. They provide the substance of the interaction, the course coherence, and the personal support for students that research has shown to be so important (Rose & Adams, 2014). Because of the many differences between face-

to-face classroom exchanges and asynchronous online interactions, important questions arise: What is the role of the online instructor? How does one organize the learning for the course, for the assessment? What is required to create a caring environment at a distance? How should instructors facilitate meaningful interactions between and among students?

Cheng (2015) explored the preparation of a group of world-language faculty members teaching online, and found that the training and instruction they were given for online teaching was limited. The instructors were not thoroughly prepared for teaching online. In the same way that technology is often introduced in K-12 schools by simply showing teachers where the "buttons" are, not how to teach with the technology (Meier, Mineo, & Cheng, 2013), online instructors are often introduced to the various parts and functions of the online platform with limited discussion of design or pedagogy.

Knowledge of design and pedagogy is an essential component of instructor preparation. Even if there was an expectation that instructors could design their courses within the framework of an LMS, few instructors have been exposed to different design approaches. Cheng (2015) found that the world-language teachers in his research sample had different understandings of what was meant by "instructional design," but that many of them felt that following a specific design might be too rigid and limiting. Traditional understandings of "instructional design" may differ significantly from more recent, open-ended design approaches such as Wiggins & McTighe's (2005) Understanding by Design.

Another key element of instructor preparation is the need to learn how to foster a dialogue between online students. Bolliger, Inan & Wasilik, (2014) note, "When designing an online course, one needs to keep in mind that the most important element is not the content but the interaction among course participants (Simmons, Jones & Silver, 2004)" (p. 184). The development of collaborative learning and dialogue is an emerging design aspect of effective online teaching. According to McAlister, Ravenscroft, & Scanlon (2004):

Structuring and guiding learners' dialogue can lead to clear and significant educational benefits, and further, collaborative educational argumentation is often essential to support the sort of deep dialogue that in turn leads to conceptual development and improved reasoning in learners. (p. 195)

Educational dialogue can be designed in a way that fosters student development of reasoning and critical thinking, by following logical questioning sequences with open-ended questions (McAlister et al., 2004). However, instructors must be prepared to create and implement robust online discussions: asynchronous online conversations require different techniques than face-to-face classroom discussions.

A third component of instructor preparation is knowledge of appropriate tools and methodologies. Historically, teachers have not been prepared to use technology effectively (Meier et al., 2013). Although many instructors use technology fluently every day, fluent use is different from knowing how to use technology to engage students in building knowledge (Meier, 2011; Wallace, 2004). Instructors and faculty need support in learning to use technology, but unfortunately, "we know much more about

how to insert technology into the curriculum as a generic topic and about software that affects student learning than we do about the teacher's role in using technology to mediate students' learning" (Wallace, 2004, p. 449). Teachers need an understanding of discipline-appropriate technology-based tools and resources, and an understanding of when and how to use them, which in turn requires content and pedagogical content knowledge (Wallace, 2004).

Finally, instructors require appropriate support in learning about design approaches. Ideally, a community of online instructors would be organized to discuss learning theories and design approaches. They would also pursue more specialized knowledge, such as how to encourage meaningful dialogue between and among their students. On an ongoing basis they would also be exposed to specific technology applications, learn to teach with them, and learn about emerging technologies.

Conclusion

New learning opportunities, supported by digital advances, require the close attention of educators. We need to continue to explore the unique properties, opportunities, and limitations of online learning. Researchers can contribute to a timely dialogue in three key areas: learning theories; creative designs for digital learning; and the preparation of online instructors. These areas are critical for evolving online environments that go beyond the digital status quo.

Educational optimists see online learning as a source of new, more equitable learning opportunities for a growing number of students. The reality is that students are not equally prepared to take courses online. If the goal is to give students agency and scaffolded support to build their knowledge in collaboration with others, then instructors will need help in learning how to design learning environments to address the learning needs of their students. To take full advantage of the learning potential offered by digital tools, design approaches must accommodate a range of learners and provide "an ethic of online pedagogical care" (Rose & Adams, 2014) for all students

Educators have an unparalleled opportunity to serve our students better, by shifting into new ways of working and empowering students to become knowledge builders who can contribute meaningfully to our democracy. The poet Brenda Shaughnessy says that:

"Change" can mean substitution rather than transformation (same person into another outfit or same amount, just quarters now instead of bills) or "the more things change the more they stay the same." But over time, right before my eyes, there are irreversible changes that have never occurred before — where it seems possible to grow, not just rearrange, to break patterns, not just replace. (Shaughnessy, 2015)

It is time now, in the words of this poet, not to rearrange or replace, but to break patterns — to define new learning environments that can provide meaningful educational opportunities for a growing number of students, opportunities that begin to redefine the educational landscape for a new generation of learners.

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Preparing Teachers as Literacy Leaders in a Hybrid Classroom

Tamara Spencer

Fully online and hybrid courses (a combination of online and face-to-face learning) have become an increasingly common approach to higher education, both at the undergraduate and graduate levels. With economic needs and the rise of digital technologies and communication, many colleges and universities have pursued these emergent forms of online education. Some researchers suggest that they result in the same or better learning outcomes (Bowen, Chingos, Lack, & Nygren, 2012) and increased access to more students at a reasonable cost, and that they improve the institution's financial stability (Fishman et al., 2013).

There are also critical considerations, as some note that institutional benefits are not being passed on to faculty, whose teaching loads and financial rewards are still based on traditional standards and criteria (Santilli & Beck, 2005). For teacher educators, online and hybrid courses pose particular challenges, as coursework often relies upon active participation, the demonstration of teaching practices, field based-experiences, and, in many cases, smaller class sizes.

Over my seven-year tenure at a large public university, my school has sought to expand online graduate programs and courses, identifying such measures as critical to the institution's long-term growth. Expanding course and program offerings to include online formats is described as an asset with a relatively lower cost and impact on the physical campus. As a result, the university has made great efforts to provide faculty with substantive professional development on online teaching and learning, many of which I have participated in over the years. Central to this professional development is the belief that Palloff & Pratt (1999) describe:

> *Electronic pedagogy is not just about fancy software packages or simple course conversion. It is about developing the skills involved with community building among a group of learners so as to maximize the benefits and potential that this medium holds in the educational area. (p. 159)*

My initial interest in trying out online and hybrid teaching came through my students. As an associate professor and the graduate program coordinator for the Masters in Reading, I regularly received inquiries from current and potential students about online and hybrid course offerings. In many cases, the students worked long hours during the day as classroom teachers and juggled evening graduate courses on campus, in addition to familial, economic, and personal obligations. They seemed deeply committed to their coursework and valued the academic and professional reputation of our program.

However, they struggled with the logistical demands and in some cases, worried that they would have to select a different university or seek out online coursework elsewhere to complete their degree.

I believe in a student-centered classroom—even with adult students—so I heard my students asking me how I might broaden my instructional approach to meet their needs and to reflect a broader societal shift in higher education. I ground my courses in both constructivist and culturally relevant pedagogy frameworks, and so I struggled to understand how such practices would translate into an online environment. In addition, while I am not a tech-troglodyte, I would not identify as a "techie" either and I had never given much thought to what my courses would look like online.

In this article, I describe and analyze how I developed a course that I teach in hybrid format—50% online and 50% face-to-face teaching—*Literacy in the Elementary Grades*. First, I draw upon two overlapping frameworks in literacy studies—sociocultural theory and new literacy studies—to describe the broader theoretical framework that grounds both the course design and the approach to literacy taken with the course. From there, I provide a detailed analysis of the course, the objectives, overall content and assignments, and how I modified the course to be hybrid.

I detail key aspects of the hybrid course that include: virtual groups and office hours, online tasks, group presentations and protocols, discussions, and tools. I then engage in an analysis and note several key observations and ways that online sessions and face-to-face sessions varied significantly in terms of group dynamics and discussions, the ways that course content expanded and shifted as online space afforded both myself and students "wiggle room," and the way that students' engagement with each other varied, depending on the nature of our work and the types of tools we used.

Sociocultural Perspectives on Literacy Learning

How I design my courses and choose content is informed by sociocultural perspectives on teaching and learning. Fundamentally, I ground my work in a *literacy as social practices* framework, a perspective that considers the authentic and purposeful ways in which people engage in literacy practices in their everyday lives. Such a perspective avoids a singular definition of literacy and instead requires educators to broaden their own teaching practices, as literacy knowledge is positioned as nuanced and varied.

I also ground my work in the principle of multimodal literacy practices "in which written-linguistic modes of meaning are part and parcel of visual, audio, and spatial patterns of meaning" (Cope & Kalantzis, 2000, p. 5). Harste (2003) argues that the meaning-making that grounds twenty-first-century language and literacy learning has expanded, not only in the form of reading and writing, but in the form of visual-text literacies.

While this theory has always been visible in the ways that I understood and taught K-12 literacy learning—encouraging educators to broaden what "counts" as text—it was less clear how such a theory might be directly connected to my own teaching. In fact, each semester, I found myself more perplexed as my students' use of smartphones and computers increased, despite disclaimers on my syllabi

and reminders throughout the semester that such practices were distracting. Moreover, they did so brazenly and nimbly, participating in class as they searched for content on computers to expand our discussion or texting each other notes about a project in small group discussions. Perry (2012) asserts:

> *Multiliteracies scholars do not reject print literacy, but they view it as only one form of representation and meaning-making among many—one that has been, and continues to be, privileged above other forms in schooling. (p.59)*

With irony staring me squarely in the eyes, I decided to rethink the content and delivery of my course in a way that would build upon the literacy practices that my students were bringing with them into the undergraduate and graduate classroom. However, before I could do that, I needed to revisit my key goals for them as future teachers.

Before deciding which of my courses I would move to online instruction, I needed to consider the principles that ground my beliefs and how to best prepare literacy teachers. Long ago, I understood constructivist principles to be most conducive to my work in classrooms. Specifically, learning happens within social contexts, as the zone between learner and teacher is dynamically drawn and redrawn through shared experiences (Vygotsky, 1962). As Rovai explains (2004):

> *The implications of constructivism for a learning environment include using curricula customized to the students' prior knowledge, the tailoring of teaching strategies to student backgrounds and responses, and employing open-ended questions that promote extensive dialogue among learners. (p. 81)*

Rogoff (1988) argues that learning within a sociocultural and constructivist framework is a collaborative process, yet collaboration doesn't have to be face-to-face. At the time, she argued that it could include endeavors such as letter writing and joint authoring. My hybrid and online teaching would need to somehow overlay a constructivist framework with emergent online teaching technologies. I would have to build a learning community that was grounded in shared experiences and circumstances in which our physical bodies were not always present.

Given the heightened attention on hybrid and online teaching, my university offered a variety of professional development opportunities and I took advantage of them. As a result, I developed an introductory understanding of our school's online course management system and the range of virtual learning environments, and learned how to decide if one's course should be synchronous or asynchronous. Consequently, I homed in on *Literacy in the Elementary Grades*, the second in a two-part undergraduate course sequence in which prospective elementary teachers explore key theories and methods for teaching literacy, with an emphasis on the intermediate grades. The following sections demonstrate how I moved this course from a face-to-face syllabus to a hybrid one.

From Face-to-face to Hybrid

Deciding to use *Literacy in the Elementary Grades* as the course for my first online experience was tactical. First, I had taught this course more than any other in my tenure and I was a lead architect in a content redesign of the course a few years earlier. I also chose it because I knew the content well. I had taught it both in a traditional semester sequence and in a more intensive summer schedule so I knew that the course was malleable. That is, assuming students were responsibly and regularly attending and participating, we could achieve our goals and objectives in a variety of ways.

Course Format

The first decision I made, in terms of my online teaching, was to offer the course during a four-week summer session. The schedule required students to attend class for long stretches of time, several times a week. I also chose a hybrid schedule, so that in any given week we would only meet one to two times and the remaining sessions would occur online. This is distinctly different from a traditional semester hybrid course, where there might be several weeks between face-to-face meetings. While content moved quickly, I wanted to ensure that there was never too much time between our face-to-face sessions.

Structurally, the next major decision I made was to offer the online sessions asynchronously, meaning we did not have to be present online during our scheduled meeting time. While my professional development included software programs that would allow for us all to interface and participate at the same time, I felt that these programs were not only glitchy but more compatible with a didactic or teacher-directed pedagogy. Thus, an essential realization included an understanding that the online technologies had to align with the face-to-face constructivist pedagogies that undergird my teaching.

Much like a K-12 classroom, in any given class period, my course time is divided so that there are ample opportunities for students to engage in whole class, small group and one-to-one interactions. In applying constructivist pedagogies to an online environment, I needed to consider how these principles would translate. That is, I needed to choose "technological tools" that built most naturally on our face-to-face practices—in other words, avoiding a technology-for-technology's sake mindset. Table 1 outlines the technological tools and their uses for different types of interaction in our online environment.

Table 1. Online Tools for Different Types of Class Participation

Instructional Configuration	Online Tools	Use
Whole Class Participation	University Virtual Environment Platform	Holds all course documents, session assignments, and announcements
	Discussion board	A place for posting questions or video responses for all students to ponder
	Session agenda	A dedicated link that provides a checklist for session activities and experiences
	Ask the Professor	A dedicated "space" in the virtual classroom to "raise your hand" and ask questions that all students can see
Small Group Participation	Group discussion board	A space for groups to answer focused questions, share ideas, and plan content
	GoogleDocs	A platform for creating shared documents and inviting others to collaborate or read
	Google email	To see when others are online and to use group chat feature and pages
One-to-one Participation	Google chat or face time	For office hours and to communicate with classmates

Choosing Content for Online and Face-to-face Contexts

My courses are grounded in sociocultural perspectives in literacy and a culturally responsive teaching framework (Villegas & Lucas, 2002). Prior to designing the schedule of online and face-to-face sessions, I made the baseline decision that certain conversations lent themselves better to online conversations than others. For example, early in the semester, we read Teale, Paciga, & Hoffman's (2007) work that complicates the longstanding notion of a "literacy achievement gap."

The authors acknowledge an "achievement gap" that warrants attention and concern. That is, data reveals that children from poverty backgrounds score significantly lower in literacy assessments than

those from middle- and high-income backgrounds and that this gap also correlates between African-American and Latino students and their respective White peers. However, Teale et al. (2007) critique the notion of an "achievement gap" in the absence of a conversation about the huge "curriculum gap" in U.S. schools. Rather, a standardized-testing culture, coupled with curricular policies that privilege reductive interpretations of basic reading and writing, create classrooms that lack rich comprehension, content area, and writing instruction.

While the Teale et al. (2007) article focuses on standardized testing, in my experience, students tended to focus on deficits and presumptions about urban families and home literacy practices. As such, our face-to-face conversation required a tremendous amount of questioning, pausing, redirection, reflecting, and reconsidering of content. While it is possible to engage in this type of conversation online, it is more difficult because you are unable to read body language, gauge feelings, notice silence, and react in real time.

However, there were other instances when I found that conversations readily translated to online spaces. For example, one assignment in the course requires students to participate in a group project, teaching and demonstrating a reading comprehension strategy to their classmates. When I teach this course face-to-face, I find that most students give PowerPoint presentations that are closely connected to the course readings and they rarely veer off this script.

When I teach the course in hybrid format, I require students to create a multi-author presentation (e.g., a Google doc) and embed videos, images, content links, and demonstration videos of themselves teaching others to use this strategy. While this is initially daunting, the assignment invariably generates higher quality work than the traditional assignment during a face-to-face course. For example, students embed videos of themselves modeling reading practices, sharing self-histories of their own struggles learning to read/write, or act out humorous parodies that apply popular culture references to our course content.

Student evaluations regularly reveal that the assignment taught them a lot about multiple-author writing tasks, technology, and the actual content--reading comprehension. In addition, as the instructor, the students always add me to the shared document as an author. As a result, I have the opportunity to witness their learning process through tools like document history, text chat-features, and group meetings. This insight into student learning is rarely afforded in a traditional classroom group assignment.

Opportunities Afforded by a Variant Course Model

One of the biggest surprises that emerged from teaching the course in hybrid format was the rich community that we were able to create, despite the difference in face-to-face time. Each semester, I revealed to my students that I was learning the technology for this course alongside them. Therefore, students regularly saw me take a learner stance—calling University Technology Services when I did not know the answer to a question, making mistakes here and there, face-timing at all hours of the

day from our respective homes—a perspective that complicates the traditional professor/student relationship. As a result, the students saw me make mistakes, reveal gaps in knowledge, and engage with new technological content willingly. Because of this model, the students took up these same practices more readily. However, students did not distinguish between the content of their inquiries—their communication and questioning extended beyond technology into the content of the course, their professional ambitions and work, and general and personal experiences.

For example, in one exchange on the differences between phonemic awareness and phonics—linguistic components of oral and written language—the students shifted this conversation to one on the content of their standardized tests (the PRAXIS exams), which included these topics. They noted how such topics appeared on the test, but they were also quick to note that such exams failed to assess other theories and perspectives in literacy.

This is not to say that this type of community doesn't exist in my traditional courses; however, there does seem to be a different tone than in others I have taught. The conversation extended for several threads and students provided links to each other to explain information—interactions that would be less likely within the already time-stretched agenda of a weekly face-to-face session. I also feel that students learned more about me, through open access to my online social networks (e.g., Google platforms, Facebook). For example, my social media platform reveals images of my family, the types of ways that I spend my leisure time, musical taste, etc.—information that is less likely to arise in a traditional course.

Another way that we build community is through our critical friend groups. During online sessions, students are directed into group conversations with the same peers and while not required, they tend to sit with each other in the face-to-face meetings as well. I have found that students are comfortable engaging deeply with course content and readings in these groups. Because writing and communication online is fully visible, I find that I "hear" a more diverse range of voices in online sessions. In addition, students seem more willing to challenge each other's perspectives and/or raise questions in response to what another has said. For example, students use language like "I disagree…", "Where did it say that?" or "Could you say more about that point?" in their online writing. One hypothesis is that they do not want to appear as if they are expressing the same point as a previous poster. Or perhaps the communication practices of online spaces differ from those within a physical classroom community. As the professor, I find it easier to step back and watch the students lead each other through critical or challenging conversations online than it is face-to-face when some students invariably talk more than others and discussion questions are redirected towards me, whether this is my desire or not. Online, I can watch and wait for others to chime in, one of the affordances of an asynchronous class session where the notion of "class time" varies.

Tensions that a Hybrid Course Presents

I have emphasized many of the benefits associated with moving *Literacy in the Elementary Grades* into

a hybrid framework; however, this type of teaching also poses unique challenges. In face-to-face sessions, the vast majority of our conversations involve oral communication, which includes gesture, intonation, expression, and situates context and discourse communities (Gee, 1996). However, online teaching involves significantly less oral communication. Rovai (2007) argues:

> *The defining characteristic of an online constructivist learning environment is discourse, typically in the form of online discussions. Discussion provides learners with opportunities to write, and in doing so, reflect on course content and previous postings by members of the learning community. (p. 78)*

If discourse is central to a constructivist online learning environment, online communication and what it looked like in my course required serious thought. Therefore, I built on Rovai's principle and also made the discourse practices of our online writing communities explicit. For example, students initially would respond to a question in formal prose, respond in multiple paragraph form, and cite readings to support their ideas. These practices are commonplace in academic writing; however they generate less dialogue and are difficult to translate into authentic communication practices online. Large blocks or quotes and citations typically led to less commentary or online discussion.

Therefore, in our first session, I explained (and modeled) to students, that posts should speak to ideas that were of interest to them, complicated, and/or worthy of further discussion. Posts were not an assessments of their summarizing skills but instead, responses should be a place for them to raise issues publicly and look to see how others are responding to selected texts and engage in conversations accordingly. I spent a significant amount of time in the semester talking to students about how we respond and raise questions during our online sessions. I'd end my posts with informal expressions: "What do ya think?" "Others?" "Thoughts?" I hoped that students might see how my own vernacular varied in our online discussions.

In addition, we would engage in face-to-face practices that addressed discourse, studying the ways that we communicated and attempted to translate communicative tendencies into online platforms. For example, I would ask the students to analyze a conversation we had online and discuss why they thought the conversation went well. I would also encourage the use of visual representations of knowledge or links to additional web resources to respond to each other.

Often, students would point out resources online that had practical use. At times, these links would demonstrate the multilayered experience we were having face-to-face and through more typical, informal online tools, as in the example below, where a student shared a lolcat image (imgflip, 2015). He built on the group discussion of phonemic awareness and phonics. His post was playful, yet also a recognition of the hybridity of the learning experience in the course, adapting online discussion tools to suit our intellectual needs in the course.

If discourse is the heart of constructivist teaching (in online communities), as Rovai notes, then our discussions very much built on our experiences, the communication norms and content we valued, and the available forms of discussion that our hybrid class provided.

And yet, the online format could not supplement a number of meaningful in-person practices. For example, children's literature and artifacts from elementary classroom practice weigh heavily in my face-to-face teaching, and are more difficult to bring into online teaching. Children's literature—specifically, picture books—provide a powerful space for authentic communication and inquiry in graduate courses, and require a type of communicative multimodal inquiry that is lost online.

It is nearly impossible to pour over a book's images "together" online. In addition, when it comes to actual examples of children's writing or artifacts from classrooms, these too involve a degree of physicality that lacks substance when I attempt to mirror them online. Moreover, my own ability to model the instructional practices that might accompany such materials—i.e., participating in a "read-aloud" or a writing workshop lesson—is reduced when I attempt to replicate them in online spaces. For example, providing a video of myself reading a text or even pointing to a read-aloud of a text on YouTube does not compare to the shared reading experience we might have in a face-to-face class.

Other resources do readily translate to the hybrid format. Chapter books, online texts (for children), and video clips from classrooms all translate effectively and provide additional evidence to support online discussions and assignments. In terms of online materials, students were also more likely to cite the work of other teachers—lesson plans, classroom websites, Pinterest pages, blogs—in their discussions online.

Over the course of a semester, our understanding of technology and our own learning were powerful and collective. My students and I collectively commented on our growth and were able to engage in metacognitive practices that provided an analysis of our development as learners. And yet, students were far less likely to see how such practices might translate into everyday K-6 teaching practices. Rather, literacy pedagogies in schools continue to privilege traditional notions of print and text.

Marsh (2007) argues convincingly that, "Because of the range of learning opportunities presented by digital technologies, new pedagogical approaches are needed in schools if the curriculum is to be sufficiently engaging and appropriate for children and young people" (p. 267). When students did mention technology in classrooms, the conversations tended to emphasize software or the use of iPad apps; however, as Lankshear & Knobel (2006) note, technology in today's classrooms requires an entirely new worldview. As such, considerations of how we might use technology in classrooms complicate not just how we think of technology and children, but our beliefs about literacy as a whole.

Conclusion

As I reflect upon my experience translating *Literacy in the Elementary Grades* into a hybrid course, I see great benefits beyond the economic benefits of hybrid or online courses in university settings. How-

ever, being committed to new literacies is not enough. As Millis (2010) states,

> *Application and execution . . . remain key issues for faculty. Even faculty who are philosophically committed to the new paradigms often lack the know-how to successfully adapt the teaching techniques and classroom management practices that can lead to more learning-oriented approaches. (p. 1)*

Thus, one critical factor to my future success as an online educator is a need for ongoing professional support on these tools and technologies. Karchmer-Klein & Shinas (2012) note: "One can never know everything there is to know about technology. Instead, we encourage you to focus your efforts on your own professional development by maintaining a finger on the pulse of technological advancements" (p. 288). Indeed, it was this type of intellectual curiosity that first brought me to teach in online settings. However, it was equally my commitment to using a constructivist framework.

A principle assumption of my teaching is the belief that I have to build upon the knowledge and resources that my students demonstrate in our classroom. As the number of online and/or hybrid learning options increase, so does the importance of considering practices that mirror high-quality, student-centered, and authentic learning practices in these emergent technology settings. As I look to future online teaching, I would like to continue to engage students in critical conversations about how we might better align their students' multiliteracies and technologies with their work in K-12 schools.

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Fostering Student Engagement: Creating a Culture of Learning Online

Robin G. Isserles

I have been teaching at the Borough of Manhattan Community College (BMCC) in New York City for 15 years; since 2004, I have taught at least one class online each semester. Before I began teaching online, my greatest reservation was whether I could recreate the kind of culture that so often develops in my onsite classes. By culture, I mean a familiar group with its own norms and patterns of behaviors. Influenced by constructivist theorists like Dewey (1916) and Bruner (1996), and by an understanding of the social and relational aspect of learning, I have always depended upon the familiarity of names, voices, and the physical space of the classroom—what Jaffee (2003) calls the "pedagogical ecology" (p. 228) to enhance the learning process.

In addition to fostering the general culture that evolves in the classroom, familiarity promotes a culture of learning, which I define as the social experience of being a student: a shared understanding of expectations, diverse backgrounds, and goals; a respect for one another and the learning process; and an intellectual curiosity to move beyond where one was when one entered the classroom. A culture of learning both requires and reproduces the active engagement and thoughtful participation of students as well as their ability to take ownership of their own learning and to think critically about it (Freire, 1970; hooks, 1994). In describing the importance of mutual learning cultures, Bruner (1996) states, "[t]here is a mutual sharing of knowledge and ideas, mutual aid in mastering material, division of labor, and exchange of roles, opportunity to reflect on the group's activities" (p. xv). These discussions centered on the brick-and-mortar classroom. I wondered whether such a learning culture would be possible in a community college course online, and, if so, how.

To answer these questions, I analyzed student work from my online Introduction to Sociology classes over two semesters. I focus primarily on the discussion board—a format that allows an asynchronous online course to mirror the type of discussions that occur in a brick-and-mortar classroom. Although there are other tools that may provide useful sites of research, such as wikis and blogs, this analysis centers on the discussion board because it is a prominent feature in my online courses. Using grounded theory (Glaser & Straus, 1967), as patterns emerged from student posts to the discussion board, I have developed four interrelated categories illuminating essential aspects of a culture of learning. Much in the way that sociologists define culture as a way of life— a set of norms and values of a particular group—these four categories represent a set of norms and values that are essential to fostering student engagement in online settings. In fact, the structure of the online asynchronous classroom arguably facilitates the emergence of this culture, especially as it limits the teacher's role to that of "guider and enabler" (Bruner, 1996, p. xii) of discovered knowledge.

Students At BMCC: Some Context

In 2009–2010, when this study was conducted, there were 21,424 students enrolled at BMCC. According to the BMCC Factbook (2009-2010, p.24), 59.6% of the students were women and 40.4% were men, with a median age of 22 years. Approximately 70% of the students identified as Hispanic (37.7%) or Black (33.5%); most of the remainder identified as Asian (14.6%) or White (15.0%). Close to 15,000 students qualified for federal Pell grants.

Thus, the majority of those enrolled were students of color from low-income households. Many were the first in their families to attend college. Most were employed either full or part time, took on courseloads of 12 credits or more, and had the responsibility of caring for family members—children, grandparents, nieces, nephews, or younger siblings.

This context is important for a few reasons. A recent report shows that half of all community college students have taken online courses (Public Agenda, 2013). However, although a few studies, including Brown (2011) and Xu and Jaggars (2014), have been conducted on the online experiences of community college students, that research tends to be quantitative and focus primarily on course outcomes like GPA and attrition. Other studies (Bambara, Harbour, Davies, & Athey, 2009; Jaggars, 2014) have tried to look at student engagement and general attitudes toward online classes, but that research tends not to focus on the type of learning that takes place. Given the lived realities and multiple identities of most community college students, their experiences with online learning must be at the forefront of the research. Thus, I hope this study can enhance what we already know about those experiences.

Structure of the Distance Learning Course

I use the learning management system Blackboard© for my Introduction to Sociology course. Weekly assignments are announced on the opening page of the class site. In addition to readings and interactive lecture notes, a central feature of the assignments is the discussion board. For each unit, I post questions similar to those I ask in an onsite class. Students must then post a substantive response to my question as well as to another person's post. To help students understand the expectations, I provide examples of what I mean by substantive. During the first few weeks of the course, as students are getting used to the format, I also continue to highlight examples of substantive posts and responses. I send private emails to students who are not engaging substantively with the material and refer them to certain posts as examples of what they should be doing. This does seem to help those students who may be new to online courses; once I send these emails, I generally see improvement in the substance and detail of the students' posts. In fact, the primary reason students do not perform well on the discussion board component of the course is failing to submit work, rather than submitting posts that are not substantive.

All of the students are expected to read all the posts and all the responses to the discussion board, and I set deadlines for each post required throughout the week. For example, by the first half of each week, students must submit a post that addresses that week's question and then respond to one

other person's post by the end of the week. To ensure that students are able to read all the posts and responses coming in each week and still have time for the weekly course readings, I require only one response. Given the class size of 25, students have to read at least 50 entries each week. With all their responsibilities, the time these students have to devote to each course is constrained. Thus, I strive to organize the course in a way that maximizes participation and learning without overwhelming the students. In fact, once the week is over, the discussion boards are closed so that the students can concentrate on the new material.

After the midweek posting deadline, I summarize what the students have generated, often using direct quotes from their posts to reinforce or examine key ideas. When appropriate, I also respond to individual student posts, providing positive reinforcement, follow-up questions, or clarifications. Outside of this, I keep my involvement to a minimum, modeling the teacher as a "skilled facilitator" (Clegg & Heap, 2006, p. 5 with a "restrained presence" (Vandergrift, 2002, p. 83 who guides the learning (Bruner, 1996). I consider much of this an online version of what I do in the brick-and-mortar classroom.

The facilitator role that I assume enables the students to lead the discussions, giving them the sense that the classroom is their place of learning. As Scarboro (2004) writes, "[s]tudents are responsible not only for their own learning and achievement but also for that of the class as a whole. The professor relinquishes the dictat role and joins the students, now as a participant" (p. 226). In fact, very often students will refer to my summaries in their responses, using some of the ideas as ways to develop their own. Moreover, reading their posts and responses gives me the opportunity to develop better, more engaging questions. Based upon their posts and the questions they raise, I am able to assess their level of understanding of the content. This helps me to redesign how I am communicating the ideas to them. I argue that these aspects have particularly important pedagogical implications for enabling students to develop and sustain a culture of learning as well as for creating a constructivist learning environment online.[1] Thus the discussion board, where written questions are posed and students are encouraged to write thoughtful responses as well as ask to more questions, is especially helpful in the construction of knowledge (Bruner, 1996), both the students' and mine.

Four Categories Of A Culture Of Learning

In this section I describe four interrelated categories that embody a culture of learning. In this sense, the online class has been transformed into what Bruner (1996) would call a "subcommunity of mutual learners" where "learners help each other learn, each according to her abilities" (p. 21). Bruner believes that in such a community, students gain not only subject mastery of course content, but also good judgment, self-reliance, and the ability to work well with one another. In the next section, I offer some examples of students' posts that exemplify these categories.

1 It should be noted that Jaggars (2014) found that some community college students whom she interviewed expressed that they "taught themselves" (p. 27) the course material, suggesting that they did not experience some of these more positive student-directed experiences.

I call the first category *valuing the learning process*, defined as an expression of intellectual curiosity and self-reflection. This could take the form of students posing questions that take a concept or idea to the next level of abstraction or following up a question with a more complicated one. When one values the learning process, one is comfortable with changing one's mind or rethinking something using the conceptual language of the subject matter under consideration. There is an expressed respect for learning as an enlightened endeavor, not merely focused on outcomes; its importance and meaning is derived from an appreciation of the process itself.

A second category that emerges from the posts is *valuing collaborative learning*, defined as the importance of meaningful exchanges between students. In an onsite class this is often fostered when students work on a learning activity together in small groups. In this online class, it happens through students' responses to each others' posts. Often a student will build upon what another student has posted in order to further clarify the point. In doing so, students recognize what they have learned from someone else.

Related to this is the third category, *ownership over knowledge production*. Much of what students are learning is self-directed and demonstrates an active engagement with the material. This is revealed when students make connections to relevant ideas or concepts that they have learned in other classes or when they offer links to websites that relate to the topic. It can also be found in posts that draw on students' own experiences that affirm or negate the theory, concept, or idea under examination.

The final category is *thinking critically*. On the discussion board, students express what was difficult to understand, reflect on a reading, evaluate the ideas put forward, and/or see things from multiple perspectives. We can see this deliberation in the ways that students frame their posts, using phrases such as "What I don't understand is," "I'm not sure if I agree with that because," or "Does that mean then?"

These four categories represent the norms and values embodied in a culture of learning. When students value the process of acquiring knowledge and skills, they draw on the contributions of others. In doing so, they stake a claim in their own learning process, enabling them to think critically about what they know as they take in new ideas.

Documenting The Categories: Working With The Data

As stated above, the data presented in this study come from student work in an asynchronous online course (Introduction to Sociology) during the Spring 2009 and Spring 2010 semesters. The students in the classes signed an IRB approved consent form allowing me to include their posts or responses in this study. Out of two classes of 36 active students[2], 21 students granted their consent (58%). Pseudonyms are used to protect the anonymity of the participating students. I have not corrected any

2 Despite the aforementioned 25 class cap, there is a great deal of attrition in online courses, as has been documented elsewhere. Feedback from students confirm that one primary reason for withdrawing is that they were unaware how much work was involved in an online course and could not manage it with their other classes and responsibilities.

spelling or grammar, as I want these posts to reveal the students' authentic expressions, though I have edited down some of the passages for readability.

I begin each semester with an icebreaker. For instance, I ask students to share a brief summary of a movie they have recently viewed and their reactions to it. This sets an inviting tone and allows me to comment on how so many of the movies they discuss deal with sociological concepts that we will cover over the semester. As we move along and the students are introduced to those concepts, my questions become increasingly analytical, enabling the students to incorporate the ideas in deeper ways. For example, the question on gender socialization (see category II, valuing collaborative learning, below) asks the students to apply the concept of socialization which they learn in the second week of class to the ways in which we learn the norms and expectations of gender, a topic covered later in the semester. Many of the questions pertain to theories introduced in a chapter or readings that were assigned, and students are asked to draw on their personal experiences that relate to the concept or theory under review. In this way, students develop what we refer to as a sociological imagination (Mills 1959): the ability to see how one's personal experiences are enmeshed in larger social forces.

Category I. Valuing the learning process

Discussion board question: After reading the article by Deborah Tannen, share with us your reactions. What does this piece show us about the power of gender? If you can, include an example of a conversation you have had with a significant other or close friend or family member (or one that you have been a witness to) that is represented in this piece.

Student post: Reading Tannen's research was eye-opening for me. While reading it, I thought to myself that by studying and understanding gender differences in communication so many misunderstandings could be avoided…Tannen's Independence vs. Intimacy example made me smile, because that exact same thing happened to my husband and I. (Marisol)

Discussion board question: Be sure to read pgs. 175–182 in the Kimmel (2009) textbook and the lecture notes. Choose one theory of deviance or crime that you found interesting and discuss why you thought it was interesting. Did it change the way you thought about deviance or crime? Did it confirm what you always thought about deviance and crime?

Student post: One theory in this chapter that was fascinating to me was Emile Durkheim's argument for the necessity of deviant behavior. Durkheim argues that deviance helps society acknowledge what social norms and values are acceptable and those that are not; it shows us that we can not judge something as good without knowing what's bad, …. The entire chapter gave me a different outlook on deviant behaviors and criminal activities and I understand that all crimes are not committed by criminals. A man that is stealing food from the 7/11 convenience store may be trying to feed his wife and children, the stealing is a crime but I do not see the criminality in feeding a family. It is society's judgment that condemns us. (Nathan)

Analysis: Frequently I find that in their posts, students say that what they have read was "eye opening." Phrases like this represent intellectual curiosity and respect for learning as a process. In several of these examples, this appreciation is noticeable; the students provide thoughtful, self-reflective responses to my questions, sometimes taking concepts and ideas to the next level of abstraction and/or rethinking something using the conceptual language they are learning in the course.

Marisol revisits personal experiences using a deeper sociological understanding of gender not as a biological fact but as a social construction. She shows how our behaviors are affected by profound beliefs about gender and gender roles. Nathan draws on classical sociological theory to enrich his understanding of deviance, viewing it as a socially constructed process and appreciating how his thinking has evolved and matured. As both of these cases demonstrate, the online format allows students to deepen their appreciation for the process of learning.

Category II. Valuing collaborative learning

Discussion board question: Think about a specific example from your childhood or adolescence when you were taught the appropriate expectations of your gender, what the authors call "boy and girl code." What were the circumstances? How were these expectations expressed to you? Was it from your parents or family members, peers, members of the opposite sex, teachers, etc.? Describe how you were rewarded for acting according to these expectations and/or how you were "punished" for not acting according to these expectations.

Student Post: There was one day I recalled I was sitting down but I turned to speak to my cousin behind me. The next thing I know, I received a slap on the leg, got shushed, and was told "close your legs!" I turned around and did what I was told. On the way home my mom made it clear that little girls and women should not sit with their legs open. There was no rewards for sitting like a lady but there were repercussions such as spankings from everyone who knew you, from in church until you got home. (Francesca)

Response to Francesca's post (1): I can relate to your experience, it was not only my mother who would say that it would be teachers and relatives, but it was the same message they were trying to get through to me, girls don't sit like that, it was inappropriate and not lady like. I agree with Marisol too when she wrote that the way a child acts could be a reflection of the mother herself. With so called inappropriate behaviors, a mother would not want to be associated with those behaviors. This may be the reason that parents become so concerned with how their child whether boy or girl appear or act, they want them to act according to their gender and what is the norm of their society. (Bari)

Response to Francesca's post (2): It's funny that most of us "girls" chose this same issue. It takes one generation to make a difference, but bold moves have to be made. I've often dressed my daughter in a way that was disapproving of my mother and her paternal grandmother. I didn't like frilly dresses when I was younger and I didn't like her wearing them. Her hair had to be neat or I would get this response, "What would people think?" and "I never allowed you out of the house with messy hair."

(Simone)

Analysis: This exchange demonstrates a command of the sociological concept of gender socialization. In addition, it reveals the students' profound respect for one another as learning partners. It is clear that students were learning from and with each other. In response to Francesca's post, as well as Marisol's (not included), Bari analyzes the meanings behind the symbolic directive of sitting with your legs crossed, suggesting that mothers see their children's behaviors as a reflection on themselves and their parenting—a powerful aspect of the way in which motherhood is understood and practiced. Bari further enlarges the world of social influences, including teachers and extended family members as active agents of socialization—another context within which we learn the norms and expectations of our gender. Simone notes the common gendered experiences among so many of the women who had posted, writing about how she is raising her daughter differently, much to the dismay of her mother and grandmother. Her post also expresses the idea that while socialization is a powerful force influencing our behavior, these expectations and gender codes are malleable—an important aspect of understanding how gender is socially constructed. In this way, the students clarify this newly learned concept for each other, acting as much as teachers as learners. They acquire content knowledge through building relationships with others, reflecting a reverence for the collaborative process.

Category III. Ownership over knowledge production

Discussion board question: For this post, I would like you to discuss one topic that you read about in Chapter Eight (Kimmel textbook or lecture notes) that you found interesting, alarming—something you didn't know before. Briefly discuss this idea in your post (include page numbers so everyone can re-read if necessary) and share with us why you were interested in this idea. What questions does it raise or answer for you about the way we understand race and ethnicity sociologically?

Student Post: The one thing that stood out to me was Selective Perception…when someone who is prejudice comes across a minority person who contradicts the stereotype, they are viewed as an exclusion. As I read the lecture it brought many conversations I have had with people who would talk about certain types of people but it seems that they know of some one from that group but they always make an exemption for that person because he or she is different… For example I know someone who always has something to say about Dominican people, so I questioned her one day and asked her why she has negative things to say about Dominican people knowing her best friend is one. Her response was that her friend is not like the rest of them. She really contradicted herself that time. (Jazmine)

Discussion board question: Please go to: https://www.youtube.com/watch?v=TYIh4MkcfJA and watch this video on Dr. Asch's experiment in social psychology (1955, p. 79 in Kimmel textbook). What does this experiment tell us about human social behavior? Can you think of an example where you were influenced by the "will" of the group to do something against your better judgment? What happened? What were your reactions to this experiment?

Student post: What this experiment tells us about human social behavior is that humans want to

be accepted in society and will sometimes go against their own better judgment to do so. However, humans would adjust their social behavior for different reasons, whether it is to save them from embarrassment, to appear intelligent or just simply to fit in. It was only last Friday when I was influenced by the "will" of the group. In my Creative Writing class the Professor called on one of my classmates and asked for his interpretation of the story. I agreed with his interpretation one hundred percent, however, when the professor asked if anyone agreed with him and I saw no one put their hands up, I kept my hand down too. It turned out that we were right and I felt stupid for denying my better judgment. I laughed at this experiment because it is so true; it definitely reminded me of my own episode last Friday. Groups are extremely influential, more so than one would like to admit. (Zamaris)

Analysis: In these two posts, the students are becoming enculturated into the practice of sociology (Brown, Collins, & Duguid, 1989). That is, they are demonstrating a clear understanding of the subject matter, but even more importantly, of engaging in sociological inquiry. This new conceptual language is not merely taught to them; they are learning important sociological concepts in the context of what sociologists do and think. Jazmine explores a meaningful concept, selective perception, that she found interesting by writing about an exchange with her friend who expresses the concept. And Zamaris is able to make sense of the influence that the group has on our behavior by connecting a recent experience she had in another class to Asch's (1955) classic experiment on group conformity. In both of these examples, the online discussion board is enabling an essential component of constructivist learning.

Category IV. Critical thinking

Discussion board question: After reading the three readings from the The New York Times Class Matters Series, write your reactions to all three readings. What did you find interesting, disturbing, shocking? What did you learn that you didn't know before?

Student post: While reading the statistics and the different theories explaining why one might be poor I was angered even more, words used like "lack of will, drive and discipline or nothing can change because there is nothing to strive for. I thought of the struggles I have experienced and friends that have it even harder. None of us lack in drive, discipline etc... We have even more to strive for, but the less money you have, the more you have to work and certain opportunities are passed by...There was an interesting theory I read in my psychology class… "Maslow's Hierachy of needs" …. A lot of this theory was maybe a little unbelievable for most of us, but after reading chapter 7 and the many theories behind social class, I couldn't help but go back to this theory. Our basic human needs is food, shelter, safety and water... If faced to struggle for these basic needs, an individuals time might only be spent trying to to meet these very basic needs to survive. Education, "savings" (that was laughable) and other needs to bring a person out of poverty and into working class or middle income is much harder to achieve. This is when you can see the inequalities that exist in our country and many others. (Yanna)

Discussion board question: Be sure to read pgs. 175–182 in the Kimmel textbook and the lec-

ture notes. Choose one theory of deviance or crime that you found interesting and discuss why you thought it was interesting. Did it change the way you thought about deviance or crime? Did it confirm what you always thought about deviance and crime?

Student post: Before reading about the Conflict Theory of crime I just assumed that laws were put in place to protect us "all" from wrong doing. Instead the Conflict Theory shows that the laws were written and put in place to protect the dominant class (or the socio-economically advantaged) giving them power to keep the subordinate class (or the socio-economically disadvantaged) down. When you stop to think about it, who is it that is writing and passing these laws anyway?…The example the author gives in the text book shows how the crime of stealing bread as a fraternity prank by a rich college student is dismissed with a slap on the wrist and yet if a poor person who really needed the bread were to commit the same crime because he was hungry and had no choice the judge would throw him in jail for ten years. This does not make sense except that the rich kid was indeed protected and the poor person would actually be pushed down so hard that it would make it difficult for him to ever rise up from his conditions. (Cristina)

Analysis: These passages exemplify the rudiments of critical thinking. Yanna is questioning assumptions she read about social class based upon her experience as part of the working class. She then connects a theory she learned in another class to make sense of the discussion, posing thoughtful questions. And Cristina challenges her own long-standing belief in the legal system, developing a critical understanding and drawing upon the conceptual knowledge discussed throughout the course. All of these examples demonstrate an understanding of the importance of the social context of a phenomenon, which is one of the foundations of sociological thought. The students show this by opening up to multiple perspectives.

Discussion Boards, Student Engagement, And A Culture Of Learning

These four overlapping categories are useful in demonstrating that a culture of learning can be created in an asynchronous online classroom. As these examples suggest, students are actively engaged in the course material, developing a mastery over the conceptual language and modes of inquiry while drawing on personal examples and experiences to deepen their understanding. There is a palpable reverence for learning as a process, receptivity to thinking about things in a new way, and an acknowledgment of the importance of a learning community. This is consistent with what others have written about distance learning (Benson et al., 2002; Jaffee, 2003; Persell, 2004; Scarboro, 2004). The students are really talking to each other, albeit via computer. Moreover, as these discussions are accessible throughout the semester, students may return to them. In fact, students are encouraged to incorporate them into their midterm and final exams.

When asked to write a substantive reaction to a reading, students do so with nuanced thought and active engagement. Often they go beyond what is required and research a discussion they found inter-

esting, suggest relevant books to read or movies to see, and provide links to recent newspaper articles on the topics being discussed. In this way, they develop as the experts of their own knowledge production, forming a community of learners in the process. They share ideas directly with each other rather than going through me. As Vandergrift (2002) states, "Thus, as a group, the class create[s] a web of relationships and a web of meanings that dramatically extend the personal and intellectual range of all participants" (p. 89). The students are learning that I am not the sole gatekeeper of the information. They do not need me to intervene as frequently as I tend to do (and am often expected to by students) in the onsite classroom. In fact, my online teaching experiences have helped me facilitate more and control less during discussions in my onsite classrooms. The online classroom, with its text-based interactions, allows, in a very real way, a more restrained presence of the teacher; it accordingly transmits important messages to students about their own abilities in making discoveries.

Concluding Thoughts: Spontaneity, Sensory Experiences, And The Hybrid Classroom

As the evidence in this paper suggests, a culture of learning is quite possible in an online community college classroom. Despite my earlier reservations, I now support online learning as an important feature among a wide range of opportunities, especially for the nontraditional students who enroll in institutions like my own.

However, I have a few lingering concerns about learning online rather than in a brick-and-mortar classroom. First, I miss the spontaneity of the onsite classroom—discussions that emerge from other discussions, going beyond the subject material but still relevant to it. As a teacher, I find such spontaneous conversations invaluable and invigorating. While tangential discussions happen online, they occur in asynchronous postings that become difficult to follow (Winiecki, 1999).

Even more than the spontaneity, though, the sensory experiences of learning that are difficult to translate to the online classroom are missing—hearing each others' voices, laughter, and the audible, collective "a-ha" moments of discovery and seeing the expressions of fellow students. I suggest that these sensory experiences enable teachers and students to connect with one another, are central to constructivist learning, and may have implications beyond the classroom. For example, in my experience, I find it much more challenging to write personalized letters of recommendation for my online students. I am also less likely to reach out to an online student about academically enriching opportunities, which I do frequently with my onsite students. This is consistent with Jaggars's (2014) findings that students felt disconnected from their online instructors, and may explain some of the attrition problems that have been documented in the online setting. In the context of the proliferation of online higher education courses, this raises some important questions: To what extent do online students miss out on creating these types of relationships and learning about such opportunities, and what overall effect might this have on students' academic and professional experiences? Such questions are particularly important for the nontraditional student, who may be less aware of such opportunities to begin with. Offering flexible and more accessible learning environments to students is certainly

important, but these concerns about online learning deserve more consideration.

I do think that as the technology advances, some of the sensory issues will be addressed. Examples like Screencasting and Voicethread offer ways for students and faculty to communicate through video and audio, rather than just in writing, thus personalizing some of the online experiences. Blackboard Collaborate is another tool that facilitates communication. I use it to hold weekly virtual office hours, where students can log on and ask me a question and I can reply immediately. However, despite the accessibility of Blackboard Collaborate, students seldom visit it, though this may be due to their competing responsibilities rather than the technology itself. Students who need to speak to me make it a point to come in to see me or, if that is not possible, to call me. They seem to want to make a more interactive connection with me, especially if they are struggling in the course.

Perhaps one way to bring together the best of what online and onsite classrooms each have to offer is through the hybrid classroom, which has been gaining momentum in community college course offerings (Dembicki, 2011). Combining online and onsite content delivery, hybrid courses may address some of the social relational challenges of the online classroom experience, especially at the community college. Consistent with Dewey's (1916) exposition of education as rooted in the idea of self-development emerging from social interaction, the hybrid classroom is a fruitful place for further research and reflection among those committed to constructivist pedagogies.

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Teaching Science Teachers in an Online Context with a Constructivist Approach

Frederick W. Freking & Jenny D. Ingber

Over the last few decades there have been several calls to action regarding the necessity for increased numbers and better preparation of American students going into the fields of Science, Technology, Engineering, and Mathematics (STEM) (e.g. National Academy of Sciences, 2006; National Commission on Excellence in Education, 1983). One of the key strategies for answering these calls is better preparation of teachers of STEM disciplines at the kindergarten through twelfth grade (K-12) levels. The need for effective STEM teachers is critical, with the President calling for the recruitment, preparation, and induction support of at least 100,000 middle and high school teachers who have strong majors in STEM fields and strong content-specific pedagogical preparation. However, there are several challenges to the recruitment, preparation, and retention of STEM teachers (President's Council of Advisors on Science and Technology, 2010). The University of Southern California (USC) has begun addressing this need by recruiting and preparing cohorts of STEM majors to become K-12 teachers through a fully online Masters of Arts in Teaching program.

This paper describes the USC program from the perspective of one of its implementers, Fred Freking, who is constantly reflecting on his teaching practice and considering ways to integrate and model learning theory and best practices in the context of a fully online STEM teacher preparation program (STEM TPP). Fred's work is supported by Jenny Ingber, who helps him think through his ideas and serves as a "critical friend." By examining student work from their joint Robert Noyce Scholarship grant, Ingber helps to identify strategies both to maintain a student-centered orientation and improve the quality of student experiences and products. The collaboration between the authors is reflective of the learning theories highlighted in this paper and has articulates how, within the online STEM TTP, learning theory is modeled, addressed, and tied to science teacher practice.

Learning Theory & Program Development

The development of the online STEM TPP, and each of the courses within the program, required careful consideration of our beliefs about how people learn and the strategies that could support this learning. The theoretical underpinnings of the STEM TPP are based on a framework that draws from sociocultural theory (Vygotsky, 1978; Wertsch, 1991). This framework suggests that an instructor's role is to provide the tasks, assignments, and supportive scaffolding that will allow for increasingly higher order thinking among students. We also want teacher candidates to develop the skills and strategies to create a learning environment that parallels the one we create for them.

We cannot take for granted, however, that such skills will automatically develop in teacher candidates' practice. In the same way that Noddings [1993] calls for teachers to avoid simply "turning students

loose 'to construct'" (p. 38), we should also avoid turning our teacher candidates loose to think critically or to foster critical thinking in their classrooms without support from us (Anthony, 1996, p. 365). If we want to know, for certain, that our teacher candidates can teach in ways that reflect and foster critical thinking, we must make explicit our commitment to the development and assessment of critical thinking and discourse.

To create the USC online TPP, faculty worked together to develop a curriculum that integrated theory and practice and utilized technology to increase the interactions between faculty and students. The core theoretical underpinning of the program is that learning is a social, societal, and academic endeavor that is enhanced through the inclusion of diverse human and learning characteristics in students' learning experiences (see Figure 1). This is the essence of sociocultural theory. The sociocultural framework is based upon the seminal work of Lev Vygotsky and is expanded upon in current literature (Gallimore & Tharp, 1990; Ladson-Billings, 2008; Hollins, 2008).

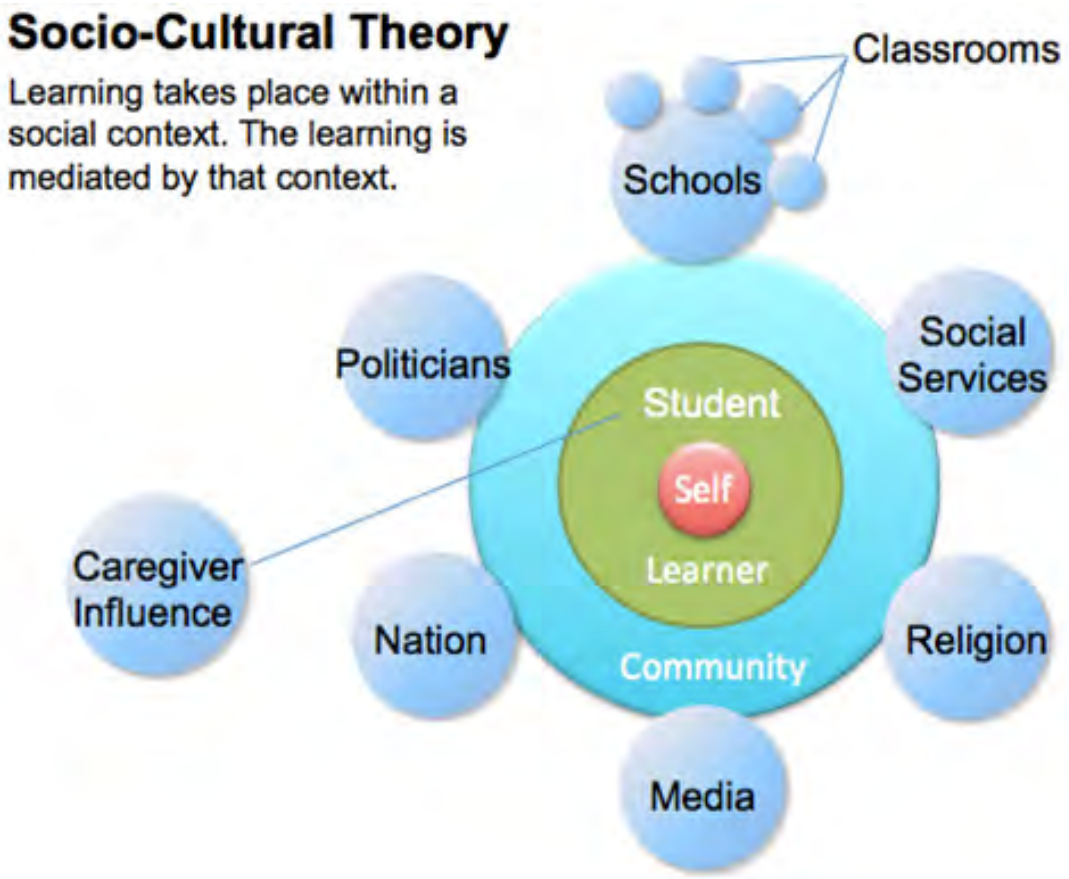


Figure 1. MAT Program's View of Sociocultural Theory

In a classroom built on the ideas of sociocultural theory, students engage in inquiry-oriented, interactive group projects and discussions, co-constructing new understandings through their collaboration and discourse. While class or group ideas may surface through the collaborative work,

each individual learner is also constantly reflecting, making connections, and integrating new ideas with prior knowledge as he or she is confronted with new information and experience, stretching individual knowledge and the knowledge of the group.

Instructors are co-constructors of the knowledge and experiences generated in a course. They shape the learning experiences to push new thinking while being responsive to the developmental needs and interests of the students. Faculty for each of the courses meet monthly to discuss how students are experiencing the program and share ideas across content areas that help students to plan, implement, and assess learning in K-12 contexts; thus, they are learning within a community of their own as they are working with MAT students. Specifically, science educators are mindful to foster classroom discourse and work parallel to that of the scientific community, in addition to the educational one; thus, "enculturating" future teachers into the field.

Not only is the pedagogy of the MAT program grounded in sociocultural learning theory, but features of the program are strategically designed to provide teacher candidates exposure to the theory behind the practice they will use when they enter the classroom. The MAT Program explicitly teaches principles of sociocultural theory in comparison to other theoretical frameworks as it relates to learning context (EDUC 516), learning theory (EDUC 518), language acquisition (EDUC 501), and human difference (EDUC 519). Candidates learn to assign learning principles and theoretical frames to pedagogical decisions (Pedagogy A/B) and instruction (EDUC 568 A/B).

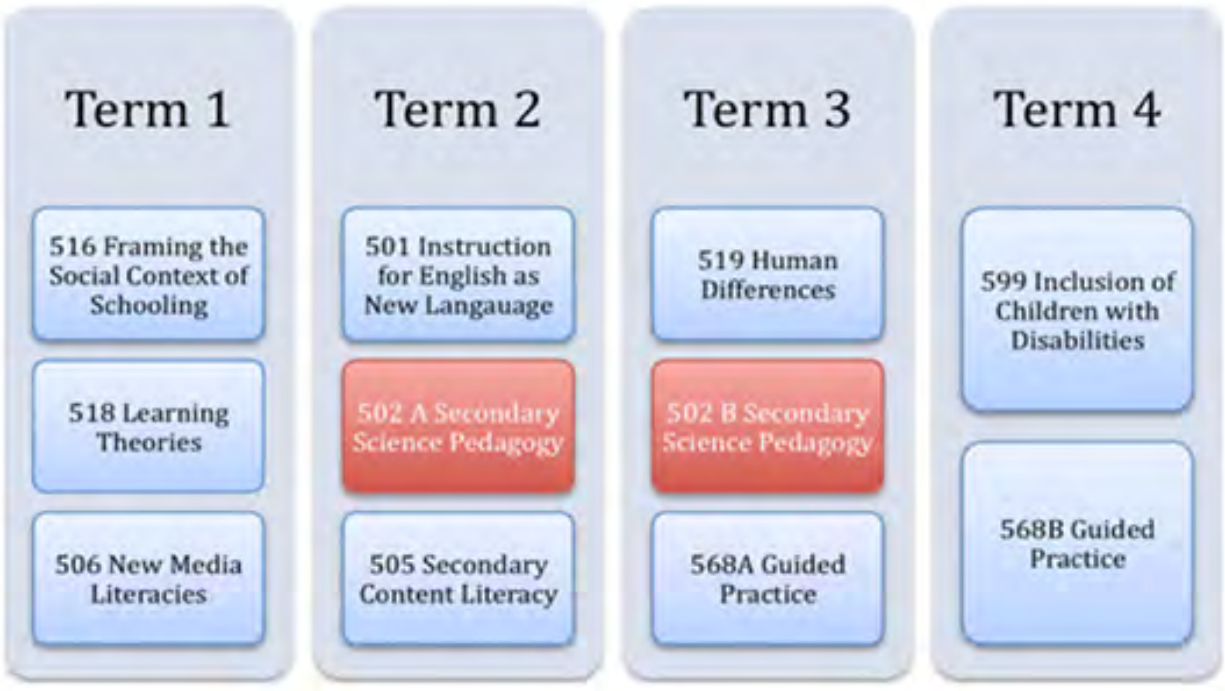


Figure 2. The Course Titles and Sequence for the Online STEM TPP

Sociocultural learning theory is operationalized in our program in the following ways:

- Through strategic facilitation of classroom discourse
- Through instructor responsiveness to teacher candidate needs
- By leveraging teacher candidate expertise and experiences

These elements of the program are built into the ways in which participants, both instructors and teacher candidates, interact within courses and in Guided Practice (similar to what other programs call student teaching or supervised fieldwork). For example, interactions that build community knowledge may take place in small group or whole class face-to-face discussions or in online, asynchronous forums.

Student Learning Experiences

Students in the STEM TPP have a variety of learning experiences in the online environment. Some are synchronous, which means that everyone in the group is in a shared, online space, at the same time. Other learning experiences are asynchronous, allowing for students to log on and engage in conversation around different ideas, media, questions, at a time convenient for them.

Both synchronous and asynchronous learning experiences were built on the sociocultural framework. The fully online nature of the program provides the ability to bring STEM teachers with varying perspectives from around the world together to co-construct their understandings about best practices in science education. We will show how students experience these strategies and share how the instructor's experience in an online teacher education program informs further development of our science teacher education program.

Coursework

Students in the MAT program take ten courses intended to help them to build an understanding of K-12 learners and best practices in teaching science (see Figure 2 for course titles). To demonstrate how sociocultural theory is used to create learning experiences in our program, we use the Science Pedagogy courses, in red, as exemplars.

The Science Pedagogy courses are designed to provide science teacher candidates with opportunities to develop innovative, inquiry-based science lessons and unit plans. The courses facilitate the convergence of STEM fields as a foundation for teaching science. Science teacher candidates learn that STEM is a more holistic approach to the teaching and learning of natural phenomena. The philosophical underpinnings of the courses are rooted in sociocultural learning theory and brought to life by challenging students to collaboratively solve real-world problems through constructive activity and modeling processes. All of the interactions, both synchronous and asynchronous, are designed to build an online community of science teacher practice, where faculty and students can discuss how to best teach science to K-12 students.

The two Science Pedagogy courses integrate ideas from the theoretical foundations classes as well as

fieldwork experiences. For example, in the first class, students collaborate to create a science lesson plan using the 5E instructional model (Bybee, 1989), backwards planning (Wiggins & McTighe, 2005), and the relevant state and national standards. Candidates receive feedback from other groups, a mentor from a classroom placement, and the instructor. Based on this experience, teacher candidates design three to five days of instruction, make revisions based on feedback, and then implement, video record, and assess student learning. The process is iterative and non-linear as candidates use new learning and their conversations with each other and mentors to inform the design of their plan.

In the Science Pedagogy courses, students interact with one another and the instructor in a multitude of ways, using both synchronous and asynchronous methods to further their understanding through collaboration and discussion. Course assignments are intended to provide opportunities for sharing, collaborating, and reflecting on experiences both in and out of the classroom. For example, the first assignment in the Science Pedagogy A class is as follows:

> *Describe your experiences as a learner of science. Include recollections from elementary, middle, high school, and college experiences. Equally important, describe informal learning experiences that are related to science and mathematics. Submit a 3-5 minute video that addresses these prompts.*

Figure 3 is a screenshot of a few of the videos that candidates posted before the first class. These reflection videos promote development of a community by sharing stories that candidates and the instructor can view before the first class session. In this case, the instructor chooses not to have students respond in writing to the video before the synchronous class. During the first class session, in breakouts and then in whole class discussion, the teacher candidates and instructor connect what was shared in the videos to their ideas about effective science teaching.

All teacher candidates come from unique backgrounds and bring a variety of experiences to the online classroom. Knowing the teacher candidates helps the instructor to establish effective working groups. For example, teacher candidates with research experience can be paired with teacher candidates who come from high needs communities for a group assignment where they will create an inquiry-based lesson plan. The instructor can also encourage teacher candidates to share these experiences during whole class discussions.

Throughout the program, the instructor can remind candidates of their memorable science learning experiences as the class works together to transform their urban science teaching. Candidates who have lab experiences can push the group to develop and implement inquiry-based labs. Candidates with experiences in high-needs communities can share ideas about connecting science content to urban kids. The first author attempted to develop these collaborations during ten years in a face-to-face program, but video assignments provide a more engaging and memorable first look at what teacher candidates bring to a teacher education program.

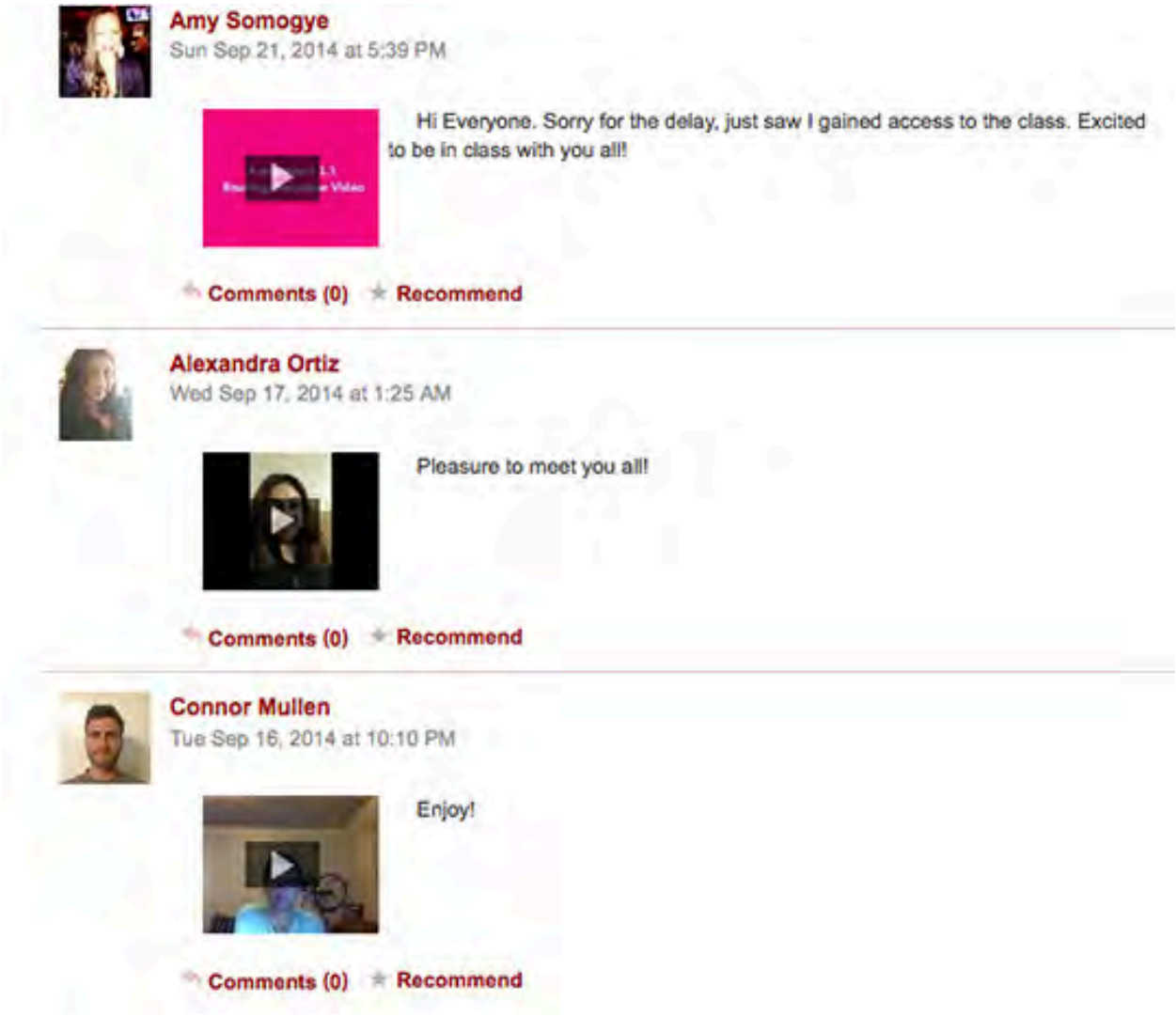


Figure 3. Course Wall in Pedagogy A Class and Screenshot.

In our online STEM TPP, the course videos and teacher candidate-constructed videos foster a burgeoning community of practice that begins with asynchronous experiences and develops in subsequent synchronous class sessions, future assignments, and Guided Practice.

Guided Practice

Guided Practice is a two-part course that provides science teacher candidates with opportunities to apply theory in practice, to deepen their understanding of the teaching-learning process, and to engage in a continuous cycle of critical reflection. It is similar in many ways to the "student teaching" aspect of face-to-face programs, and it demonstrates the way in which sociocultural learning theory is operationalized within the program.

In Guided Practice candidates realize facets of the MAT program's professional "Vision of a Teacher,"

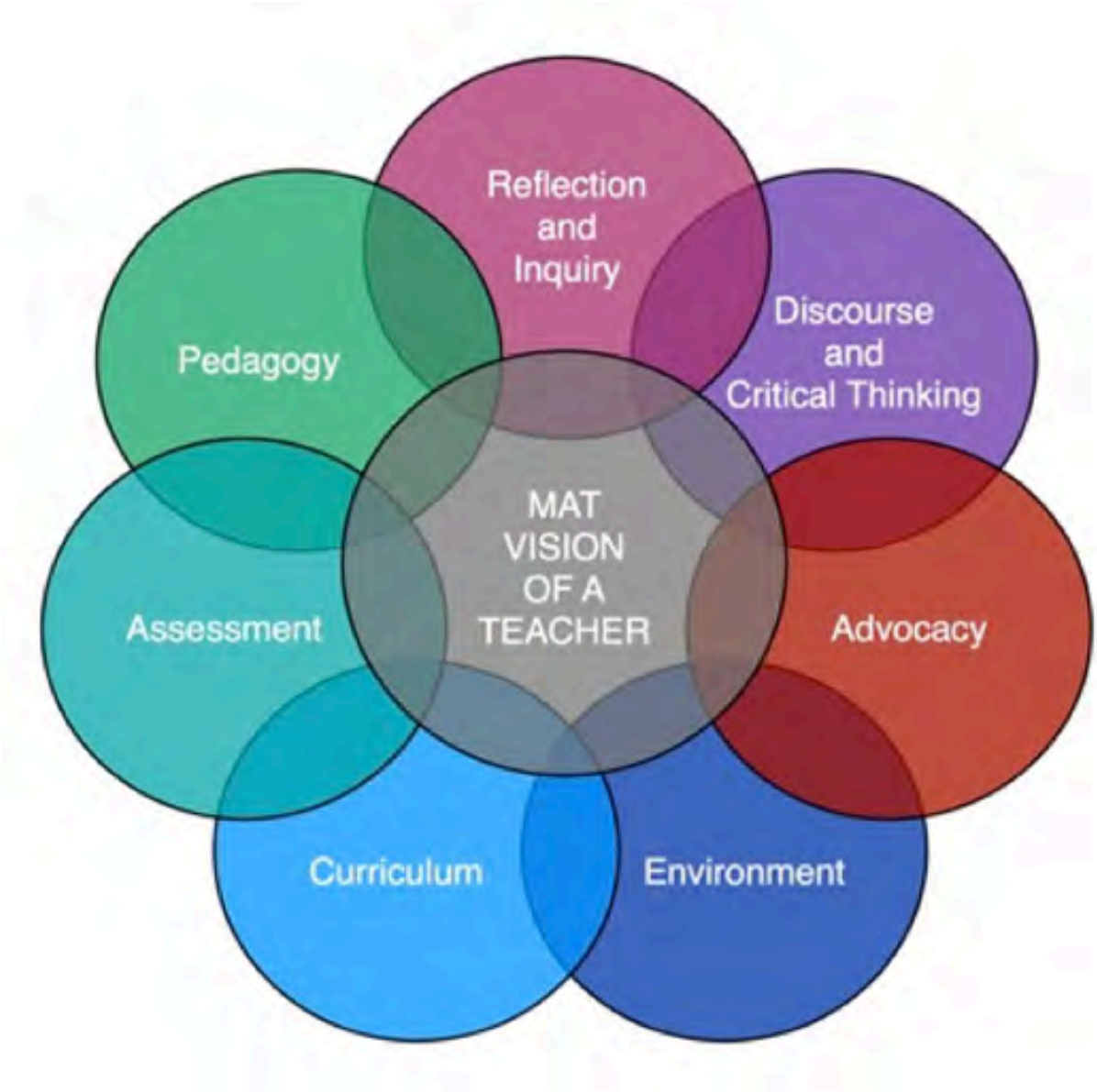


Figure 4. MAT Vision of a Teacher

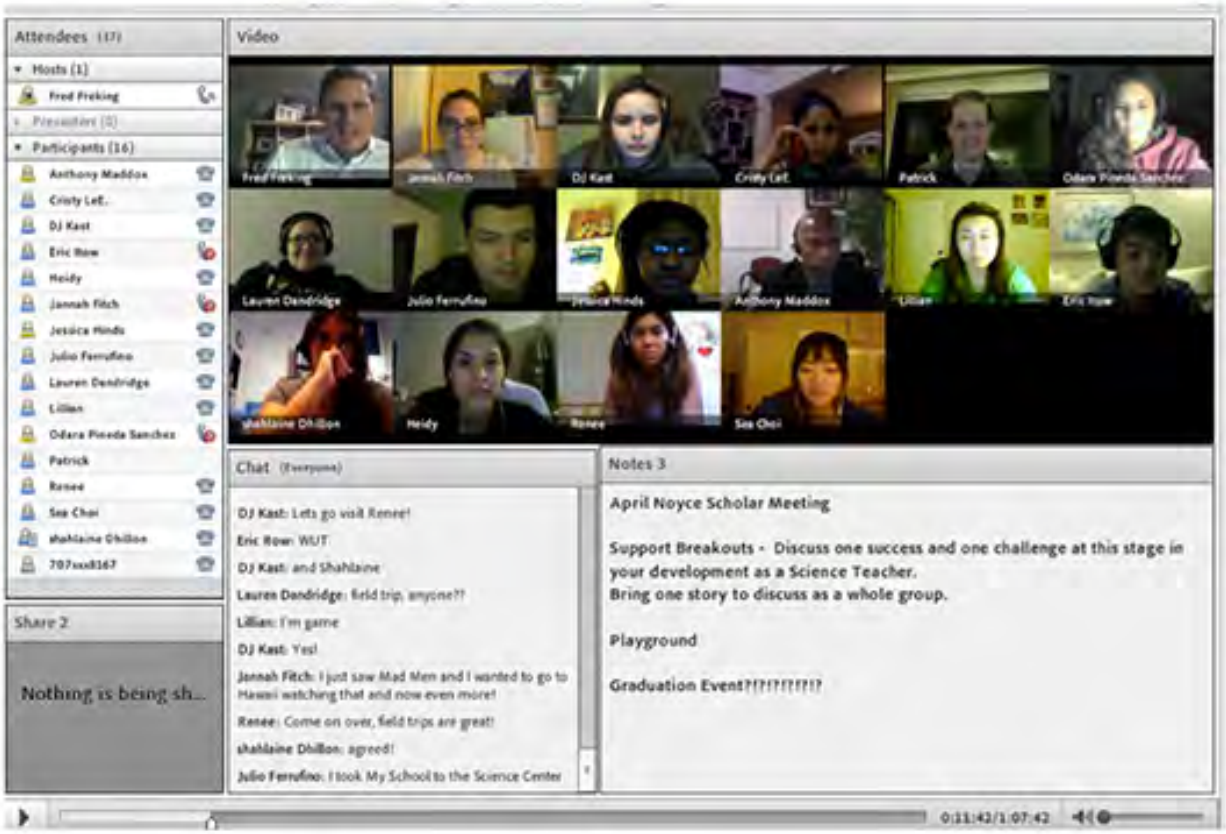
which refers to the set of identities and goals that teacher candidates work toward (see Figure 4). We refer to the identities and goals as a "domain," each of which embodies aspects of both teacher knowledge and classroom practice. During Guided Practice, candidates apply learning theories, content knowledge, and the repertoire of pedagogical approaches acquired in previous courses as they work to stimulate student learning in the K-12 placements. Complementing the Guided Practice course are assignments that require candidates to work together synchronously and asynchronously to explicitly connect theory to classroom practice.

Specific Learning Interactions

Teacher candidates interact with one another, instructors, and mentor teachers synchronously, asynchronously, and sometimes face-to-face. Each of these interactions contributes to the learning of the individual community member and to the community as a whole. Some assignments and conversations bridge courses and Guided Practice and may occur in both synchronous and asynchronous modes. The idea is that the knowledge and skills needed for science teaching build over time and prior experiences inform future experiences. Although we have separated out the types of interactions, the experience is very fluid.

Synchronous interactions. Every participant has live audio and live video and the classroom is completely customizable by the facilitator (see Figure 5 below). All synchronous Adobe ® Connect™ sessions are recorded so that teacher candidates can revisit the lessons. Furthermore, teacher candidates can set up their own sessions and invite whomever they choose to participate, including their mentors or local scientists.

During class, the breakout feature seamlessly moves teacher candidates into groups where they can discuss class assignments and fieldwork experience. The facilitator can move between groups, broadcast messages without inhibiting discussion, and bring teacher candidates back to a whole class discussion in seconds. Although the facilitator cannot put his or her hand on the shoulder of a struggling teacher, he or she can read the facial expressions of every teacher candidate as if they were



all sitting in the front row. A chat pod, in the middle of the screen, encourages an ongoing dialogue between and among teacher candidates.

In synchronous class sessions, teacher candidates have structured opportunities to construct meaning around aspects of science teacher practice. For example, since science teachers have a difficult time integrating literacy strategies into their K-12 teaching practice, breakout sessions were organized to have each teacher candidate share and discuss one example of how they incorporate a specific literacy strategy into their content area. Each group chooses one strategy to discuss in detail with the whole class. The instructor captures the discussion in a note pod, which is an online whiteboard, and later emails the teacher candidate the responses to co-construct a toolbox of strategies that can be integrated into future science planning and instruction.

One group shared how they planned to incorporate a scientific article on Bee Colony Collapse into an ecology lesson. This led the instructor to challenge all groups to incorporate scientific articles and current events into their science instruction. A future science teacher responded that his students' reading levels were too low to incorporate scientific reading into their lessons. The instructor then prompted the class community to address his concern about student reading abilities. Candidates responded in the chat pod and during ensuing class discussion with ideas and resources to meet this challenge. Suggestions included using Lexile appropriate online science readings or integrating additional strategies, or using "Cornell notes" that worked for participants in similar K-12 contexts. This is exemplary of how a community builds new understanding together, and is reflective of sociocultural theory.

Asynchronous interactions. Although many teacher education programs have adopted learning management systems where teacher candidates can share content and collaborate, in 2009 we developed a flexible and interactive asynchronous space to create assignments designed with a sociocultural approach in mind. The assignments allow for interactions and discourse between and among the teacher candidates and the teacher. These assignments derive heavily from the first author's experience as a science teacher and as a neuroscientist, experiences that have instilled a belief that science should be taught from a sociocultural perspective and with an inquiry approach.

The recently adopted *Next Generation Science Standards* (NGSS Lead States, 2013) and their integration of Scientific and Engineering Practices now serve as the cornerstone for curriculum development for the online STEM TPP. We use the 5E model of instruction (Bybee, 1989) to support an inquiry-based approach to teaching. To be inquiry-oriented and grounded in sociocultural theory, the online STEM TPP leverages a variety of course assignments that allow learners to use multimedia to consider new ideas or observe new situations and capitalize on their dialogues with one another and the instructor to construct new understandings.

Facilitating discourse videos. Student teachers often struggle with leading class discussions. Knowing the value of dialogue in fostering more coherent scientific understandings among students, we

Figure 6. Screenshot from a Video Modeling Scientific Discourse in a Natural History Museum.

created this assignment to enhance this skill. Designed to be completed early in the teacher candidates' Guided Practice, it involves recording a five-minute clip of his or her teaching practice, writing a detailed transcript of the clip, and then analyzing the discourse patterns. The work is done first independently and then in groups. In addition to evaluating their own teaching, teacher candidates also observe, in a video, an informal science educator effectively leading a discussion about the structure-function relationships of a marine mammal (see Figure 6). This assignment has a tremendous impact on teacher candidates, as shown in one response:

> *I learned that, while I do include questions to prompt deeper thinking, I don't do this in a very organized way, and it leaves students struggling. I feel that my students communicated to me that they can find given information, but struggle with higher levels of questioning. As such, I need to develop my order of questioning, and think through my points in advance. This will help me scaffold the levels of questioning, so that once I get to the higher levels, students will have familiarity with the initial concepts. (Teacher candidate in Pedagogy B class)*

The classroom discourse assignment is also very important given the new expectations of the Next Generation Science Standards (NGSS). With the implementation of NGSS, STEM teachers will be expected to create learning environments that move from teachers posing questions with only one

Figure 7. Screenshot of STEM Teachers Discussing Their Practice in the Keeping It Real Videos.

right answer to students discussing open-ended questions that focus on the strength of the evidence used to substantiate claims as part of scientific explanations (National Research Council, 2012). And instead of teachers providing information to the whole class, new STEM teachers will be expected to provide opportunities for students to conduct investigations, solve problems, and engage in argumentation with teachers' guidance (Osborne, Erduran, & Simon, 2004). This discourse analysis assignment allows students to develop new scientific understandings as well as participate in the science practices of communicating, explaining, and arguing in science.

It should be noted that this assignment was developed with a colleague who works completely face-to-face with her teacher candidates, so these assignments are not only workable with online programs. Teacher educators have used video recordings to improve practice since the development of video cameras. Learning management systems used by face-to-face programs may also enable teacher candidates to post and comment on different forms of media, such as video, as part of course assignments; however, assignments in an online program such as this rely heavily on these forms of interactions.

The flexibility of asynchronous class environments allows teacher candidates to participate in courses when they have time rather than when a course is scheduled to meet. We note that it is within the *interactions* that new learning is developed in our teachers. How the interactions are encouraged and facilitated, not the venue in which the interactions are occurring, is ultimately what supports the learning.

Keeping It Real Videos. One of the major shifts in our online assignments involved updating our asynchronous content to better reflect the classrooms of our teacher candidates. In the early years of the STEM TPP, the asynchronous content focused on an award-winning video series that helped teachers think about inquiry-based teaching. However, the videos were a little outdated and teacher candidates said that the classrooms represented there did not look like their urban classrooms. That led to the development of the Keeping It Real video series (see Figure 7), which attempts to connect inquiry-based teaching to urban classrooms.

For every unit in the Science Pedagogy B class, teacher candidates are expected to view and comment on the perspectives expressed by three science teachers around issues from assessment to teaching diverse learners. The following is one example of a candidate response :

> *I really liked how the teacher mentioned the need to incorporate prior knowledge. There is some knowledge that most students will have in common, maybe due to the content being relevant to the school they are at, or something the teacher tried to teach the students in that class. Other things.... For example, trying to relate a roller coaster ride to the feeling you get when you are taking off in an airplane is useless for someone who hasn't been on a plane or a roller coaster.*
>
> *I like how the teachers valued the work the students created and [gave] it meaning beyond it sitting on their desks. Community involvement and helping students create work that will impact their community is an amazing way to have students care about being good human beings and not just scientists. The idea of creating competition and self-motivation to excel is awesome and I think adds entertainment and excitement to the teacher's job as well! (Student in Pedagogy B class)*

After posting their own thoughts about the topic of the week, candidates participate in a synchronous group-inquiry session (see "Blending Asynchronous and Synchronous Interactions") to build on their understanding of specific skills they will need to develop to become effective science teachers.

Final Reflection Video. In the final video assignment for Pedagogy A (see Figure 8), teacher candidates view and comment on each other's thoughts to increase the interactions between teacher candidates and build a community of practice. Examining the dialogue in this online forum and then adding questions and comments helps the instructor better prepare teacher candidates for Pedagogy B and Guided Practice. Knowing teacher candidates' strengths and challenges helps the instructor to provide appropriate feedback to facilitate STEM teachers' growth. The Final Reflection Video comes on the heels of teacher candidates posting their first teaching videos to the course wall (see Figure 9). Candidates' reflection is situated in their recent K-12 science teaching experience and built upon their

Figure 8. Screenshot of Final Reflection Video Assignment

construction of what effective science teaching should look like.

In the science-specific Pedagogy A class, candidates design an inquiry-based lesson with two classmates and then revise according to peer feedback in a forum and then based on instructor feedback. After receiving feedback from three people, the teacher candidates are more prepared to create a science unit plan for their specific context. The interactions during the planning process help to develop a learning community that can critique and support the implementation.

Figure 9 is a screenshot that displays three teacher candidates' first science teaching videos, one of the culminating assignments of Pedagogy A. Below each video, classmates have noted their observations of strengths and challenges.

Here is one of the comments:

> *You have a great speaking voice! The kids seem super cooperative and engaged, which is great! It looks like your lesson had a format similar to mine (demo in front of the class, kids make predictions, then*

> *kids are given scientific explanation for why prediction was/was not correct). How do you think your lesson went? After my first demo (the one I posted to the wall), I started using think-pair share to make sure all the kids were talking to make predictions. Without it, I realized the same few kids kept answering all my questions! (Teacher candidate in Pedagogy A class)*

The comment reveals the richness of the interactions between teacher candidates in this asynchronous space. The candidate provides much-needed positive feedback to the candidate and identifies a strategy to help facilitate scientific discourse in future lessons. The collaborative and co-constructed nature of the Unit Plan and Implementation assignments are well aligned to the sociocultural approach in the

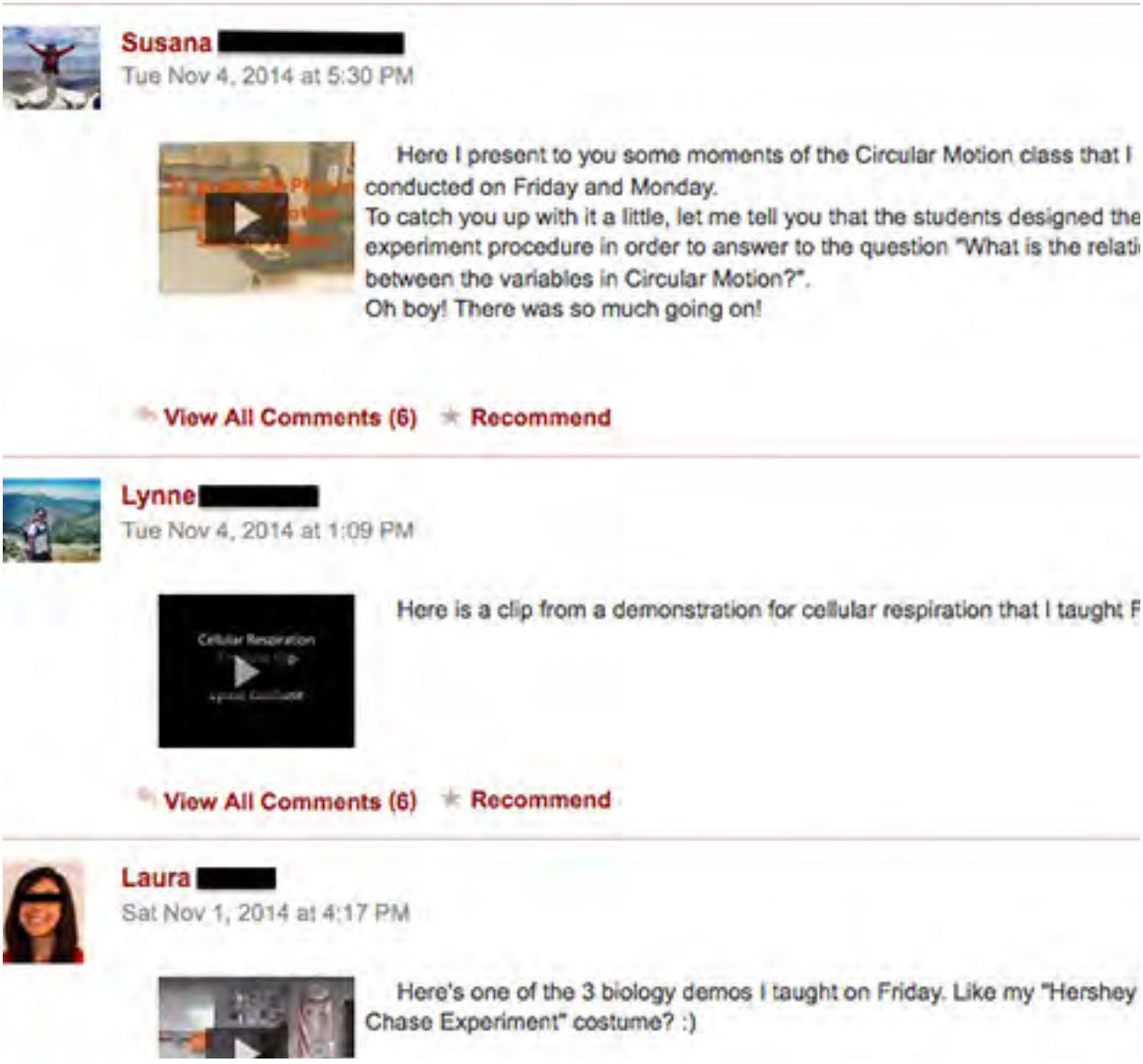


Figure 9. Screenshot of Asynchronous Interactions of First Teaching Video

Assignment 5.2: Group Inquiry - Student-Led Study Session

Unit 5: Inquiry Instruction for English Language Learners

Purpose

The purpose of this exercise is for candidates to:

- Develop a critical inquiry of science and science teaching and learning;
- Recognize the the importance of creating an using professional networks; and
- Foster quality interaction among peers that will lead to professional growth.

Inquiry Topic for this Week:

This week's group inquiry will center on this question: What are the literacy and ELL strategies that you learned in term 2 and which of these strategies are working in your GP placement?

Directions

Step 1 - Answering the Question of the Week

1. Remain in the same study group. If you have any concerns, please notify your instructor.
2. Be sure that your Study Group session does not conflict with other classes you are expected to attend.
3. This week, prior to your group meeting, each candidate must post a 5 - 7 minute video that addresses the inquiry question of the week.
4. Upload your video to your instructor.

Step 2 - Convening the Student-Led Study Group

1. The group host for this week must open the Study Group 5 minutes prior to the agreed upon meeting

Figure 10. Group Inquiry Assignment Example

program. Teacher candidates develop greater understandings of what comprises an inquiry-oriented lesson appropriate for the variable K-12 science classes they are teaching through the interactions among them and with the instructor.

Blending asynchronous and synchronous interactions. Teacher candidates are continually revisiting collaborations, work, and ideas from prior courses, building their knowledge and skills in STEM teaching, and learning over the course of the program. One assignment that moves through both courses and Guided Practice is a Group Inquiry assignment. In it, teacher candidates work together to study an aspect of science teaching (see Figure 10).

Before meeting as a study group, teacher candidates record their own ideas about the topic. In this case, they describe their experiences implementing literacy strategies in their Guided Practice placement.

This provides the instructor with a view of each candidate's understanding of the topic before they work with their group. Each teacher candidate can set up his or her own online meeting. During the group meeting, teacher candidates share their experiences around the topic of the week and then bring questions to the whole class session.

This allows for synchronous class time to be spent discussing unresolved issues rather than using valuable time on topics candidates already understand. Here are a few of the questions teacher candidates have come up with around planning inquiry instruction:

- What supports can I provide in an inquiry classroom to meet the needs of all of my students?
- When do I integrate the academic language in a 5E lesson?
- How do I collaborate with my GT to plan inquiry-based instruction?
- How do I manage the time when students are asking so many questions?

During synchronous class time, the emphasis is on building upon participants' knowledge and on solving the remaining questions. The instructor can bring in the perspectives of multiple teacher candidates around a given issue or question how he or she would solve the issue. This leads to teacher candidates co-constructing multiple solutions to the group inquiry questions. For example, "How do I manage the time when students are asking so many questions?" led to a rich discussion of how to foster an inquiry environment while addressing tangential questions.

Teacher candidates share multiple ideas from their varied contexts about how they and their mentors manage the inquiry-learning environment, from using a "Parking Lot" type of bulletin board called "My Scientist Questions" to taking advantage of a "teachable moment." In this context, an instructor is also able to remind teacher candidates about strategies, such as KWL (Know, Want to know, Learn) charts, that they have used in other coursework and may be applicable to this situation. These discussions help beginning teachers understand the complex nature of teaching science, and also provides them with a repertoire of tools they can use in the complicated context of an urban science classroom.

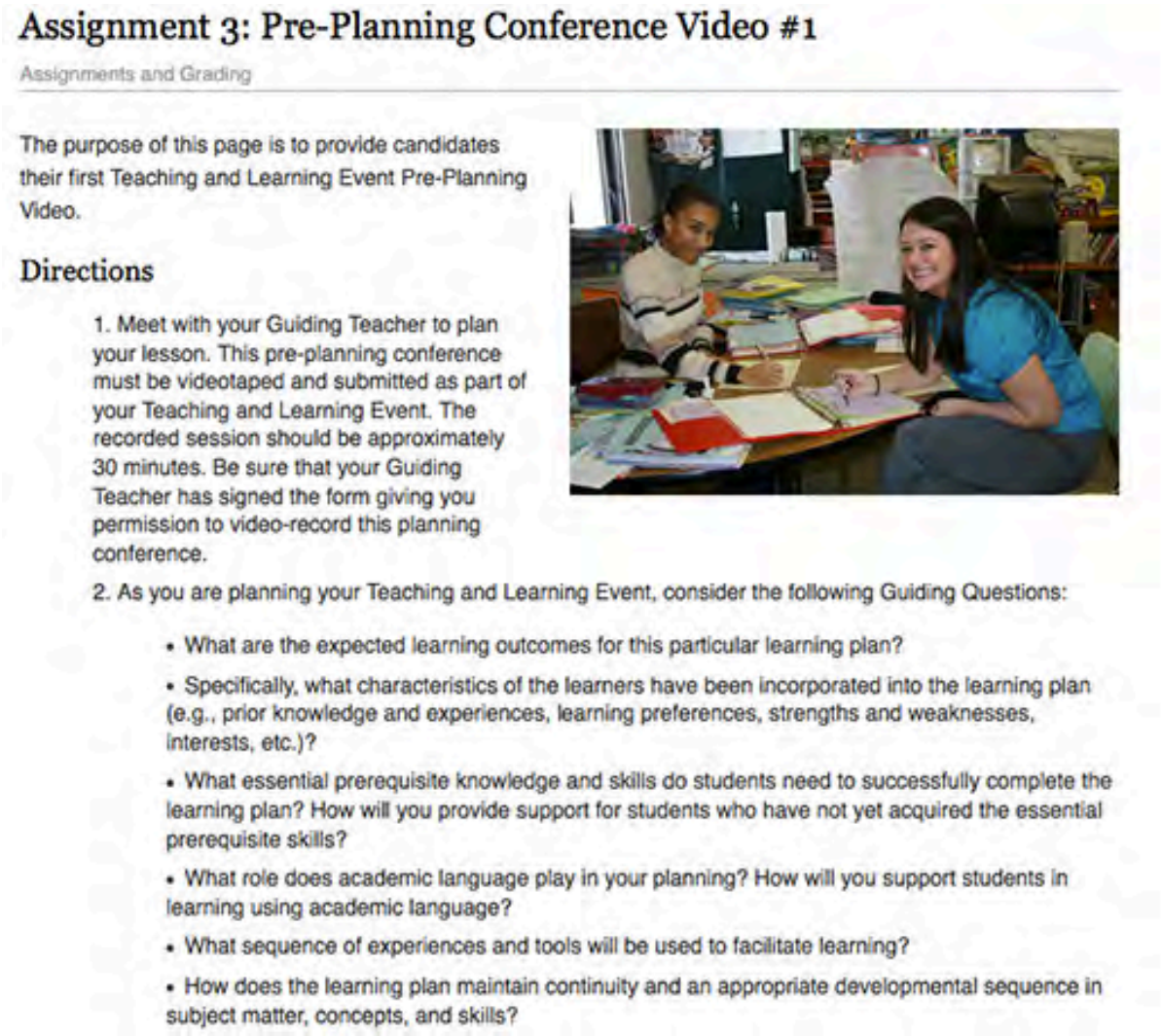
Interactions with guiding teachers. An "Entrance Interview" assignment that science teacher candidates complete before beginning Guided Practice serves as a formal introduction between teacher candidates, guiding teachers, and the Guided Practice instructor, and demonstrates how mentoring can be done within a fully online program. This assignment, and subsequent meetings of the three individuals involved, occurs within structured online meetings. Meetings are held in an Adobe ® Connect™ classroom and seek to organize the expectations for Guided Practice. Here is an overview:

> *The Entry Interview provides a structured opportunity for you, your Guiding Teacher, and your Guided Practice Instructor to meet together to discuss your understanding of the expectations of this course, your*

learning goals for the first ten weeks of "student teaching," the elements that will count as "evidence" of you meeting those goals, and the activities that will constitute your assessment of teaching performances throughout the course/placement.

As the mediator of the mentor-student teacher relationship, it is critical that the Guided Practice instructor develop an understanding of the placement context. The online meeting begins by discussing our backgrounds to develop a rapport and trust to ensure effective communication over the course of the twenty-week placement. This synchronous meeting allows the instructor to share program expectations from the lesson observation form to the teaching load progression, as well as science-specific pedagogy such as the 5E model (Bybee, 1989).

The importance of guiding teacher feedback and dialogue with the candidate is emphasized and any questions about the MAT program are addressed. A concrete science teaching discussion allows



Assignment 3: Pre-Planning Conference Video #1

Assignments and Grading

The purpose of this page is to provide candidates their first Teaching and Learning Event Pre-Planning Video.

Directions

1. Meet with your Guiding Teacher to plan your lesson. This pre-planning conference must be videotaped and submitted as part of your Teaching and Learning Event. The recorded session should be approximately 30 minutes. Be sure that your Guiding Teacher has signed the form giving you permission to video-record this planning conference.

2. As you are planning your Teaching and Learning Event, consider the following Guiding Questions:

- What are the expected learning outcomes for this particular learning plan?
- Specifically, what characteristics of the learners have been incorporated into the learning plan (e.g., prior knowledge and experiences, learning preferences, strengths and weaknesses, interests, etc.)?
- What essential prerequisite knowledge and skills do students need to successfully complete the learning plan? How will you provide support for students who have not yet acquired the essential prerequisite skills?
- What role does academic language play in your planning? How will you support students in learning using academic language?
- What sequence of experiences and tools will be used to facilitate learning?
- How does the learning plan maintain continuity and an appropriate developmental sequence in subject matter, concepts, and skills?

Figure 11. Screenshot of Pre-planning Conference Video Assignment

candidates to share their goals and the evidence they will provide to demonstrate achievement. This initial meeting is followed up by weekly correspondence with the guiding teacher and the pre-planning conference video assignment (see Figure 11). The pre-planning conference video provides the instructor with a rich vantage point of the interaction between the guiding teacher and the teacher candidate as they plan inquiry-based science instruction.

Figure 11 shares some of the scaffolding that the online STEM TPP offers for the Guided Practice experience. Guiding teachers have access to previous pre-planning conference videos so they have examples of how to support student teachers. Furthermore, all teacher candidates have the opportunity to learn from all of the guiding teachers in the class by viewing and commenting on these videos. Finally, the Guided Practice instructor can share pieces of these videos to support the development of a key science teaching idea with a voice directly from the K-12 classroom. Access to pre-planning videos provides valuable insight into the dynamics of the field placements and helps the instructor to better support teacher candidates, especially around inquiry-based teaching practices. This technology also strengthens coursework by connecting teacher candidates more authentically to the K-12 context.

Recent Developments and Next Steps

Although many of the learning activities described here demonstrate a constructivist approach to learning in an online context, courses in the online STEM TPP continue to be refined and developed. Since participation in asynchronous interactions can occur at any time, instructors need to design courses that allow for teacher candidates to balance coursework and fieldwork with their everyday lives. It is critical that we design assignments that are meaningful and will positively impact candidates' science teaching without demanding so much time that they are stressed or burn out.

Leveraging the Right Amount of Collaboration

Because the amount of asynchronous collaboration is limitless in an online program, we need to design assignments that work with the rigorous schedule of beginning teachers. We are pushing the development of communities of practice that will assist the planning, instruction, assessment, and reflective abilities of our candidates. One assignment that we plan to add, and that is working well in our in-service STEM teacher leader program, is the "professional learning plan." This assignment requires candidates to participate in local professional STEM teaching and learning communities. It will fill a void in the program when science pedagogy courses have ended and teacher candidates are engaged in Guided Practice B. Connecting our teacher candidates to a local and/or online community of practice will prepare them to participate in a professional support group that they will need after they graduate from the STEM TPP and enter the science teaching profession.

New Assignments

We are contemplating several other ideas as we continue to refine our program. First, while the Keeping It Real Videos provide context for our discussions, many teacher candidates have requested addi-

tional perspectives. It would be easy to conduct online interviews with our excellent science guiding teachers from urban districts across the nation. Their insights could be categorized around key topics in science teaching and provide a primer for discussions with our pre-service teachers. And it would be possible to connect these resources to the greater science teaching community and the wealth of science teacher knowledge that exists.

While the sociocultural and constructivist nature of our program encourages candidates to learn from each other, not all of the ideas that become part of the group learning are integrated into the coursework. Often times, excellent ideas from teacher candidates shape the program. One teacher candidate created his own Keeping It Real video to share his classroom context. We plan to integrate this activity into future classes using the "Course Wall" feature of our learning management system. As we shape the curriculum for our STEM teacher candidates the possibilities are almost limitless, as almost any text, video, or image can be shared with the group in real time as we discuss any relevant topic in STEM teacher education.

Creating an Effective Classroom Learning Community

Beginning teachers must learn how to create an effective classroom learning community. We are beginning to implement an assignment that is threaded though the whole program to help our candidates develop a classroom management plan that they can bring to interviews for their first classroom teaching job. In term one, candidates use theory from their learning and social context courses and observations from their fieldwork to construct an initial plan. In term two, candidates build on this plan by utilizing more knowledge of their students from their fieldwork experiences and ideas from their content-specific pedagogy classes. In term three, candidates further refine their plan using their experiences from GPA. Finally, in term four, candidates reflect on all of the experiences in the program to finish the classroom management plan they will bring into their first year of teaching. Throughout the process, candidates participate in online forums to receive and provide feedback and questions to their peers. Four different faculty members also share their questions and ideas with the candidates. Assignments like this, which candidates co-construct as they grow as teachers, prepare them for their first year teaching in a K-12 context.

One area that still needs development is using our technology and online program to connect teachers as they enter the teaching profession. Although alumni are frequently brought into the synchronous classroom to discuss a myriad of teaching topics, we have not created an asynchronous space for our alumni to work together to plan STEM lessons, receive support and encouragement, dialogue about the implementation of lessons, discuss how they scaffold learning for students in their unique context, or develop and critique assessments. Connecting our alumni and current teacher candidates will help all these STEM teacher participants construct a deeper understanding of what it means to teach science in high-needs contexts.

Incorporate New Technologies

From advances in the features of our synchronous Adobe ® Connect™ platform to applications and content that can be incorporated into our teacher candidates' asynchronous time, it is important that we continue to develop our program. As bandwidth has increased for all of our participants, it has become easier to stream student teaching videos during synchronous class time. As we further develop our program, it is critical that we take full advantage of technologies that provide opportunities to bring actual K-12 practice into our university-based course discussions. Deepening the connections between the K-12 context and the university coursework will improve teacher education.

Research on the Science Teacher Candidates in the STEM TPP

The next step in the authors' collaboration is a research study involving thirty of the teacher candidates who have been in the online STEM TPP. We plan to investigate the candidates' perspectives on the sociocultural/constructivist grounded activities and how these experiences in the program affect their STEM teaching. We believe that these assignments are preparing our STEM teacher candidates for their first teaching positions. However, surveying and interviewing our alumni will provide feedback that we can use to enhance the program. We look forward to integrating new technological tools that can deepen our candidates' experiences as they participate in our program and prepare to teach science in high-needs K-12 contexts.

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Activating Emotional and Analytic Engagement in Blended Learning: A Multicultural Teacher Education Example

Ramona Maile Cutri, Erin Feinauer Whiting, & Stefinee Pinnegar

As colleges of education face challenges to provide flexible teacher education, teacher educators with no previous expertise or experience with distance and online instructional formats are being asked to design and implement these types of curriculum and instruction. There is often little attention to either faculty professional development or appropriate technical support. These efforts often occur without consideration of the appropriateness of technological use in relationship to the theoretical orientations and underpinnings of specific content areas, teacher education programs, or individual teacher educators (Keengewe & Kang, 2012).

Blended learning environments combine face-to-face instruction with computer-mediated instruction and increase opportunities for reflection (Hixon & So, 2009; Kang, 2014). Research has explored the potential of computer-mediated communication and blended learning to create communities of inquiry grounded in principles of cognitive, social, and teaching presence (Garrison, Anderson, & Archer, 2000) and collaborative interactive learning with students and faculty (Vaughan, 2010). These qualities facilitate many of the conditions necessary for critical multicultural education. Yet what remains largely unattended to is the need to engage students on the emotional level. The lessons we have learned as we constructed a blended learning format multicultural education course for pre-service teachers is best introduced by one of the author's musings:

I wanted to touch my pre-service teachers' hearts and get them to consider multicultural issues from a place of compassion. This was around the same time that my department chair asked me to create the blended learning course, so the whole idea of learning objects beyond "readings" was really opening up to me and getting me excited. I had seen that textbook readings just become homework versus something students interact with, and then share with their friends. But when my students found an article, video, blogpost, etc. about a current event or topic they thought was interesting, they'd not only forward it to me electronically, but share it with all of their friends. I noticed that the things that they forwarded were from various sources, ranging from pop culture to academic journal articles that they read in other classes. I wanted to create in my blended learning class this same type of interest, engagement, and sharing of learning objects but make them specifically related to multicultural issues. This was also around the time when I was jumping on the Facebook bandwagon and discovering the power of social networking in this generation of college students. So there I was, an expert in multicultural education with little experience with technology, teaching pre-service teachers who were experts in technology with little experience with multicultural issues. (Cutri, 2011)

In this paper, we share our experience in designing a blended multicultural education course that we hoped would increase the likelihood that the teachers we were educating would take up socially just dispositions. We examine our own learning using a critical friend relationship with a colleague experienced in developing technological responses that honor relational aspects of teacher education within a framework of sociocultural theory. We steer our way to new understandings of how blended learning can facilitate teaching multicultural teacher education while maintaining a commitment to sociocultural learning theory (Cutri, 2011; Cutri & Whiting, in press).

How We Got Started

We three teacher educators have different experiences designing online and distance education. However, we are all interested in relational aspects of teacher education and sociocultural theory, since both of these theoretical orientations show great promise for improving the quality of instruction beginning teachers can provide individually and collectively (Darling-Hammond & Bransford, 2005). We have been involved in creating hypermedia cases, professional development for teachers of English as a Second Language (ESL) delivered at a distance, as well as blended learning. Two of us participated in the development of an ESL Endorsement for delivery at a distance (e.g. Teemant, Smith, Egan, & Pinnegar, 2005; Pinnegar & Teemant, 2003).

Six years ago, the two of us who design multicultural courses began to meet to discuss student responses to our multicultural education. We were primarily concerned with engaging our students intellectually and emotionally with the multicultural education content (Cutri & Whiting, in press; Whiting and Cutri, in press). Around the same time, as part of a university initiative, we had offered our class a blended learning format that combined asynchronous electronic sessions online and face-to-face class sessions. This initiative did not include any formalized professional development in blended curriculum development, but it did include resources such as access to course management systems.

We focused our conversations around two guiding questions:

1. How do we create curriculum that activates students' emotional and analytic engagement with multicultural education during asynchronous electronic class sessions?
2. How do we structure face-to-face class sessions to encourage students to share and reflect upon their experiences (from the past and in relationship to the online asynchronous activities)?

We structured our weekly meetings around these questions and took notes on our discussions for three consecutive years. In our efforts to make sense of our experiences, we turned to Design-based Research (DBR). DBR studies learning in environments that are designed and systematically changed by the researchers "to develop new theories, artifacts, and practices that can be generalized to other schools and classrooms" (Barab, 2006, p. 153). DBR enabled us to closely study our planning and practice as it passed through multiple iterations in the contexts of our courses.

The data we gathered focused on two different aspects of our journey: 1) the student's experiences and 2) our experiences as teacher educators. Cutri & Whiting (in press) document the emotionally charged quality of our experiences trying to engage our students intellectually and emotionally. For this paper we returned to the data to examine what we have come to understand about how to create blended environments that maximize learning from asynchronous and face-to-face experiences and activate emotional and analytic engagement with multicultural education.

For this analysis we discussed what the notes from our past conversations revealed. Then using dialogue (Pinnegar & Hamilton, 2009) we considered each lesson, comparing it to notes we had taken, assignments that had been added, deleted, altered, class schedules, outlines of online assignments and other commentary to provide evidence that the things we had come to understand had emerged from our experiences in shaping the curriculum. Through this process we saw our struggles coalescing around four main points of tension. Rather than seek to resolve these areas of tension, we opened them up to inquiry so that we might learn from them.

The tapestry of our conversations is best described as one woven from threads of intentional vulnerability and collaboration. Since we acknowledged early on both our expertise in multicultural education and our lack of formal training in blended learning course development, we were able to quickly acknowledge what we knew and what we needed to learn. Together, we committed to educating ourselves about blended learning through extensive reading and, eventually, participating in a formal professional development course on blended learning. Additionally, we agreed to systematically collect data on our course development efforts.

We engaged with our other colleague as a critical friend on this paper. In this role, our colleague critiqued the design, implementation, analysis, and re-design of activities individually and the course collectively. Across the six years, as we have worked to improve the course, we have conferred with this colleague, asking for suggestions, analysis, or recommendations. During this process, we questioned the interactions we were having with our students around the difficult content of multicultural education. Finally, as we engaged in this study, our critical friend discussed our findings, reviewed drafts of the paper, and pushed us to provide evidence of our thinking.

How We Conceptualized the Course

Critical multicultural teacher education addresses inequitable distribution of power and access to educational opportunities. It attends to an underlying discussion of social privilege in addition to racial, gender, sexual orientation, and ability awareness at the individual and institutional levels (Banks, 1996; 1999; Hill-Jackson, 2007; Gorski, 2010; Gorski, Davis, & Reiter, 2012; Sleeter & Grant, 1987; 2006; Wilbur & Scott, 2013). Inherent in attending to this inequality is engaging pre-service teachers in critical reflections of their own assumptions, identities, and dispositions. National standards for teacher education accreditation mandate professional attitudes, values, and beliefs about diverse students, families, and communities (Council for the Accreditation of Educator Preparation Standards,

2013). A pedagogy of a mere lecture and regurgitation pattern will not promote the type of critical reflectivity and dispositional development required by national standards.

Attending to sociocultural theory in the design and development of multicultural teacher education curriculum supports teacher candidates in drawing forward what they understand from their own experiences as a basis for building on and developing their knowledge, skills, and dispositions in preparation to be teachers (Vygotsky, 1978). We sought to attend to the content of the course as well as to the pedagogical practices most likely to facilitate the type of inquiry and dialogue needed to influence dispositions. As a result, the conceptual framework for our blended multicultural education course draws on the theories of critical multicultural education and sociocultural learning theory, in particular the concepts of the *zone of proximal development* (Vygotsky,1978) and a *trajectory of participation in a community of practice* (Lave & Wenger, 1991), which we elaborate on later in the paper.

Tensions Experienced & Lessons Learned

As we discussed our experiences using a blended format in our critical multicultural education course, we uncovered four significant tensions.

1. Appropriate format for online materials

The first tension was the drawback of providing reading materials in electronic format, prompting us to reconsider how we provided reading material to the students. As professors with complete control over the readings we were complicit in requiring our students to purchase an expensive required reading packet. We recognized that when required materials are expensive, some teacher candidates simply do not purchase them. In addition, attention to financial burdens as potential barriers to learning is a concern we explore in our multicultural education course.

As we considered how to make the course materials more affordable, we realized that if we provided the material in electronic form that the teacher candidates could access for free, they would also have more autonomy regarding how, when, and where they read the materials using various electronic devices (e.g., phone, tablet, computer). With great (though naive and uninformed) faith in electronic materials, we did away with the required reading packet purchased from the university bookstore. Instead, we made all of the readings available to students electronically through various sources that allowed them legal and free access.

We found that when the reading materials were only available electronically, the teacher candidates did not read them as carefully as they did when the materials were in paper form. Moreover, they were unable to easily reference what they had read during face-to-face class session discussions. Research confirms the complex relationship between a reader's experience reading material electronically versus on paper (Kukulska-Hulme, 2007; Chao & Chen, 2009). During class interactions, teacher candidates confirmed that they had read the material, but were often unable to recall facts or express opinions about the specific issues discussed in the readings.

The collaborative and face-to-face component of our learning community was largely grounded in teacher candidates having read common articles, developing shared understandings of specific concepts, critiquing those concepts, and exploring how they related to future teaching. However, once the materials were in electronic rather than paper formats, the teacher candidates, as newcomers to this community of practice, did not participate in the course community in ways that we expected. Since they were not properly reading the materials, building notes on their reading, or retaining very effectively or efficiently the materials assigned, the face-to-face discussions fell short of their potential.

The lesson learned from this tension was that we needed to draw readings from a variety of formats. We required teacher candidates to buy a printed copy of the reading packet for the course. The physical artifact of the reading packet with articles highlighted by teacher candidates proved to be vital for the caliber of face-to-face class discussions.

According to Lave and Wenger (1991), interaction and trajectory of participation patterns within communities of practice range from what they call legitimate peripheral toward more full participation. They distinguish between opportunities individuals are given to participate and access to cultural artifacts, such as a reading packet, as the two main variables impacting an individual's progression toward full participation and learning. In a critical multicultural education class, this translates into opportunities for and conditions of dialogue and inquiry created in interactions between teacher candidates and teacher educators. In our case, access to the physical artifact of the reading packet encouraged fuller participation in our community of practice.

This finding led us to wonder about what types of electronic materials, if any, might be better suited for student consumption. The articles in our reading packet were mostly academic articles addressing well-established multicultural education concepts. We recognized that this type of academic material differs greatly from learning artifacts from non-academic popular culture sources such as videos, audio texts, news reports, and other online resources. We recognized as well, that each format greatly from learning artifacts from non-academic popular culture sources such as videos, audio text and that if we were to use them successfully, we would need to develop resources and materials to support teacher candidates in using them.

Our finding regarding the varied literacy skills required in blended learning highlights the assertion made by Leu, Kinzer, Coiro, & Cammack (2004) that "new technologies require new literacies to effectively exploit their potentials" (p. 1570). However, in the rush to implement new technologies in higher education the task of teaching students new literacies is often overlooked. Our finding suggests that identifying who is responsible for and best qualified to teach literacy skills must be addressed in teacher education.

Unlike the challenges presented by the electronic academic readings, we have had success presenting learning artifacts from popular culture to students online. The artifacts included short videos, both serious and humorous, on such topics of multicultural education as gender and racial stereotypes, and

interactive immigration maps. Students were able to recall details and points made from them during face-to-face class discussions. We also asked them to answer questions, take particular kinds of notes, or engage in outside-the-classroom interactions with friends and family in relationship to these materials. For example, we required teacher candidates to share various online artifacts with their social contacts via the social media platform of their choice, and then to analyze comments from friends on social media about the artifacts they posted. These analyses usually take the form of a short paper in which students identify trends and patterns in their friend social media platform of their choice, and then to analyze comments from friends on social media about (See Appendix A for a full description of a sample assignment.)

The social media "friends" today's students maintain are a "local" social system in which students interact. Online popular culture artifacts are designed to be shared socially and interacted with, and we were more likely to push the teacher candidates to engage with them in these ways. For example, asking students to listen to the song from Avenue Q, "Everyone's a Little Bit Racist,"and then design an interactive activity attached to it, is more engaging for students than asking them to read an American Educational Research Association (AERA) presidential address and come to class prepared to comment on how we attend to the educational debt in educating multicultural students.

The novelty of the online resource and the addition of sociocultural or linguistically based activities deepened students' engagement with the materials and enabled them to make connections to their lived experiences outside the learning space of the class. Sociocultural learning theory encourages educators to begin with what students already know and extend that knowledge through additional experiences. Our students were very familiar with the process of sharing popular culture artifacts via social media and promoting discussion of them. The types of assignments described above built on that knowledge and extended it through additional structured experiences.

It has been much more productive to have students engage electronically with artifacts constructed for online consumption than with academic readings typically generated for paper formats. For Vygotsky (1978) and sociocultural theory that stems from his work, intellectual development is an inherently interactive activity occurring within a local social system. Structuring these interactive learning activities and experiences is therefore of critical importance. This is particularly true in a blended course where, since students participate in both face-to-face and electronic interactions, careful attention must be paid to what students can do independently, what they can do online, and what experiences fundamentally require face-to-face contact with the professor and each other.

Dalton (1998) identifies meaning-making as one of the Five Standards for Effective Pedagogy and defines it as "connecting school to students' lives" (p. 10). Meaning- making involves personal and dispositional development and public use of materials and consideration of them in a public context. Multicultural teacher education seeks to affect the beliefs, values, and practices of teacher candidates. It relies on inquiry and dialogue as the primary vehicles for dispositional development (i.e., making meaning, critiquing, and reaching mutual understandings) (Gay & Kirtland, 2003; Gorski, 2010;

Hill-Jackson, 2007; Sockett, 2008). In our multicultural education courses individual dispositional development occurs in the social context of face-to-face and online interactions. Inquiry and dialogue in face-to-face and online settings demand attention to the relational aspects of education and learning. The adjustments we made to which materials were presented online and which were presented in paper format greatly facilitated increased inquiry and dialogue.

2. Online conversation and discussion

The second of the four major tensions we observed was the nature of online discussion posted on a platform called Digital Dialogues. This tool is used for assigning discussion points, and then asking teacher candidates to comment and discuss electronically either in small groups or whole asynchronous groups. The small groups for digital dialogues were formed randomly without consideration for participants' technical expertise; all students were enrolled in the same multicultural education course. The dialogues occur asynchronously, so no attention was given to time availability of group members. Because of the random assignment to digital dialogue groups, members of the same group would not necessarily sit near each other in class. In this way, students were encouraged to form relationships with multiple people in the class.

We quickly observed that some teacher candidates avoided participating, or engaged superficially and shallowly in their peer-to-peer online discussions. We acknowledge that trajectories toward full participation and learning include what Lave and Wenger (1991) call legitimate peripheral participation. However, shallow responses did not seem legitimate, but superficial.

One response to this situation would be for the professor to join in the digital dialogue and through questioning encourage students to "dig deeper" or "say more" in their discussions. Such questioning and guiding of students to build on what they know and extend to deeper understanding and application would be a form of what Vygotsky described as helping students progress through their zone of proximal development surrounding a topic (1978). However, we had hoped for this to be an activity that grew organically and gave teacher candidates an opportunity to develop ideas and hone them with each other. We hoped they would create an online community of practice that would travel from the online discussion into the face-to-face sessions.

We had not envisioned the digital dialogue interactions as a curricular element under the control of the professor. We felt intervening in the digital dialogues might compromise them as a safe forum for teacher candidates to express concerns, frustrations, and opinions about the delicate content of multicultural education (e.g., racism, sexism). Because we held out hope for these digital dialogues to become student-led and to create safe communities for trying out ideas and expressing beliefs, we were hesitant to intercede in the digital dialogue forum.

We considered the digital dialogue space to be a community of practice for which teacher candidates had primary ownership. We wanted to allow for legitimate peripheral participation within that community but not tolerate merely surface engagement with the topic of discussion or with peers' com-

ments. To address the tension between allowing for legitimate peripheral participation and insisting on quality participation, we created a simple rubric for the types of comments required. (See Appendix B for a sample rubric.) We did not participate directly in the conversations; however in using the rubric, we communicated to candidates that evaluation of participation would focus on the depth of discussion rather than the types of opinions expressed.

During digital dialogues we selected certain group conversations to observe over the week. We examined and noted trends and patterns in the conversation. Then we addressed or extended the commentaries in face-to-face whole class discussion, including certain ideas, dilemmas, opinions, or wonderings in the slides we used during face-to-face lectures. We observed that peer-to-peer critique happened more often online than in face-to-face interactions. However, as we engaged teacher candidates in ways of articulating critique and inquiry these skills began to transfer, although to a limited extent, to face-to-face whole class discussions. We also noticed how vital it was that peers disrupted or called-out their peers about certain ways of thinking or voicing diverse experiences and perspectives.

Teacher candidates knew that their dialogues were public, and that there was a chance that they would be quoted to illustrate an insight into a certain multicultural concept or to articulate a concern exhibited by more than one student. The practice helped us manage the polarizing of ideas and opinions and address our need to direct the discussion somewhat to avoid unethical tangents or comments. In the field of multicultural teacher education, teacher educators have an ethical responsibility to engender positive dispositions toward multicultural students and families. Additionally, the practice of quoting teacher candidate digital dialogue comments allowed these discussions and issues to live on in public space and permitted us to return to them more specifically throughout the semester.

We found it much easier to notice trends and patterns in teacher candidates' thought processes and opinions online than during face-to-face discussions, when so many other things are vying for the professor's attention. We also found it easier to wrestle with our own emotional responses to teacher candidates allowed these discussions a when we had the time and space to reflect on them.1

One lesson learned concerning the use and management of digital dialogues is that a small group discussion format is imperative. We recommend well-organized groups of about five people. We found it crucial to have a teaching assistant assign grades to teacher candidates for their participation in the discussions using the established rubric, and to flag elements of discussions that were potential problems and bring them to the professor's attention. The involvement of the teaching assistant demonstrated to the teacher candidates that they were accountable for their participation, but they knew that it was not graded, and so felt more free to articulate their concerns and opinions. They knew from the quoting of discussions in whole class lectures that the professor was involved and recognized the engagement and the value of knowing what they were thinking and learning.

1 In this paper, we do not include samples of student Digital Dialogue responses because our aim is to focus on the tensions and lessons we experienced as teacher educators. If readers are interested in data from student perspectives, see Cutri, 2011; Cutri & Whiting, in press; and Whiting & Cutri, in press.

3. Connecting online and face-to face sessions

The third of the four major tensions we identified was the struggle to build connections between online and face-to-face sessions without being repetitive. Related to this challenge is the tension of trusting that the teacher candidates deeply engaged with and understood all the material online beyond simple recall on a quiz. The struggle to extend the knowledge that teacher candidates already possess when they come to a face-to-face class session is a classic one that professors face when guiding teacher candidates through their zone of proximal development. Relying on an electronic class session to deliver background knowledge can be even more complicated.

Professors generally have faith in their own teaching -- their presence in class, their lecture abilities, their well-designed learning activities. After a class, most professors can provide a general assessment of the students' response to the topic and how well they have understood the material. However, when the students have experienced all of the content online without any live professor present, we were unsure how to measure or feel confident that the learning experience had been successful.

One lesson learned regarding how to identify student knowledge gained through the electronic sessions is that, as in the face-to-face class sessions, it is helpful to design activities that ask teacher candidates to produce actual products. These products must utilize the information that the teacher candidates learned electronically and provide the professor an artifact of their learning through which to evaluate their understanding of the content. Teacher educators need to be aware that electronic sessions are communities of practice in and of themselves. (As mentioned previously, the digital dialogues are also communities of practice affiliated with the electronic sessions.) Examples of products that we assigned for online sessions included memos convincing another person of the key issues of a topic, short structured video responses, an analysis of opinions voiced about the topic in the form of a short paper, polling of friends and relatives. (See Appendix C for an assignment example.) Often these products were shared on digital dialogue and served as the source for those discussions of the topics. However, these products were also turned in and graded independently as course requirements.

It was important for us to be able to document teacher candidates' understanding beyond mere recall of facts presented electronically. One of the reasons for this was because we wanted to be able to identify themes and trends in how teacher candidates were responding to the online material. We were interested in how effective materials and activities were in pushing teacher candidate thinking and change. By having products posted electronically and reviewed if possible before the next class session, teacher candidate response to the materials and learning from them was made visible. We were also then better prepared for resistance, support, or apathetic responses to material from teacher candidates.

4. Relationship-building across distance

The fourth tension we observed was the difficulty of building relationships across electronic and physical space. Of course it can be challenging to memorize teacher candidates' names and build

connections with them in face-to-face sessions, but when electronic sessions are interspersed with face-to-face ones, both peer-to-peer and teacher candidate to teacher educator relationship-building becomes more difficult.

Our findings suggest that an effective way to establish relationships across electronic and physical space is to meet consistently with the teacher candidates face-to-face at the beginning of the semester. We have fourteen class sessions per semester, and we meet face-to-face for the first five to eight sessions before switching to a flipped learning model in which students meet electronically every other class session.

During face-to-face class sessions professors have the opportunity to demonstrate the breadth and depth of their knowledge, their understanding of the nuances of belief, opinion, and disposition. Yet even though professors' online materials, activities, and products are designed to push for deeper understanding, teacher candidates often treat these materials as if they are incidental. Their comments often indicate surprise that professors understand and are highly familiar with the ideas, controversies, and materials posted.

We found it difficult when we were not physically with the teacher candidates to express our presence and expertise since we conceptualized electronic sessions as a free zone where teacher candidates would take up new ideas, struggle to understand them with peers, and grow as professionals. We initially tried talking-head videos as a means of interjecting our presence. However, in our experience talking-head videos do not work well as a means of projecting professor presence or establishing expertise. Research confirms that single source artifacts such as talking heads and voice-over lectures accompanied by slides are not compelling to learners online, but rather that learners receive scattered, multiple sources of information and make sense and meaning of those sources as opposed to a single professor delivery model (Siemens & Tittenberger, 2009).

The four tensions that we identified in our efforts to capture the potential of blended learning informed by sociocultural pedagogy included: 1) finding the appropriate format for online materials; 2) facilitating meaningful online conversations and discussions; 3) connecting online and face-to-face class sessions; and 4) building relationships across distance. We now explore the implications of these identified tensions.

Implications and Conclusions

Across the four tensions we identified there was a common overriding dilemma, which centered on our role as teacher educators in a blended learning environment. Computer- mediated instruction can be interpreted as merely putting learning materials online and granting autonomy to teacher candidates to make their way through them. Our commitment to sociocultural learning theory demanded that we further critique and question what roles teacher educators could most effectively play in a blended learning format.

The four tensions we identified are not easily addressed by making one choice over another. Rather, the points of tension became productive areas of inquiry for us to explore our role as professors. Recognizing the points of tension forced us to develop new understandings of how to scaffold teacher candidates through their zone of proximal development and encourage them to evolve toward full participation in their learning community, electronic or live.

The blended learning environment of the course enriched the teacher candidates' learning, but only after we as teacher educators systematically and rigorously reflected on our practices in light of sociocultural learning principles we are committed to and made needed adjustments. Many areas need further examination. Data collected from teacher candidates about how they make sense of the extension during face-to-face class sessions of materials presented online and how they make sense of their digital dialogue experiences would be insightful. Another area of further investigation is the ways in which teacher educators' presence is experienced during online sessions. We wonder in what ways our perceptions as teacher educators are similar to or different from teacher candidates' perceptions. We offer our four identified tensions and our wonderings to others interested in utilizing technology to pursue sociocultural teaching.

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Appendix A

Social Media Dialogue

Use social media to facilitate a conversation about race from an event in the news, etc. (on Facebook, Instagram, Twitter or if you don't have access to social media, create a survey or email friends to start a conversation). Follow and respond to what your friends say.

1. Be sure to choose a recent current event (nationally or locally) involving racial identities, racial tensions, etc.

2. Be sure to think carefully about how you present the event on social media to ensure that you open up opportunities for your social media "friends" to explicitly express opinions about racial identities and racial tensions. We suggest that you consistently monitor the comments you get and interject in the "conversation" by sharing insights and understandings that you have gained from this class.
3. Do not just let the comments run wild. You are responsible for facilitating an honest and respectful conversation about race and the current event you posted about.
4. Write a 1-2 page analysis of the conversation that occurred. Do not just summarize what was said. Rather answer questions such as: *What were the trends in the dialogue and what implications could they have for students in your future classroom? What major concepts from class best describe the trend(s) that you saw?(Deficit theory? Fundamental attribution error? Thin-slicing, etc.?) What major concepts from class helped you address the trends you identified? How did it feel to be responsible for facilitating an honest and respectful conversation about race and current events?*

Appendix B

Scoring Guide for Digital Dialogue Inquiries

Video

- 10 points for doing the activity
- 1 point each for answering each question

Discussion Rubric

A-level work: Insightful. Shows careful reflection and learning. Makes connections between two or more of the following: course material, previous readings, online sessions, assigned book for this course, core beliefs, own past experience, applications to future teaching and students. Responses are original, showing deep understanding of the subject matter and its applications. Questions asked to group members are meaningful, thought-provoking, useful, and applicable to how this affects society and the classroom.

B-level work: Shows careful reflection and learning. Similar to the A-level grade, connections are made, showing understanding of the subject matter; however, understanding of how to apply the learned knowledge is not as deep. Questions asked to group members may not be as relevant, useful, or thought-provoking. Expresses opinions and reflections, but may lack evidence of how this relates to future students or teaching.

C-level work: Satisfactory. Responds to each video. Contributes to discussion and shows learning, but does not show originality, insight, and effort. May just be repeating what other group members have already said. Lacks in understanding of the subject matter.

D and below: Does not respond to each video. Does not show learning. Lack of originality, insight,

and effort. May be restating or summarizing information. Answers may be overly short with no real content.

Appendix C

Gender & Sexuality Learning Activity and Digital Dialogue Inquiry

Choose one of the following options. Report your experience on Digital Dialogue following directions below.

- Break a gender norm
- Attend a support group about a gender- and sexuality-related issue (e.g., Understanding Same Gender Attraction [USGA] meets at Provo Library Thursday evenings)
- Attend a support group for pornography addiction or for domestic violence

This assignment is a 2-week process. After doing one of the learning activities listed above for Gender and Sexuality, complete the activities below on Digital Dialogue.

Initial Post Due at 5:00 pm on Saturday, February 21st:

Reply to this post with a video of yourself answering each of the questions below. (15 points)

- Brief description of what activity you did (when, where, who).
- What expectations did you have before the activity, and what surprised you?
- How did the experience challenge or reinforce your core beliefs?
- What do you feel was the most interesting or important thing you learned?
- How will this learning impact your relationships with future students?

Due at 11:59 pm on Wednesday, February 25th:

Watch each group memberimpact your relationshipsmeaningful discussion by replying with a typed response to the videos. Respond to each video at least once; however, keep in mind that this minimum requirement may not be enough to constitute what counts as a meaningful discussion. You will be graded on how well you show that you are making connections between the course material, the online sessions, the way you view society, your core beliefs, your own experiences, and your future teaching. You are welcome to ask your group members questions about their opinions as well. (20 points)

Here are some questions to help get you thinking about possible responses. This is NOT a checklist of requirements.

- What comments made by group members expanded your point of view and why?
- How does this subject affect students in their everyday lives?
- How do the comments and experiences made by your group members connect with what you

have learned in the online session, previous readings, or your assigned book for this class?
- How has studying this subject affected your social viewpoint or perspective of society?
- To what can you relate from personal experience, and how does this knowledge affect you as a future teacher?
- How do these experiences change or reinforce your core beliefs?
- How whas your understanding of the "single story" expanded?

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Creating Meaningful Learning Opportunities Online

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In recent decades, the use of information and communications technology has provided opportunities for student-centered education that enables students to control and influence their own learning. The impact of technological change has also presented new challenges for educators as they teach increasing numbers of courses online. These new settings sometimes create tensions for students and teachers (Oliver, 2003) but also offer opportunities for new ways of learning and teaching.

This calls for new thinking in teacher education. As teacher educators at the School of Education of the University of Iceland (UI), our response to these opportunities and changes has been threefold. We developed an engaging online learning environment, expanded our constructivist teaching approach, and created a collaborative self-study of our practice. In this article we will present findings from the self-study, describe how we organized a course on inclusive practices taught in a blended format (i.e., online, along with intensive on-campus sessions), and discuss the successes and challenges we have met. We focus here on how we developed the online learning environment, students' activities, and interactive communication.

Context & constructivist pedagogies

The UI School of Education has offered distance education for undergraduate and graduate students for more than two decades. The undergraduate programs have offered both campus-based and distance courses, and the graduate programs have offered mixed distance study that includes three to five days of intensive sessions on campus per term in what are often referred to as blended/hybrid courses (Jakobsdóttir & Jóhannsdóttir, 2011). One such course is Working in Inclusive Practices (WIP). There have also been changes in the programs, so course sections now consist of students from several majors who have a wide range of teaching experience and different school-level concentrations.

Distance learners and online courses

Findings from research on hybrid courses at the UI School of Education indicate that students who choose to pursue their studies online differ from those who choose traditional face-to-face courses on campus. Online students tend to be older, live farther away from campus, and have a heavier workload (Jakobsdóttir & Jóhannsdóttir, 2011). These findings also indicate that younger students and students who live farther away tend to want fewer meetings on campus and prefer to use the time there more for discussion and collaboration and less for listening to presentations. In a further study on the quality of these blended courses, findings indicate that students had concerns about the organization

the class schedule, conflicts between courses, cost, poor use of students´ time, and confusing overall organization of the courses (Jóhannsdóttir & Jakobsdóttir, 2012).

The importance of using new technologies in a structured way and giving students opportunities to participate through teleconferencing or online conferencing emerged prominently in these findings and became an important factor for us as we developed WIP. We believe that intensive sessions on campus are important for networking, collaboration, and hands-on work. A study conducted at the University of Akureyri on an online course that students could take any time during the term, at their convenience, showed that most students were satisfied with the opportunity to study that way. They also reported that it can be lonesome to study online; therefore, it is important that teacher educators respond to students' questions both regularly and quickly. However, half of the students did not want to have more than one course per term organized this way (Björnsdóttir, 2012).

These findings indicate that students want diverse course formats as well as flexibility in their studies. This situates teacher educators at the forefront of creating learning environments that respond to diverse learners and their resources—the personal qualities and strengths that emerge from and shape a person's life experiences and actions (Rodriguez, 2007)—and to "walk the talk" as they develop inclusive practices.

When student teachers decide to enroll in online teacher education programs, they have to learn new ways of studying, including participating in virtual collaboration and forum discussions. However, if the changes needed to support learning are not accepted and facilitated at the institutional level, there can be tensions and frustration (Jóhannsdóttir, 2014). The teacher education department needs to acknowledge the emerging paradigm by adjusting rules and the division of labor in accordance with the new model (Jóhannsdóttir, 2014).

Supporting competence for teaching in inclusive schools

Our focus on inclusive education (IE) and innovation education was central to the creation of the course. Both are social constructivist approaches. Learning through social interactive processes and developing community through cooperative group discussions has become part of our teaching practice. Through reflection and dialogue, students gain the opportunity to develop new understandings and shape their learning (Farren, 2009; O'Donahue, 2003; Shor & Freire, 1987).

Inclusive education (IE) is an educational policy that involves consistently developing a system that offers equitable learning opportunities that build on students' resources. It is based on universal inclusion, accessibility, and the participation of all students. Diversity in the student population is embraced; all students are welcome at school (European Agency for Special Needs and Inclusive Education, 2014; UNESCO, 1994, 2008). However, accessibility to the school system is not enough; all students must have the opportunity to participate in a meaningful way. Inclusive schools therefore require teachers who have the competence and values to build on all students' resources and who are ready to institute inclusive practices (Guðjónsdóttir et al., 2007; Reynolds, 2001). As candidates enter

teacher education programs, they bring valuable resources—their talents and skills, built on their experiences, knowledge, and beliefs—to their studies. Our intention is to draw upon these resources as we establish a learning environment that supports students in making meaning and taking action in their teaching settings (González, Moll, & Amanti, 2005).

Innovation education

In 1999 innovation education was introduced in the curriculum of Icelandic compulsory schools (Ministry of Education, Science, and Culture, 1999). Innovation education—or innovation and entrepreneurial education (IEE), as it is called in Iceland (Jónsdóttir & Macdonald, 2013)—is about applying creativity and knowledge to meet needs or solve problems that learners identify and consider important. IEE inherently involves social constructivist pedagogy with culturally sensitive approaches that link students' learning to everyday life (Gunnarsdóttir, 2013). The aims of IEE are to help people develop the capacity for action and critical and creative thinking through dealing with real-life issues (Jónsdóttir & Macdonald, 2013).

We introduced IEE into the course as a creative approach that encouraged inventive ways to deal with difficulties and issues of living in the modern world, and in particular with being a student teacher and becoming a responsive educator. The core pedagogy of IEE has been defined as emancipatory pedagogy, where learners are creative explorers and the role of the teacher is to be a facilitator rather than an instructor (Jónsdóttir & Macdonald, 2013). Inclusive practices call for teachers who have the pedagogical competence to respond to diverse groups of students. Teachers need to have a strong grasp of content areas, understand child development and individual differences, and be committed to the education of all students. Their competence lies in their ability to use their knowledge to create learning spaces where diverse students can benefit from their education (Guðjónsdóttir, 2000). Through the approaches and the pedagogy of IEE, our goal was to help teacher candidates develop creative teaching skills and create learning opportunities for diverse groups of students in inclusive schools.

Self-study in a blended course

The purpose of this study was to see how we could create an online learning environment as part of our course on teaching diverse groups of students in an inclusive practice. Our intention was to give the students opportunities to participate in meaningful learning moments in a diverse group, applying creativity and knowledge to solve problems that they identified as they worked in inclusive settings. The goal of the study was to understand and learn about the opportunities the online space affords. Thus, the research question was: How can we create meaningful learning opportunities online? We wanted to learn how to create a constructivist teaching and learning community online within the blended course we taught during the spring term in 2013 and 2014.

A self-study methodology grounded in an understanding of the action-reflection-learning-action cycle guided our inquiry (Bodone, Guðjónsdóttir, & Dalmau, 2004). However, we not only reflected on our practice but also generated questions about our teaching and how we could respond to the

challenges we faced teaching online (Korthagen & Kessels, 1999). By focusing on our collaboration, planning, and teaching as well as on students' participation and learning, our understanding of the affordances of online teaching began to emerge. To understand our practice more deeply and to support our findings as self-study practitioners, we attend to the voices of our students to see if they provide evidence for our claims (Pinnegar & Hamilton, 2010).

We examined what we were doing, and how and why, in order to further understand our practice and to foster our development in becoming critical and responsive at the same time. Our intention was to offer students quality education that was practical and empowered them as professionals. In addition to the three of us, groups of students that included both experienced teachers and student teachers participated in the study.

The course is an elective and takes 13 weeks. It is taught online, along with five intensive days on campus in four sessions (one two day session). The data we gathered over the two years of the study included minutes and recordings of the meetings we held to prepare for the course and to analyze it, as well as of our professional discussions; e-mail communications; tickets out of class (TOCs); documentation from the online program; and students' assignments, discussions, and projects.

As we discussed and critically reflected on the teaching and learning, the data analysis took shape. Each of us looked at the data with an open mind and coded it by marking incidents and issues that interested us or spoke to us. In the next step, we focused on looking for evidence of constructivist pedagogy—how the learning environment was responding to student resources and providing opportunities for learning. Then we further analyzed the data together, combining and expanding the emerging findings in light of the research questions, through discussions and writing. We thus constructed an understanding and a description of the learning environment we had created.

Creating learning opportunities online

Two different groups of students participated in the class; some attended the blended course and others chose or needed to take the course completely online. We refer to the first group as blended distance students (BDS) and the second group as online distance students (ODS).

We wanted to respond to the students' diverse needs by organizing an active and supportive learning environment online as well as on campus. Our response was twofold: (a) we maintained the online learning environment for both groups of students during the in-between online sessions, and (b) we designed an additional learning space for the ODS in place of the on-campus sessions.

Designing learning environments

In the course, we introduced various teaching methods, different approaches to gathering information about students, and a variety of ways of designing inclusive learning environments. In addition, we emphasized collaboration with parents, colleagues, professionals, and paraprofessionals. To meet

the course objectives, we focused on teaching approaches and educative assessments known to be effective with diverse groups of students. However, we intended not only to introduce the students to different teaching methods, but to use those methods in our own teaching as well. One of our students said:

> *The way you organized the lessons was informative; instead of letting us just read about multiform teaching strategies, you used them in class. After each day we listed the strategies and it was surprising how many you used and convinced me that it is possible to use many different strategies in our teaching. (Haraldur, self-evaluation report, 2014)*

The course is grounded in students' independence, responsibility, and participation, and we organize lectures, projects, collaborative work, discussions, formal assignments, and educative assessment accordingly. During the four intensive sessions on campus, we designed a learning environment that was active, creative, hands-on, and supportive, and we encouraged students to make use of the resources within the group. Students responded positively to this approach; as one commented, "It has been educational to attend the sessions on campus, work on the tasks and projects, and to connect with the students in a dialogue or work" (Jóhanna1, course evaluation, 2014).

In planning the course, we built on and expanded each other's ideas. For example, in one meeting Svanborg suggested building on students' resources and Karen suggested we could ask students to write a case history that begins "I remember." Hafdís took that idea further, pointing out how to use that story for us to analyze the resources students drew on in the case they described. Students appreciated the versatile teaching and learning methods we offered:

> *I have got a lot out of the face-to-face sessions and the discussions have been interesting, and the multiple teaching strategies will certainly help me in my future teaching job. (Johnathan, course evaluation, 2014)*

This was not a surprise, and it is consistent with our previous experience. However, as we reflected on these responses, we felt it was important for the ODS's learning experiences to be similar to the BDS's. In spring 2013 we decided to develop assignments for the ODS that were like the creative hands-on projects and discussions on campus. We developed this approach over two years; it creates valuable learning opportunities for the ODS and gives us an opportunity to follow their learning progress.

Online environment for all

The in-between online sessions consisted of discussion threads about the topics we were focusing on,

1 All student names used in this essay are pseudonyms

readings, and presentations. During online sessions students worked independently on different assignments and presented them on the course site either individually or in groups. Initially we were not prepared to post all the small assignments and projects from the on-campus sessions, but in 2013 we decided to respond quickly to the students that did not attend on-campus sessions and uploaded each presentation. We also created different folders for turning in the hands-on assignments. This made the online learning environment, Moodle, more complex than we had planned. The students pointed out that our Moodle site was becoming confusing; one student described her experience:

> *In spite of being very satisfied with the course as a whole I found the system online confusing. There was a lot going on in Moodle both in discussions and [when we were] turning in tasks and projects. I was constantly afraid I would miss something. (Þóra, self-evaluation report, 2013)*

This view was common among the ODS because they had to turn in a number of hands-on assignments and various small projects that the BDS finished during on-campus sessions. We have responded to these comments by working on overcoming the limitations of the Moodle environment.

Between the intensive on-campus sessions, all the students used Moodle to discuss different themes, connecting reading materials to their own experience. This turned out to be a challenge. Even though students presented their thoughts, it seemed harder to develop them into real discussions. One student described her experience:

> *It is very hard for me to start discussions on Moodle. I also do not find the so-called discussions to be real discussions. Often I was just repeating what the last person had said and I found that a bit pointless. (Linda, self-evaluation, 2014)*

As we analyzed the data in spring 2014, we decided to respond to the issue of online discussions and develop a different format for the following year. Our idea was to create a space for students to write articles about education and post a few at a time for responses and discussions.

Transferring active learning on-campus to online learning

As we realized the importance of the hands-on tasks in on-campus sessions and of the positive feedback from students, we wanted to create similar learning experiences for the ODS.

Activities on campus and on line

All the presentations were recorded and uploaded to Moodle along with their accompanying slides. We modified the activities and created discussion threads. At our meetings, we talked about those changes and our rationales for them:

> *H: In the last on-campus session we saw that students who attended were engaged in the tasks we provided. And the TOCs also showed that they felt active and engaged.*
>
> *K: Making the online tasks is enacting the nature of our pedagogy; it is about whether the tasks are engaging and creative and empower students.*
>
> *S: We are transferring the experience to online students. It is about caring about those students enough to give them similar learning experiences as [the ones] we designed for the on-campus sessions. (meeting, February 2014)*

One of the tasks transferred from on-campus to online learning was using recyclable materials to convey the message taken from a film about a teacher who connected with her students through writing. All of our students watched it before attending the on-campus session, and in class they reflected on it, analyzed it, and related it to what kind of teachers they wanted to become. Our classroom became lively, and students were creative as they used recyclable materials to represent how the work of the teacher affected their own thinking. We wondered how to transfer this opportunity for thoughtful learning to the online class environment and whether the ODS would respond to this assignment. In her journal, Svanborg wrote:

> *I wonder how the ODS will do this task—will they resist it? And will they experience the same creative buzz I saw with the students doing this in small groups on campus?*

The ODS followed the instructions and, in their various locations, used recyclable materials, made their representations, and uploaded a picture of the outcome (Figure 1) accompanied by a written description of it. Sigríður wrote:

> *The teacher is immersed in reading the students' journals. You can also see the diverse group of students in her class with a journal in their hands; they are actively writing in their journals. I wanted to show how the writing in the journals taught the students to be open and talk about their experience and how writing got them to trust the teacher. (Moodle task, 2014)*

In discussing the outcome of the online activities, Hafdís pointed out that the ODS seemed to welcome the opportunity to work online, display their projects, and explain their process. She described how the response to these online tasks surprised her and said that they were worth pursuing. She could feel the engagement and found it exciting that the students understand and construct their

Figure 1 Sigríður's interpretation of the film

knowledge in different forms (meeting, May, 2014). We felt the students' excitement as we studied their creations, and we have continued to structure these tasks for the online learning environment.

One of the things we did was to open up a forum for all the students to develop their own professional working theory (PWT). PWT builds on three components: practice, theory, and ethics—that is, on the often hidden foundation of everything teachers do or wish to do in their teaching. To support students in critically reflecting on their work, participating in discussions about theory, and developing a personal statement, we used the PWT instrument, which consists of three pages of questions about the three components. During the on-campus sessions, the BDS interviewed each other about their reflections on practice, theory, and ethics. The ODS interviewed one another in pairs, using online programs for a video call or a cloud meeting. They recorded their interviews and used the information they collected as they pulled together their personal PWT. This activity supported students in communicating and reaching out to each other as they worked on their task.

Supportive online learning environment

The ODS appreciated the online learning environment. Salvör was one of those who felt it had empowered her:

> *I listened to all the recordings of presentations and they were well organized. They were immediately uploaded and that was very helpful as I could then [do the] work right away and turn [it] in on Moodle. I am used to studying online and found it rather easy to do those lesson-tasks alongside listening to teachers' presentations. I loved reflecting on and contemplating the different issues and tasks such as making artifacts and things with my hands. (self-evaluation report, 2014)*

Other ODS expressed similar views, and many of those students were grateful for the quick responses and feedback. Guðrún said, "It was very easy to get assistance from the teachers online, they helped me when I was stuck and answered my questions quickly" (self-evaluation report, 2014). Linda, who was teaching while she was pursuing her studies, said she noticed that the course changed her thinking about inclusive schools and that she now looked at her students differently: "I started to look at each group as a whole with collective strengths and resources, rather than just focusing on their individual shortcomings" (self-evaluation report, 2014).

Throughout the course, we developed different hands-on creative tasks; one of them was having students use Lego blocks to interpret their experience of the course. This was a challenge for both the BDS and the ODS. However, both groups became engaged in the activity, highlighting their individual and collective experiences. The ODS photographed their symbolic Lego interpretations to upload on Moodle along with written statements about them. Describing her Lego representation of the course (Figure 2), Sigrún explained:

In the middle the teachers drive a yellow car representing the knowledge for students delivered in different directions. The lines symbolize the routes to learning materials that the teachers opened in order to meet and respond to different needs in the student group. The wheel represents the freedom we had choosing the topic for our final assignment and how we presented it.

Figure 2 Sigrún's interpretation of the course

Behind the teachers, I sit in front of a yellow window representing my computer screen. The plant

shows that even though I was at home I experienced good connections with the teachers that responded quickly.

Indicators of the ODS's engagement and experience of the online environment were also evident in other data. Anna wrote:

> *I evaluate this course as very good, highly educational and well planned. I have learned a lot as I described in this report in detail and I have been able to take it completely as a distance course as my situation does not allow traveling to Reykjavík to every on-campus intensive session and for that I am very grateful. (self-evaluation report, 2014)*

These statements and other data show how the ODS approached their tasks in creative and thoughtful ways. However, there were also incidents that shed light on various challenges that students encountered, such as loneliness in doing projects by themselves, missing face-to-face interactions with fellow students and teachers, and having to express themselves in different ways.

Throughout the term, we wondered how well we did in creating an active learning environment online. We found it to be daunting but also exciting as it offered the potential for our growth and development as teachers.

Travelling from past to future

Our intention was to design a dynamic, hands-on course on inclusive education that used IEE approaches and built on student resources. Our previous experience in organizing online discussions had generally been successful; students participated in meaningful conversations that sometimes were led by the students themselves and sometimes were led by teachers. However, this time was different. The students felt that the discussions became more like reports or summaries of the readings, with little continuity or flow, and that they didn't learn much from participating in the online exchanges. The dialogue and critical reflections we aimed for didn't occur (Farren, 2009; O'Donahue, 2003; Shor & Freire, 1987), so in spring 2015 we created an online platform with guided discussions among smaller groups of students about articles they wrote and posted. We are learning that this better reflects students' critical thinking. In addition, because students found the Moodle environment to be increasingly complicated, in spring 2015 we began to reorganize it, providing more structure. We intend to continue improving it.

According to our findings, students were satisfied with the on-campus sessions. They liked having face-to-face classes, interacting with other students and teachers, experiencing multiple teaching strategies, participating in hands-on activities, and receiving direct support. We decided to adapt the versatile teaching methods and various tasks for an online environment by adding a learning space for the ODS. This was a challenge, but it also led to solutions that expanded student learning opportunities. We found this experience exciting as we had to learn new ways of teaching and often spent

considerable time during our meetings figuring out how to achieve this goal.

For online teaching to be successful, its development has to be facilitated at the institutional level, and teacher educators need to be supported in tackling the new learning system and overcoming frustrations (Jóhannsdóttir, 2014). The UI School of Education can accordingly support the development of online teaching by acknowledging the extra work needed to create comparable tasks for both on-campus and online students, allowing additional time for meeting with students in blended courses, and providing online platforms that are more interactive (e.g., by enhancing Moodle).

In spring 2015, when we used the model of implementing on-campus tasks online for the third time, we succeeded in responding quickly to the ODS, much as we do when we teach in face-to-face sessions. Through the self-study, we have come to think that the next step might be to offer online meetings with small groups of ODS after the on-campus sessions.

It was interesting to experience how the ODS responded to the modified activities. Using innovation education helped students apply creative thinking and solve problems instead of avoiding the tasks. We aimed to view our students in their totality, build on their resources, and encourage them to draw on those resources as they become responsive teachers in inclusive practices (Guðjónsdóttir et al., 2008; Rodriguez, 2007). In order to allow the ODS to experience the same or similar activities as those we had designed for on-campus sessions, we transferred those activities to an online environment and learned valuable lessons for our future work from this experience.

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Operations Management Outside of the Classroom: An Experiential Approach to Teaching Enabled by Online Learning

Kristen A. Sosulski & Harry G. Chernoff

This paper describes the design of an experiential approach to teaching operations management (OM) at New York University Stern School of Business. OM students study the design and management of the supply side of business, including how products are produced and how services are supplied. The course discussed in this paper is unique in that students learn operations while visiting real companies and organizations. The foundational concepts are not taught in classroom lectures, but through video minilectures, demonstrations, group work sessions, and practice problems that are available online and can be accessed at any time. This allows for classroom time to be spent interacting with OM leaders in companies throughout NYC. The city becomes the classroom, and students witness the OM processes of real companies through direct onsite observation and discussions with field experts and professionals as well as with their own peers. This approach was inspired and informed by a desire to have students gain experiential interactions with OM professionals and simultaneously learn theoretical models and constructs.

In order to provide an experiential learning course in OM, we needed to completely redesign the onsite course. To realize our vision of learning through experience and observation, we developed online lessons to ground students in the foundational knowledge of the field. The online lessons were designed as weekly modules that included readings, a series of minilectures, an individual assignment, and a group assignment. This structure helped the students develop a theoretical understanding prior to applying their knowledge in real-world contexts, which changed our roles from lecturers to facilitators. The redesign shifted the ownership of the learning from the instructors to the students, who became active participants at the center of the learning.

It was the use of the online learning modules that made this experiential course possible. Using online lessons enabled us to conceptualize the classroom experience and create an authentic learning experience that provided students with opportunities to construct their own understanding of OM by (a) experiencing it in context, (b) engaging in authentic practices within a community of peers (i.e., their classmates), experts (i.e., the course faculty members), and professionals (i.e., business executives in OM roles), and (c) developing a rich understanding of the subject and its relevance to every business.

Literature Review

Constructivist learning theory posits that students construct their own understanding and knowledge (Brown, Collins, & Duguid, 1989; Papert, 1993; Piaget, 1954; Piaget & Garcia, 1991). The focus is

on the process by which knowledge is constructed by the learner rather than on knowledge acquisition (Fosnot, 1996; Jonassen, 1992; Lajoie, 1993). Fundamental to constructivist approaches are "context-rich experience-based activities" (Jonassen, 1992, p. 138). These activities involve attention to the social context and culture in which the learning takes place, the support for the development of knowledge construction, and the opportunities for active learner engagement through authentic practice. The design of both the online and the onsite learning environment for the course needed to support students in this approach, and digital learning resources had to be developed that supported constructivist principles.

The course design followed a learner-centered framework. Learner-centered design (Soloway, Guzdial, & Hay, 1994) focuses on providing students with the necessary scaffolding (Vygotsky, 1978) to help them develop from novices into experts. The online activities in our course also gave students the necessary scaffolding to support the active construction of knowledge, which was further supported through immersion in authentic activities or work (Quintana, Shin, Norris, & Soloway, 2006). Part of the students' weekly online assignment was to address real and current problems that the companies they visited were facing. Students worked in teams on these site-visit challenges to identify alternative solutions and then had the opportunity to discuss their recommendations with the company executives. Situating cognition or learning this way enables learners to see knowledge and its application in context (Greeno, 2006). Specifically, the executives shared insights and the realities of their business that influenced how their companies actually solved these problems.

Discourse is also important to the learning process. Through exposure to professionals in the field, students can "learn (and practice) professional discourse" (Quintana, Shin, Norris, & Soloway, 2006, p. 123). To help learners develop and refine their understandings of the knowledge they are acquiring, it is crucial for them to discuss their ideas and questions with each other and with industry professionals. Finally, students need exposure to the relevant community (e.g., the OM divisions of companies) to understand the culture and environment in which the concepts and principles they learn are applied in the field.

Course Redesign

The newly designed section of the OM course embodied the principles of experiential learning, authentic practice, and attention to the social context that support a constructivist approach to learning. The context was the real-world business setting. The OM business practices of a company—the ways products are produced and/or services are supplied—were observed in the field. Moreover, the online lessons involved collaborative activities that mirrored the challenges faced by the business being studied. The social context involved the community of OM professionals, the class of students, and a group of OM faculty members who participated in scaffolding students in their learning, online and in the field.

The course was given the title Ops in NYC: An Experiential Section of Operations Management.

It was launched in the spring of 2014 for full-time, first-year MBA students and was cotaught by the authors. Between us, we have experience in education, OM, and business.

The Idea

In March 2013 we developed the idea for the course redesign during a lunch conversation with some of our students who were enrolled in an elective course we coteach, Operations in Panama. In it, we take a group of 25 MBA students to Panama to study the Panama Canal, how business is conducted in Panama, small business entrepreneurship, and real estate development. The students expressed great enthusiasm for this course and reflected on the value of learning on location and hearing from industry experts from inside their workplace. We asked the students to comment on their experience in the prerequisite course, Operations Management. They described the course's content as engaging, but saw it as a missed opportunity to learn more about businesses in NYC. Given that we witnessed such success in the site visits in the Operations in Panama course, we considered whether it would be possible to also take students out of the classroom and into NYC for the OM core course. On the university's website, it states that "NYU, in keeping with its founder's vision, is 'in and of the city': the University—which has no walls and no gates—is deeply intertwined with New York City, drawing inspiration from its vitality" (New York University, n.d., para 3). We wondered whether we could realize this mission by using NYC as our classroom. We knew we needed to teach the foundational content of such a core course and realized that it would be a challenge without regular classroom meetings. However, having had previous experience with online education, we thought it could be possible to teach the necessary content in an online format. Online learning is a viable way to enable students to self-prepare for the learning that takes place in the field.

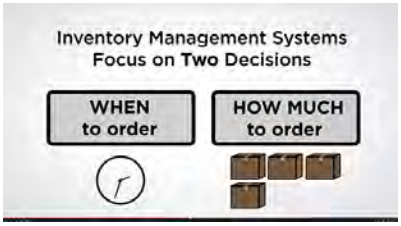
Solidifying the Course Vision

During the summer and fall of 2013, we worked intensively on the course redesign. Our vision for the course was to use NYC as the platform for learning; class time was to be spent at various businesses. The types of businesses and organizations selected were organized around five themes that we felt represented NYC: food, fashion, finance, real estate, and transportation. Each site visit focused on fundamental topics in OM, including process design and analysis, waiting lines, scheduling, inventory, quality, supply chains, operational risk, project management, simulation, and optimization techniques. The nine site visits ranged from a shipping container terminal to an educational farm, all within the NYC area.

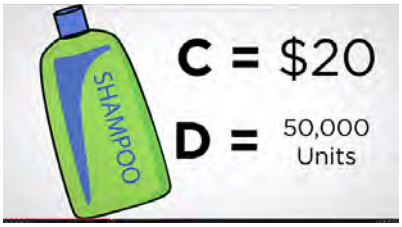
Course Components

As we progressed in our planning, we identified several features of this course that went beyond the traditional OM class: (a) nine online lessons that included the foundational content and collaborative online challenges designed to prepare students for the site visits and (b) nine visits to companies and organizations.

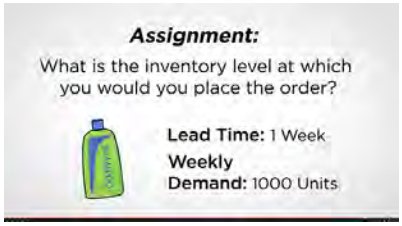
Online lessons. Given the strong emphasis on learning in the field, a series of sequential online activities were designed to support foundational learning and concepts. Online lessons in OM, each of which included three faculty-led videos that ranged from one to seven minutes, were part of the learning environment. These videos helped to strengthen students' understanding of foundational concepts as well as their ability to make OM decisions through accompanying practice exercises. The video sequence followed a simple format: (a) a brief introduction to the topic, (b) a problem-solution demonstration; and (c) an assignment: a challenge related to the topic. The assignments served as the weekly formative assessment. The first video (in Figure 1) is an overview of an OM topic, inventory and inventory models. The second video (in Figure 2) is a problem and solution demonstration by an OM faculty member. The third video (in Figure 3) introduces an individual practice exercise for students to solve based on the second video. Students submitted their work online to the instructors who provided feedback on these assignments to help students refine and improve their work.



Video 1. Introduction to inventory management by Professor Srikanth Jagabathula (New York University, 2014b). The video is available at: http://youtu.be/kGPr9oeNoMQ



Video 2. Problem-solution demonstration by Professor Jagabathula (New York University, 2014c). The video is available at: http://youtu.be/JCt1IVSjsuM



Video 3. Introduction by Professor Jagabathula to a practice exercise for students to solve based on the video referenced in Figure 2. (New York University, 2014a). The video is available at: http://youtu.be/pIOzdftXsXc

The principles of multimedia learning (Mayer, 2001) were applied to the design of the lesson and the videos that comprised it, which were created using animation and narration rather than the typical talking-head format. The introductory and problem-solution demonstration videos were each between five and seven minutes. The assignment video was about one minute. Figure 4 shows the content of a weekly lesson.

Each of the online video lessons was created and led by a different OM faculty member. Inviting other OM faculty to participate in developing content for the course helped us achieve two important goals. First, it served to extend the community of experts beyond the course faculty. We thought this would be a way to highlight and leverage the expertise of the OM faculty at NYU Stern. Second, including others in the course design enabled us to begin a dialogue with our OM colleagues concerning the new course format and to facilitate a culture of collaboration and experimentation in teaching. Our vision was to incorporate an experiential element into every OM core course at NYU Stern.

The online lessons were intended to enable students to study foundational concepts and models

Figure 4. A weekly online lesson for Ops in NYC.

online; to work in teams on real business challenges; and to observe those concepts, models, and business challenges on location at a different firm each week. In the course evaluation, many students commented that the online minilectures had been very helpful, although some students indicated that they wished that additional resources had been provided. Out of the 11 students who responded to the postcourse survey, 90% indicated that they had found the online video lectures and problems at least somewhat important for developing their knowledge of OM, with 72% indicating that the lectures and problems were important or extremely important in that regard. Furthermore, 72% of the respondents indicated that they found the online lessons at least somewhat important for developing their skills in operations consulting, with 54% indicating that the lessons were important or extremely important for that.

In the field, students observed the operational techniques, processes, and strategies employed in a va-

Figure 5. A weekly online lesson for Ops in NYC.

riety of contexts. For example, during one site visit, they learned how a retail store used two different types of inventory models, both of which they had studied and discussed during the weekly online lesson.

Preparation for the site visits. In preparation for each week's site visit, students worked in teams of four to complete an online challenge that typically included a brief case study and questions that helped them analyze the challenges faced by the firm and guided them in their exploration, observations, and questioning during the site visit. (See Figure 5 for an example of a pre-site-visit group challenge.)

To ensure that the students' time on site was used effectively, prior to the site visit students were also required to identify their learning objectives and then develop questions for the industry experts that were designed to ensure the attainment of those objectives.

Site visits. Our initial thought was that every class would be on location. We agreed to hold three in-class sessions to orient students, followed by nine sessions out in the field. The sites visited included JetBlue, Whole Foods, the NYC Taxi and Limousine Commission, and FreshDirect. To emphasize that students were active participants in the learning process, we set the expectation that they were to approach each site visit in the role of an OM consultant, fully cognizant of the major challenges facing the business, rather than as a "tourist" who expected to be shown the interesting aspects of the business.

The visits to companies and organizations involved a presentation by a company executive and a

discussion with the decision makers, a tour of the plant or office facilities, and a question and answer session. The quality of the students' questions was evidence of the efficacy of our approach to the preparation for the site visits. The student's role during the site visit was to observe the operational processes and participate in the discussion with industry experts. Through observation, students developed an understanding of how the different models and operational strategies were employed.

Results & Refinements

In the traditional classroom-based OM course, it was difficult for students to experience operations in context and impossible for them to engage in discourse with the OM community of experts and practitioners beyond their peers and their professor. In the redesigned course, the online video lessons presented students with expert voices from OM faculty, while the site visits presented viewpoints of practitioners and industry leaders.

The interest level in OM increased with the new experiential format. The course was fully enrolled and had a waiting list, which is rare for classes in this subject at NYU Stern. They also demonstrated evidence of being able to transfer OM concepts from one context to another through their experiences during the various site visits; although a different aspect of OM was addressed at each site, it was clear that students could see that all aspects of OM studied in the course were present during every site visit. The in-class midterm exercise also provided evidence that students could identify and reflect on all operational topics covered in the course and successfully transfer their knowledge of OM from one business setting to another. In addition, the operations consulting project at Sylvester Manor Educational Farm provided an opportunity for students to apply their learning from the course to a set of ill-structured problems—i.e., those that tend not to have one definitive or correct solution—and accordingly apply their collective knowledge in identifying a set of solutions and alternatives in operational decision-making and strategy for the organization.

Reflecting on the class, several students expressed their preference for learning in an authentic real-world setting. One student commented:

> *I'm a hands-on learner…This class was perfect for my learning style. As a future brand manager, I'll be overseeing so many parts of the process, from advertising and marketing to operations and supply chain management. This class showed me how operations fits within the larger business. Having been on an in-depth visit to Maher Container Terminal, I now have a better understanding of why goods take a certain amount of time to ship, for example…The complexity of coordinating different departments in a company, as well as running an effective assembly line, became real and relatable to me. (NYU Stern, 2014, para. 3)*

Another student said:

> *I took this class because I wanted to see operations from more of a strategic aspect…In this class, we took the theory and put it into practice in the real world…This class offered a rare opportunity to hear first-hand from senior executives, who actually spent up to three hours of their time with us. We didn't get all the answers from them; we learned to think more broadly and ask the right questions. (NYU Stern, 2014, para. 4–5)*

Students had two options for the final course assessment. The first, which more than 85% of the students selected, was to individually pursue further study of new OM topics through additional online lessons that we provided. The second, which fewer than 15% of the students selected, was to synthesize their previous learning throughout the course. This suggests that most students were confident and comfortable learning OM concepts on their own after the course and that they used the final assessment as a way to continue their learning. This course redesign afforded students the opportunity to construct their own understanding of OM and challenge that understanding by interacting with faculty experts, OM executives, and their peers. A major contribution of this course was its participation in the development of business professionals who see their role not just as individual practitioners, but as members of a larger community. Business education at the graduate and undergraduate levels has been slow to adopt constructivist practices. This course redesign demonstrates an approach to professional education that can extend into many disciplines within a business school and beyond. It is well known that online learning is often implemented at institutions of higher learning as a way to reach new student populations and to offer students flexibility in their schedules. However, Ops in NYC provided an alternative lens through which to view online learning. The course was exclusive, taken by only 25 full-time MBA students. The online portion of the class was not in that format for purposes of convenience; it was essential for this type of experiential course. Without online learning, it would be difficult to give students a real-world experience and also provide them with the necessary scaffolding to learn the foundational concepts. In this course redesign, we presented a pedagogical reason for online education. We saw an opportunity to transform the lecture-style format of a core course into a live, interactive learning experience within a community of industry experts, faculty, practitioners, and peers.

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Reflection and Technology in Theory & Practice: Teen Engagement in Art Museums

Chelsea Emelie Kelly

Picture this: For a full school year, 16 busy high school students from 10 different schools arrive weekly at their city's art museum for an unpaid internship. Once there, the students are talkative and attentive, amazed when hour-long discussions about historic works of art pass by quickly. They work on final projects and build technology skills to make videos that interpret works of art for museum visitors. They thoughtfully reflect on their experiences in video blogs, written responses, and one-on-one interviews. At the end of the program, one student says, "I feel like the museum is my second home." This isn't a utopian, futuristic ideal: it happens every week at the Milwaukee Art Museum's Satellite High School Program.

Meaning, engagement, and reflective practice are foundational concepts in education today, but facilitating such experiences poses new challenges, particularly when technology presents exciting and ever-changing tools for educators to use. Like classroom educators, museum educators struggle with the challenges of technology: its cost and upkeep, to be sure, but also its tendency to upend traditional

Rosaly shows her family the work of art she chose for her final project. Photo credit: Front Room Photography.

models of information delivery, in which technology is viewed as a distraction that interferes with engagement. However, when used alongside traditional methods, technology can deeply support and enhance student engagement. Because of its deep roots in constructivist education theory, the field of museum education is uniquely positioned to explore how technology, face-to-face interaction, and object-based learning can be used in tandem to create a hybrid method of instruction to foster engagement in art museums, especially within programs for high school students.

This case study shows how the Milwaukee Art Museum's after-school teen program fosters student engagement through a hybrid practice grounded in constructivist pedagogy. This article presents the museum's Satellite High School Program in theory and in practice, including its evaluation methods and its impact on students and the museum. In the spirit of the program itself, which celebrates student voices, participants' own videos, quotes, and experiences will frame my reflections from an educator's point of view.

Background

Museums have long been sites of informal learning for people of all ages. Although field trips for school-age students and traditional lectures for adults are often the first museum education experiences that come to mind, for many years cultural institutions have created innovative programs for diverse audiences that provide opportunities for meaning making, discovery, and personal reflection. Many museum educators use constructivist methods to create programs in which visitors can learn actively and build their own understanding of the world. Open-ended discussions, ongoing programs that foster communities of learners, and facilitated opportunities to connect content areas such as history, art, and science to one's own life underpin many museum educational programs.

Over a 30-year period, the Satellite High School Program has grown from a high school extension program for only two schools to one that reaches 16 students from 10 to 15 different schools in the Milwaukee area every year. From the beginning, the program incorporated aspects of constructivist pedagogy and now fosters 21st-century skills, includes workforce development workshops, and integrates technology while continuing to nurture the students' passion for art by offering direct experiences with objects in the museum's collection. The driving goal is to have students show an increased ability to reflect upon their own experiences and performance. The program's 2013–14 session took place once a week after school in the museum's galleries for the academic year. Students participated in object studies (hour-long dialogues about specific works of art), behind-the-scenes career talks with staff, and resume-writing workshops and gave tours of the permanent collection to elementary school students.

To showcase their thoughts and processes in a broader context, teens created a final project that would have an impact on the museum. They chose a work of art in the museum collection, researched it, and developed their own interpretation of it. Previously, students had used visual art, writing, or performance to create their responses. In 2013–14, students used iPads to produce videos about their chosen

artwork, explaining what the piece meant to them, what it has meant for others, and how it changed their thinking or their personal art practice. In every session, students spent time individually and in small groups with their chosen work of art, using a number of different prompts to continually view it anew: looking closely at a detail; reading a packet of art historical research about the artist and time period; developing questions to explore; imagining the artwork through senses other than sight; connecting it to a subject they were studying at school; and engaging in group critiques. Students participated in technology workshops in order to build their skills with the iPad and the filmmaking process and worked independently to plan, storyboard, write voice-over scripts, film, and edit their videos. We evaluated the program and student growth through pre- and postprogram interviews, weekly exit slips, and the video work the students produced.

View of the final celebration event for the Satellite High School Program. Photo credit: Front Room Photography.

To introduce a more in-depth discussion of the program's theory, pedagogy, and evaluation, what follows is a description, both from my point of view as educator and from the students', of one specific session that took place in the middle of this yearlong program. Although this is an example of one particular class, its structure, activities, and flow are representative of the program as a whole.

Session Description: February 20, 2014

On a winter Thursday in 2014, the 16 Satellite High School Program interns arrive at the Milwaukee Art Museum, greeting each other warmly—a stark contrast to the frigid temperatures outside—and have a quick dinner together. After an overview of our day—which will include an object study, work time on our final projects, and our weekly exit slips—I lead the group into the museum galleries, and we sit on a cluster of stools to study a painting by Agnes Martin.

After a silent minute of individual observation, I open the conversation by asking students to share any thoughts, comments, or ideas they have about the artwork. The teens are used to these dialogues, having been in the program together for a few months, but even so, they are wary as we begin. The painting, *Untitled #10* (1977), is a series of graphite lines on a neutral background. In photographs and at first glance, it looks like a plain grey canvas. From midrange, the pencil lines seem perfectly straight, but as the teens begin to notice, the closer you get to the painting, the more you see: The lines are slightly shaky, and as one student comments, you can almost feel the hand of the artist in them. Meanwhile, from very far away, the lines disappear and the canvas is no longer a uniform color—a circle of lighter gray appears in the center of it. It's as if you are looking at an immensely subtle optical illusion.

Agnes Martin (American, b. Canada, 1912–2004), Untitled #10, 1977. Gesso, India ink, and graphite on canvas. 72 × 72 1/8 in. (182.88 × 183.2 cm). Milwaukee Art Museum, Gift of Friends of Art, M1981.6. Photo credit: Dedra Walls. © Artists Rights Society (ARS), New York. Image link: http://collection.mam.org/details.php?id=2669

And that's the trouble: there is nothing recognizable in *Untitled #10*, although the students try to find something to relate to it, offering up impressions of notebook paper or schoolyard concrete. I sense from their fidgeting and crossed arms that the group is getting frustrated—how could this be considered art? I decide to provide some information to spark new ideas. I share that the work is by an artist named Agnes Martin, and read a quote from her writings: "I hope I have made it clear that the work is about perfection as we are aware of it in our minds, but very far from being perfect—completely removed, in fact—even as we ourselves are" (Haskell, 1992, p. 25).

We begin to talk about the artist's intentions. The concept of perfection seems clear from the carefully traced, nearly straight lines, but the idea of imperfection proves more slippery. We parse out what she might mean, noting that the graphite lines are not in fact perfectly straight and that the background is not flat. One student, Claire, says, "Her quote, and what she's doing in the painting—it's a lot like meditation, isn't it?" Although I have meditated before, I had never thought of this parallel. Claire and I explain that in meditation you accept the existence of chaos in order to find calm within your mind. It's a paradox, but when you stop pushing away that chaos and accept it, allowing it to be where it is, your mind begins to quiet. In the same paradoxical way, Agnes Martin's paintings can be about perfection while actually being imperfect.

There's a collective sigh, a group "hmm," as Claire's ideas begin to shift into focus and Martin's quote suddenly makes sense. Without speaking, we all once again consider the painting, and I step away, studying the students' faces as they in turn study the work once more. Some, like Claire, look entranced by the painting; others remain skeptical, brows furrowed.

I bring the group back together and share that it's time to wrap up the conversation. As always, the teens are surprised that the hour has gone by so quickly. As our minds begin to focus on the here-and-

now again, I ask for final thoughts. "I was really frustrated with this work," Evan admits. "I think I would have just walked right by it if we hadn't stopped to look at it. I appreciate it more now that we've talked about her intentions, but even though I understand what Agnes was doing, I'm just not sure a work of art should be so difficult to figure out."

"Being skeptical is important," I assure him, thereby acknowledging others in the group who might feel similarly. "It's just as valid as feeling totally taken by a work of art. In fact, we should all come at our interpretation of art with a healthy dose of skepticism, even if we like the piece, so that we can think critically about what the artist—and the museum itself—is telling us." I pause to let this sink in, then move forward to wind up the discussion: "All the same, though, was it was worth spending an hour with this painting?" Assent immediately rises from the group; they say it helped them to see more deeply and question more, and even that if we might not all agree that it's art, in the end, it helped us as a group understand more about what art is.

For the second part of the session, the teens work independently on creating their **final project videos**. Each student has focused on one artwork for the full school year, working individually in the galleries to create a series of video blogs, or vlogs—stream-of-conscious thoughts about their artwork that evolved week by week (see example below)—and researching the piece in the museum's library and archives.

Now the teens are in the independent phase of creating their final projects, armed with templates and their imaginations. The group had worked collaboratively to establish a general video format and had decided that the videos had to be three to five minutes long, reflect the student's own voice, and

Alissa shares her experience with the audience at the final celebration event. Photo credit: Front Room Photography.

answer three questions: what the artwork meant to them, what it has meant to others, and how it has changed their thinking. As a group, we also decided that each student would use a voice-over to help content flow smoothly. That way, they could write out in advance what they wanted to say, get edits from their peers and me, and then decide what footage they would need to illustrate their words.

Today, the teens split up between our classroom and the galleries. Over the past year, we've had technology educators walk us through how to use an iPad, go over the basics of movie making, and show us how to use the iMovie app. Using this skill-based knowledge, the teens' mission is to transform their ideas into a video that will be on the museum's public YouTube channel, shared on the museum's blog, and eventually featured as a multimedia asset for visitor use in the galleries.

Students who are more process-oriented start to write out ideas for their voice-over scripts or storyboard out the shots that will go along with their words. Others, whose scripts have already been edited, find a quiet corner and begin to record their voice-overs. Another student is already beginning to piece together her clips in iMovie, and calls me over for a refresher on how to shorten them. Later, another asks for my thoughts on a rough cut of her video; we critique the piece together and talk about how to pronounce a few key art history terms she wants to include. Another group goes into the galleries to start filming shots of their artwork. Lots of students are using a particularly popular time-lapse app, iMotion, that one of our guest speakers had introduced and now are filming fast-paced walking tours from the museum entrance to their piece. Others borrow a tripod to take panning shots of their gallery, artwork, or even the museum architecture to give a sense of setting to their videos.

Finally, we meet back in the classroom, and the students open a web app called Infuse Learning[1] on their iPads to type up their exit slips, quick reflections on the day's session in which they share what they learned that day and what they're still wondering about. Kira, who spoke a lot during the class discussion about Agnes Martin, writes, "I feel like I really started to understand the piece that we studied today. It was through communicating with the group that helped me a lot." Alissa, who was more quiet, says, "I learned that sometimes the meaning behind the process is what makes something art." And Luis, a new student who had joined us only a few weeks ago, writes: "[At first I was] annoyed by some pieces of art like the one we saw today, that I really didn't see no meaning of at first [sic]. But then I realized what the artist was trying to show… Some artworks look like they don't have meanings but when you look at them up close, and learn background information about it, you figure out the meaning of it."

Combining Theory & Practice

The Satellite program is grounded in constructivism, and students are encouraged to build their own unique knowledge sets. My own understanding of constructivism is influenced by four scholar-practitioners—John Dewey, George Hein, Rika Burnham, and Elliott Kai-Kee—whose progressive theories on education, museums, and teaching have informed my practice and led me to integrate technology, face-to-face interaction, and object-based learning into this program.

At its core, the Satellite program is aligned with Dewey's (1938/1977) assertion that "the most important attitude that can be formed is that of desire to go on learning" (p. 48), an outlook that supports

1 Unfortunately, the Infuse Learning website has shut down. I now have students use Typeform to write their exit slips.

learners' motivation to build knowledge themselves. Putting Dewey's philosophy into practice in Satellite, I continually ask students to push their thinking beyond surface-level observations and personal associations, encouraging hour-long discussions about works of art that unpack universal themes and connections to 21st-century life; the creation of final projects that have a life beyond the student and the program; and the production of exit slips in which students reflect on their work each day. For Hein (1998), constructivism is the ideal educational theory for museums, where visitors are able to connect objects to their own lives and thereby create personal meaning from art and history. This happens when visitors are provided with many intellectual entry and exit points, varied opportunities for active learning, and exposure to multiple points of view (Hein, 1998, pp. 34–35). With discussions and projects driven by the students themselves, the Satellite program is decidedly constructivist—students actively shape the program and their experiences, and as the program educator, I consciously build an environment where that can occur.

Finally, narrowing my focus within the field of museum education to teaching with works of art, I use Burnham and Kai-Kee's (2011) dialogical teaching method throughout the program. For Burnham and Kai-Kee, a dialogue about art is an equal playing field in which participants, including the teacher, may take on and switch among four roles.[2] The dialogical method allows students to drive the content, gently challenge each other, and discover their own interpretations about the works of art we study. In addition, I consciously use it to organize our feedback sessions on our final projects and to teach resume writing. As a result, students become more comfortable offering new ideas and even challenging each other in contexts outside of discussions about art, such as when they share their final project work with each other. As one student wrote, "I learned how to communicate better. Sometimes I have a hard time communicating my thoughts into words; this semester has allowed me to practice my communication skills."

Put into practice, these three theories provide the foundation for the Satellite program, rooted in constructivism but using a hybrid method of employing technology, having face-to-face interactions, and studying art objects to help students reflect on art, the museum, and each other—and ultimately learn more about themselves.

Evaluation & Student Impact

Infusing theory into practice is not enough; as educators, we must also infuse theory into our evaluation methods, and evaluation into our practice. As we developed the program structure, I knew it was important to align our evaluation procedures with the goal of fostering students' abilities to reflect. Creating evaluation methods that dovetailed with activities in our sessions, as well as being transparent with the students about this goal, helped make evaluation not a cumbersome necessity but a useful tool, for both the students and me. Although I used one-on-one interviews to quantitatively

2 The four roles include the mover (who moves the dialogue forward in some way), the follower (who agrees, listens, and reinforces), the bystander (who is not inactive, but takes on a resting, attentive position), and the opposer (who offers respectful disagreement or challenge) (Burnham & Kai-Kee, 2011, pp. 87–90).

assess how students had developed reflection skills, primarily measuring the level of detail in their responses,[3] the exit slips and final projects proved a much more nuanced way to document their growth.

The exit slips, which asked students, "What is something you learned today?" and "What is something you're wondering about?" provided a large amount of qualitative data. In the short term, I used them to plan the next session and ensure that each student felt both safe and challenged during the program. In the long term, the responses provide a more detailed image of the students' development in reflective ability. Although I tried to extract quantitative data from the exit slips by analyzing them in two readability tests,[4] there were no discernible patterns in the scores of students' earlier responses versus later ones. However, this analysis prompted me to take another look at the students' responses, and I noticed that while a handful of students had improved readability scores for their responses to "What have you learned today?," their scores had significantly decreased for "What are you still wondering about?" (See fig. 1.)

Figure 1. Sample responses to "What are you still wondering about?"

Student	Early Response	Late response
A	How do you distinguish different periods of art and their styles easier?	What really makes art art? Who specifically deems something as art and what causes us to recognize things as art. Is art just a linear way of thinking that we've adapted to over the century?
B	I am still wondering about the two men in the background of the painting and what their purpose was in the painting.	I'm still wondering about the meaning behind the artwork that [student] chose, specifically the use of skin color on the women.
C	The transition from Neoclassical to Impressionism.	I'm still thinking about destruction and reconstruction. It's weird to think about how they are alike but different.

In their later responses, the teens stopped trying to use high-level vocabulary, began to ask questions about the purpose of art, and mused more informally on philosophical questions of art, destruction, and race. Their responses might not have become more readable according to the Flesch-Kincaid and

3 We used pre- and postinterviews to quantitatively measure reflective ability. Each student was privately asked the same set of questions and was scored on a rubric that measured the level of detail in their responses. Their total preprogram score was then compared to their total postprogram score as a measure of improvement. These one-on-one interviews, which were moments for individual reflection, were meant to be an extension of the program's reflective group conversations. Every student's score rose on average 2.5 points, but tested only the level of detail in their responses—just one aspect of reflective ability.

4 I used the Flesch-Kincaid Grade Level indicator, which approximates the average grade level at which a student could easily read a sample, and the Fog Scale, which indicates reading ease based on the number of syllables and sentence length (Tyler, n.d., para. 4–5).

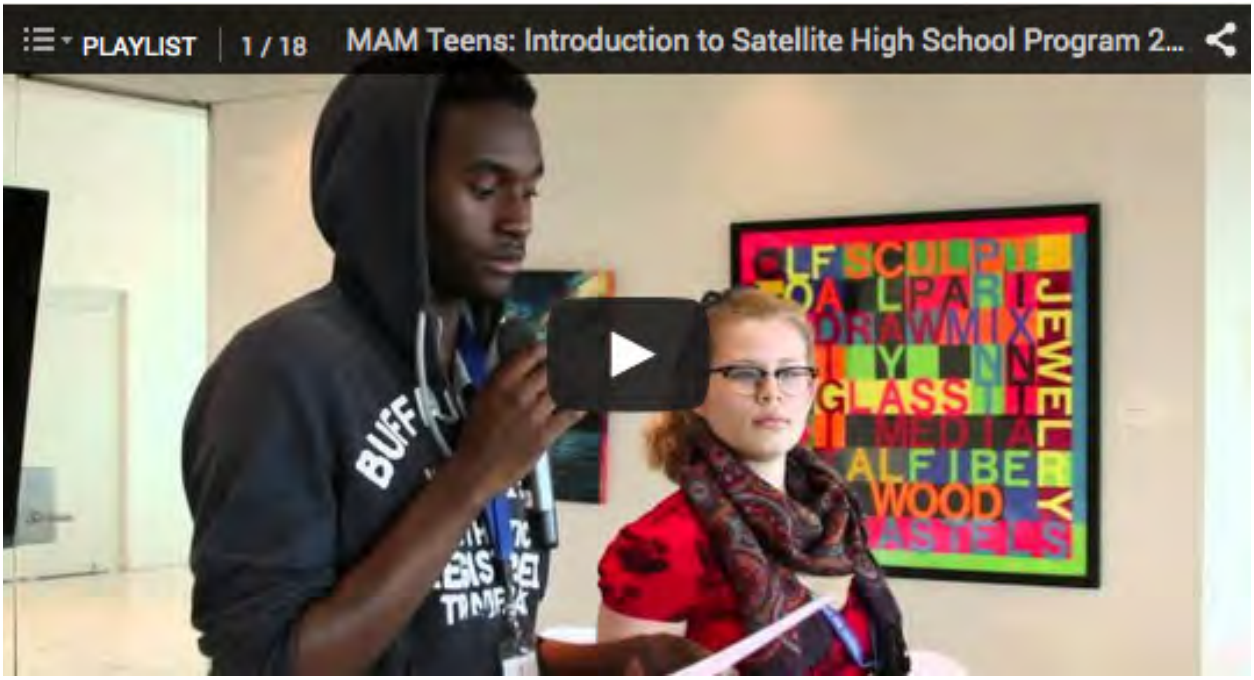
Fog tests, but the students had begun asking questions that do not have obvious answers—a sign that they were developing their ability to reflect on the messy world within and around them and engage in higher-level critical thinking. Their responses also certainly display a Deweyan desire to continue learning.

Finally, the videos that the teens produced were intentionally structured to use a work of art as a personal reflective tool. The teens used their own experiences to share how an artwork had changed their way of thinking. The videos are a diverse representation of the students' many different take-aways from the program, from art historical interpretations to personal connections, and a range of responses in between.

A full playlist of the teens' videos as well as a talkback session at their culminating screening are **embedded** above. **Justine**, for example, used Ellsworth Kelly's canvases to develop philosophical questions about art itself. She asks: "Most say that art is something that attracts attention… How exactly do we decide what is art and what isn't?" [https://www.youtube.com/watch?v=DJBnsZq-ifk]

Alana dove deeply into describing the mythology and historical context of Anselm Kiefer's *Midgard* (1982–85) and tied it all together by asserting, "Kiefer's painting… has a background to it that could be impossible to guess without researching it. This relates to me because a person may see me, but they don't automatically know everything about me." [https://www.youtube.com/watch?v=8JlG-GrHeZPE]

Termeria also drew a connection between herself and her artwork, a glass sculpture by Beth Lipman, saying, "This [artwork] is a metaphoric representation of myself: I may appear fragile, but I have been built up in a way to be strong." [https://www.youtube.com/watch?v=F09PWR_a67Q]



And **Rosaly** chose a still life of flowers that transported her to a different kind of environment: "I grew up in a city, so…weeds are the closest thing to nature when I look down to the pavement. Looking at this piece shows me just how beautiful nature really is." [https://www.youtube.com/watch?v=7RGHbjjQ4gk]

Other students drew direct inspiration for their own artistic practice from looking at a work of art for a full year. Inspired by artist Reginald Baylor, **Kira** began to incorporate more color and clean lines into her work, as well as deeper subject matter such as body image and racism. [https://www.youtube.com/watch?v=c1lJJ1a-uto]

Meanwhile, **Evan**, who had initially been underwhelmed by his chosen artwork, Jules Bastien-Lepage's *The Wood Gatherer* (1881), ended up using it to develop his own point of view as an artist. "I want to be able to connect to my viewers through my art and potentially alter or change their lives for the better," Evan says. [https://www.youtube.com/watch?v=ysGq21Ee-xs]

Inspired by a satirical painting by George Bellows, **Brandon** decided he could better show a personal point of view in his own art: "When working on a piece, I want to put a perspective of my own into [it]." [https://www.youtube.com/watch?v=Z1SNT_IhghI]

Combined, these evaluation tools dovetailed with the spirit of the program itself—teen-driven, reflective, and thus constructivist—while also showing how students were developing reflective ability both during the program and at its conclusion.

Rosaly and Luis show their families and teacher a work of art in the museum. Photo credit: Front Room Photography.

Evan and Kira introduce the Satellite High School Program at the final celebration event. Photo credit: Front Room Photography.

Challenges

This format of the program emerged from three years of experimenting with technology use in teen programs, and the biggest lesson I've learned is that technology is a powerful tool that helps initiate, strengthen, and sustain student engagement with museums and art history. The teens themselves, all of whom had different comfort levels with technology, helped remind me of this as they experimented, asked questions, and worked individually or in groups to troubleshoot as they created their videos. The technology was a tool that they actively learned to use through this project; the ability to broadly showcase the students' thinking and process as well as the questions with which they grappled all gave a broader context to their reflections and interpretations and allowed larger audiences to learn from their work. Their videos have had over 1,300 views on YouTube, blog posts featuring their work have been visited over 250 times, and their work has been supported by curators at the museum who reviewed the videos for inclusion in the museum's forthcoming media guide to its reinstalled permanent collection galleries.

As illustrated above, the students' conclusions about works of art demonstrate well-informed, passionate connections to the museum's collection. Using video also allowed us to share that work well beyond the program itself, thereby building institutional support for youth voices. The videos allowed the passion of each individual student to shine through, and, taken as a whole, they have shown museum staff that youth have the ability to contribute to the museum at large. Indeed, program alumni have continued to engage with the museum, participating in other programs, applying for jobs and in-

ternships, and regularly bringing family and friends to visit. At a time when many museums are eager to attract youth and millennial audiences, in-depth programs such as this provide a key investment in building a new generation of visitors. As a result, the museum is now exploring the creation of a more integrated teen leadership program, convening a community task force to develop and fund an initiative that serves more students while keeping the key program components of constructivist-based pedagogy and reflection at the core.

Conclusion

Educators can foster teen engagement in art museums through constructivist-based, hybrid instruction that allows students to develop technology skills, have face-to-face interactions with each other and museum staff members, and participate in object-based learning exercises. Rather than discarding established museum teaching practices, we can balance tradition and technology, supporting and enhancing object-driven learning with student-centered pedagogy. Students in museum programs benefit from a variety of opportunities to interact directly with the institution: with specific works of art, through guided dialogue, and with staff members whom the students interview about career opportunities in the arts. In order to process their learning, students need the chance to reflect in multiple ways on what they've done—in this case, through writing, verbal interviews, and a video project with real impact on the museum. In turn, the museum itself must respect the voices of students so that teens feel valued and safe at the institution. Technology allows students to make connections beyond the museum by honing media-creation skills and showcasing their work in a broader context.

Group photo of the 2013–14 Satellite High School Program teen interns. Photo credit: Front Room Photography.

When all of these components align, the institution benefits from the students' contributions: after all, these teens are our future visitors, staff, and supporters. But more important, in addition to developing important life skills in reflection and critical thinking, the students find a safe space to be supported in their passion for art, plant seeds for their future careers, and learn more about themselves. As Evan said at the end of the 2013–14 Satellite Program, "I was able to change and evolve my thinking, now being able to look past the obvious. I learned that art holds all the answers to any questions anyone may have; you just have to search for it."

Author Note

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Technology as a Tool for Collaboration, Understanding and Engagement

Kai Johnson

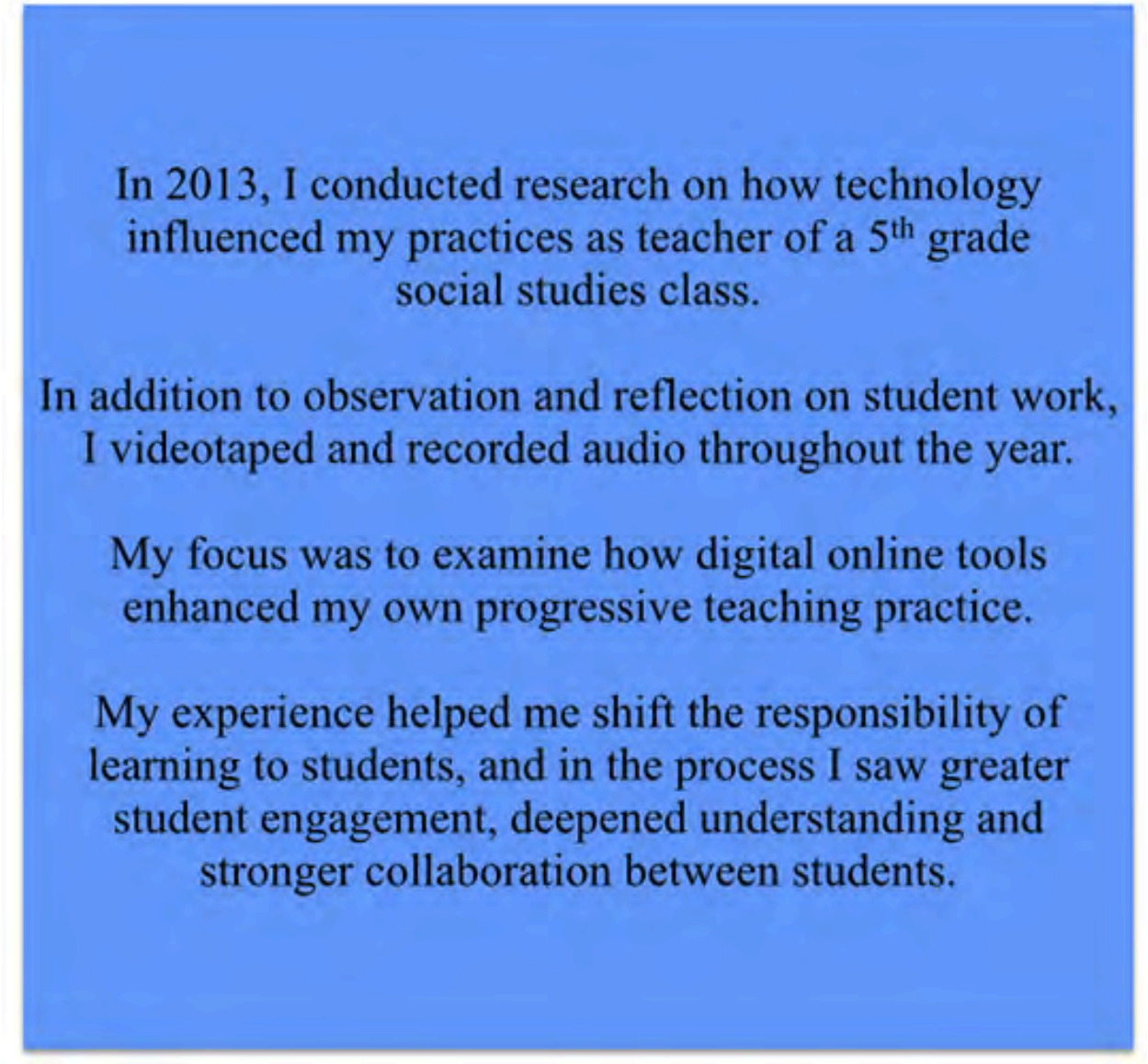
Reimagining a Progressive Classroom in the 21st century

Picture a small classroom filled with morning light. Students are spread around the room: huddled in pairs, sprawled on the carpet, perched on the edge of their chairs, lying across tables. Copies of *Harry Potter and the Sorcerer's Stone* lie open next to iPads. A quiet hum of conversation and finger taps on glass screens fills the room. This is how I remember my classroom one morning in mid-May two years ago. It was the end of my first year as a teacher in an independent school in New York City. This moment sticks out in my mind even today because it was the first time I truly understood what "progressive education" meant. Encouraged by a demonstration I had seen at Bank Street College of Education, I had asked my language arts students to use the GarageBand app on the iPad to compose a musical score for a scene in *Harry Potter*. I hoped it would be a fun way for students to immerse themselves in the text. Quickly, however, the task became a learning opportunity for me as much as for them, one that proved to be a catalyst for conducting more extended research into the potential of digital and online technology to encourage student-centered learning.

Dewey (1938) describes certain "common principles" of progressive schools: they are environments that nurture and cultivate individuality, encourage free activity, help children learn through experience, and open up children to a "changing world" (pp. 19–20). Progressive practitioners focus attention on the student, in the belief that learners develop and grow with the freedom to pursue individual interests. As life is in a constant state of flux, it is essential to expose children to a variety of changing experiences. Education cannot be rooted in the static, but must echo dynamic changes in society. Schools must equip children with the skills and abilities to adapt to the technological and societal changes they will experience. Through investigation and inquiry, students learn to solve problems and grapple directly with concepts (Wagner, 2012). Now more than ever, the most important question for teachers is not *what* students learn but *how* they learn.

I am convinced that students learn most and best by actively constructing meaning each day as they question, interpret, confuse, connect, rethink, revise, and then try again. Developmental psychology research offers a clear sense of how children learn. They innately seek to build meaning out of the world. Piaget demonstrated the stages of childhood cognitive development, and at every stage, it was through active engagement with materials that students internalized meaning (Miller, 2001). Constructivist education, in my experience, is centered around the interests and learning of the child. The basic tenets of progressive education and constructivism are simple: students are firmly in charge of building their own understanding through active work, critical thinking, and engagement in real-world issues and questions.

A recent study by Bonawitz et al. (2011) examined how direct instruction influences exploratory play and learning for young children. The researchers found that toddlers left simply to play and explore with a novel toy discovered a greater number of features (e.g., pull levers and buttons that produce a squeak) compared to children who received explicit modeling of how to use one feature of the toy. As the researchers summarize, "These results suggest that teaching constrains children's exploration and discovery" (Bonawitz et al., 2011, p. 325). There are advantages to seeing what a learner learns through spontaneous discovery. By investigating on their own, children devise solutions and develop analysis skills beyond those that are explicitly taught or modeled. My anecdotal experience with older students in the classroom indicates that they also benefit from opportunities for exploration and discovery. Given carefully chosen tools, including online resources and digital technology, students will explore and hypothesize on their own, testing out theories and ideas as part of their own discovery process.



Central to this learning are physical materials that help students build understanding of concepts and relationships through exploration. Of course, most digital technology today exists only on a screen. So what does actively constructing understanding look like in the 21st century? Progressive practitioners can work to integrate real-world, physical materials and online technology to organize and communicate information in new, expanded ways. Even in an era when teachers feel pressured to prioritize high-stakes test preparation (Ravitch, 2013), schools must still encourage students to explore and question and do. There is tremendous potential for online technologies to broaden student perspectives about the world. As I outline below, the active construction of knowledge continues, but when online technology is introduced, learning occurs simultaneously between "real life" and on a screen. As more content resources—text, audio, and video—become available online, educators and students must collaborate to sort and sift through information sources and then explore, question, and analyze in small groups and individually.

Actively Constructing Understanding with New Tools

As I think back to the GarageBand activity, the role that exploration played in its initial success is clear. I started the lesson by modeling aspects of the app: how to begin a new project and pick an instrument. As I began to demonstrate a few ways to "play" the various instruments, the fifth graders immediately lost interest in my explanation and began investigating independently. As the students continued to experiment, I abandoned my plans for the rest of the lesson and took a step back to observe. What I found was that simply giving students unstructured time to explore and tinker with the app gave them insights into its potential and about the ensuing activity connected to the work of literature we were studying, in ways that direct-instruction lessons do not. This mirrored my own experience of learning to use technology: trying things out to see what works, often discovering something new in the process.

What struck me most about that day was the incredible level of engagement and depth of thinking I observed. The students took the idea far beyond what I ever could have imagined. And most importantly, the digital tools deepened the literacy. Kids began carefully rereading chapters and skimming back through their annotations to find the perfect moment in the book that would highlight the right note of drama or terror or levity. Students recorded dialogue numerous times, which helped improve fluency, articulation, and pace. Student ingenuity emerged immediately. One group placed their iPad near the entrance to the classroom to record the door swooshing and creaking and then used the sounds to highlight a particularly suspenseful moment in the corridors of Hogwarts. Two boys asked to go into a quiet room so they could record a dramatic reading. Their presentation to the class later revealed their keen sense of humor through faux-British accents. Another student composed an original piano melody for her selection of Harry's first trip to Hogwarts: contrasting sweeping arpeggios and tender lyrical notes captured the mix of excitement and anxiety that children know so well when starting a new year at school. Students worked collaboratively, with focus and energy, motivated entirely by their own interests, passions, and understandings, rather than by my external prodding.

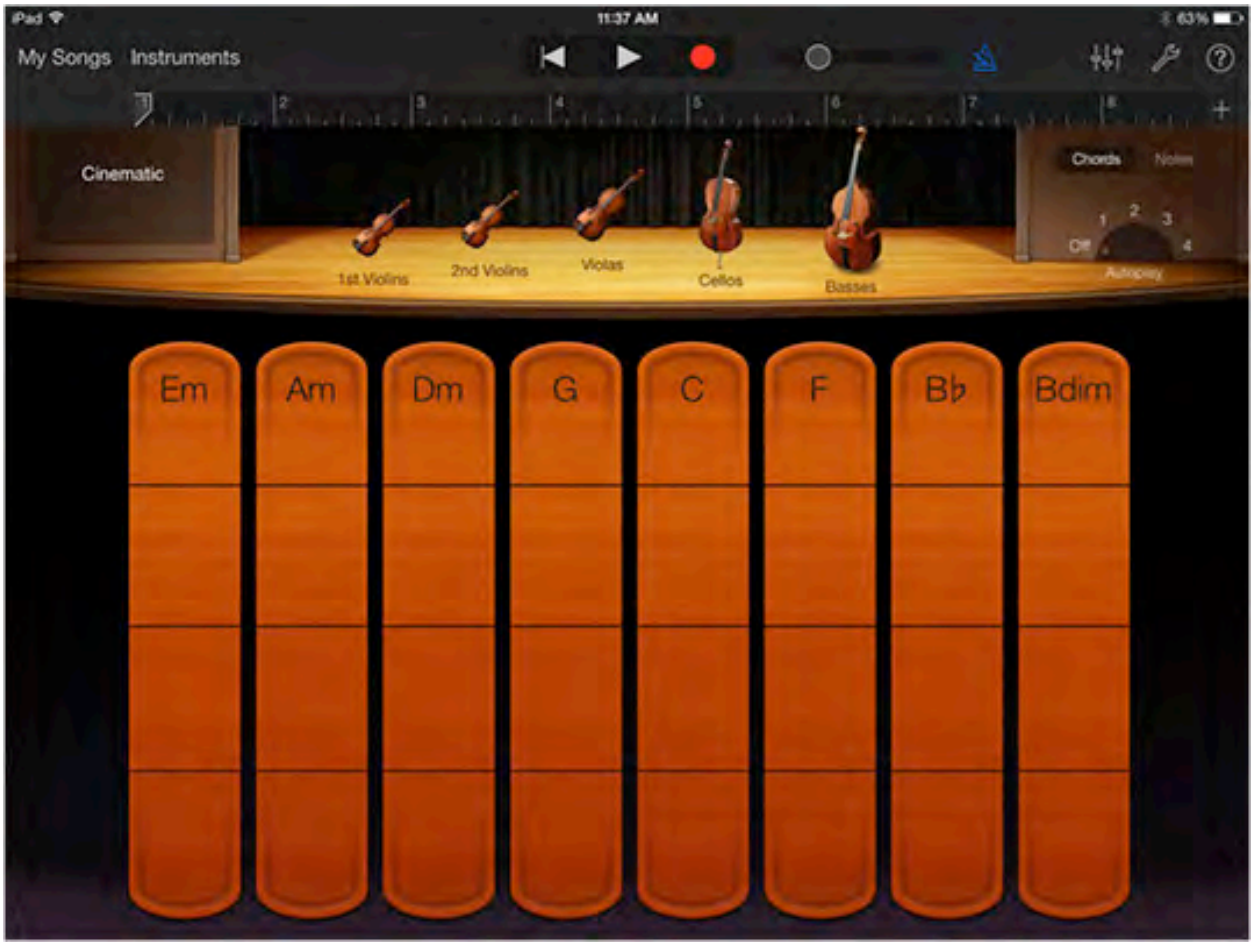


Figure 1: A screenshot of the GarageBand app, including the Autoplay feature (upper right-hand corner) that allows students to play a prerecorded melody or chord progression on a variety of instruments.

Crucially, the audience for their work widened. Their ideas were no longer meant to be presented only to the teacher; now they could be easily shared with peers and families. Students now communicated through voice and audio as well as through the written word, which benefited English language learners and students with different learning styles. The GarageBand app itself differentiates between levels of musical ability, and all students, with or without a music background, could compose their own soundtrack. The lasting impression I have from this activity, however, is not the technology. Rather, it is that students were intrinsically motivated to reread the text and think more deeply about it. The activity demanded that students demonstrate their understanding of the book through multimedia. It revealed much about their strengths and weaknesses as readers and communicators and also offered an outlet for creative expression and collaborative problem solving through small-group work.

How Online Technologies Transform Visual Thinking

One by-product of the explosion in social media and technology in the past few decades is the growth in the number of visual images that people see on a daily basis. Young people increasingly view the

world through images: graphic novels are more and more popular with many readers; Instagram is a constant presence in the lives of adults and teenagers alike; television continues to evolve as a source of sophisticated cultural discourse; fourth graders ask me whether a writing assignment can include emoji symbols. Photography is increasingly important not just for its aesthetic qualities but also for its capacity for educating people about refugee crises or environmental destruction. Of course, the ability to observe, interpret, and critique imagery is nothing new. Museum educators, in particular, have a history of working with students to develop sophisticated thinking about visual imagery. Yet the Internet dramatically increases the number of images that young people see each day. As educators, it is essential to work with students to develop visual thinking strategies. In my experience, images are one of the most powerful ways to spark discussion and analysis in a classroom.

The central aspect of the visual literacy experience lies in harnessing the power of close observation to enhance learning. Ritchhart, Church, and Morrison (2011) describe such an activity, "See-Think-Wonder," in *Making Thinking Visible*: "This routine was designed to draw on students' close looking and intent observation as the foundation for greater insights, grounded interpretations, evidence-based theory building, and broad-reaching curiosity" (p. 55). This research inspired me to use visual thinking activities in my social studies class, where we learn how Dutch principles of commerce and tolerance influenced early New York history (Shorto, 2004), and students develop a more complex understanding of the influence of economic and political forces on "New World" exploration of that time. In 2013 the class also began an exploration of the larger geopolitical considerations and the movement toward empire of many of the European powers during that period. That fall, the Metropolitan Museum of Art had an exhibit entitled *Interwoven Globe*, which examined the international textile trade beginning in the 17th century. Learning about the explosion of globalization through the discovery of distant lands and the drive for shareholders and governments alike to expand into new markets provided an interesting layer of thinking about the world we were creating in our class. One room in the exhibition was especially striking: four tapestries, each of which is about 50 feet high and 70 feet wide and represents one of the "four continents": Africa, Asia, Europe, and the Americas. Each was rich in imagery and symbolism that pertained not just to trade, but to European ethnocentrism (Metropolitan Museum of Art, n.d.).

In order to prepare for a class field trip, I used the Metropolitan Museum of Art's website to preview the images of the four tapestries. Our class discussed the history of the tapestries and anticipated what we would see at the exhibit. Students developed a solid understanding of the general time period and its art. When we arrived at the museum, the exhibit was nearly empty and students were able to sit in small groups for an hour in the room with the four tapestries, scrutinizing every detail of them, further developing theories, and sharing interpretations. Although no virtual experience could replicate the feeling of sitting beneath these gargantuan masterpieces, technology played a crucial role in preparing students for it. The level of student thinking was much higher because in the classroom we had already built background knowledge about what we would be seeing. Students focused on delving into the meaning of each image and its historical context. Back in the classroom the next day, we

deconstructed our notes and impressions, referring back to the tapestries with the aid of the museum website. The students then each chose a tapestry and acted as the curator for it, providing text about the origin, history, and meaning of the art to accompany the image. Afterward, we printed and displayed their work, creating our own little museum in the classroom.

As teachers merge aspects of experiences in the classroom and digital technology, learning today can be more powerful. Because they attend a school in New York City, my class is fortunate to be ten minutes by bus from one of the premier artistic and cultural institutions in the world. Yet the remarkable power of online technology is that with a projector and an Internet connection, a classroom in another state can experience something similar, even if not precisely as powerful. Having access to visual images on museum websites or library databases means that students, regardless of their location, can actively construct their understanding about history in new ways as they discuss and interpret artworks, maps, and photographs. The transformation is that a global repository of images can be called upon at a moment's notice.

Visual Thinking: Historical Critiques Through Image

Before a school trip to Boston in the spring of 2013, our class transitioned from studying New York City history to learning about the American Revolution. Many students were fascinated by the series of battles fought by George Washington in the winter of 1776. During class, we examined Emanuel Leutze's *George Washington Crossing the Delaware*. Although this painting hangs in the Metropolitan Museum of Art, a student saw a reproduction of it in a reading I had assigned and wanted to pull up

Students "turn and talk" about the image.

the full image online to share in class the next day. In preparation for that, I read a few posts about the painting. If the students did not point it out themselves, I planned to highlight the presence of an African American soldier in the boat as well as raise a few questions about the canonizing portrait of George Washington. Art tells a story and often contains a particular perspective. I hoped students would engage in critical thinking about this well-known painting of America's founding father and the symbolism of the image as it relates to American history.

I brought up the image on my computer and projected it onto a large whiteboard in our classroom. We began by observing the painting silently for one minute—a practice I picked up from museum educators at Bank Street. After about 30 seconds, nearly every student had a hand in the air; many of them were wriggling and jumping around, ready to explode with an insight. When the timer hit one minute, I asked the students to turn around and talk with a partner, and the class reverberated with exclamations. Students jumped off the carpet and ran to the board to point out a specific detail. After a few minutes of intense partner discussion, we shared our insights. The students' observations far surpassed my expectations, as is so often the case with kids.

The students noticed things I had missed. One pointed out that from the reading, we'd learned that it had been snowing and raining when Washington crossed the Delaware, but that that was not portrayed at all in the painting. Another noted that considering that the soldiers were supposed to have crossed the river in the dead of night, the scene looked awfully well lit. One student wondered how the boats kept from sinking with so many people packed aboard. Another student, pointing out the hairstyle of one of the figures, asked if that soldier was a woman. This comment ignited a long discussion—not for the first time—about the role of women in the war and whether or not it might have been possible for a woman to cut her hair a bit shorter and join the fight. Another related traveling through large ice floes to the terrible hardship the company of fighters had faced during a harsh winter and contrasted that to the tremendous resolve that imbued the faces of those immortal actors.

One student had not engaged in the discussion. He instead sat quietly, studying his laptop screen with intense focus. It turned out that he had pulled up a high-resolution image and was madly scanning the painting at an extremely close range. He noticed a signature on the lower right-hand corner of the work and was excited to share his finding. We pulled up the high-resolution image for everyone to see, and he took the lead in analyzing the work of the German-born mid-19th century artist who had created the painting. A student whose family is German noticed that "Dusseldorf" was written under the signature and remarked that perhaps the painter had, like them, moved from Germany to the United States. This, in turn, sparked a conversation about the role of immigrants in American society, especially in the creation of one of the more quintessentially "American" works of art.

I later did more research and learned that the students had been correct, from an art historian's point of view, about each and every critique they had made about the painting. But regardless of the accuracy of their observations, it was the students' active construction of knowledge—their thinking, inferring, and questioning—that made the work of art come alive for them. They made their own

interpretations, synthesizing their ideas with their background knowledge from prior readings and understandings. The visual image unified many aspects of the curriculum: the image analysis was a way for all students in the class to coalesce their disparate ideas about specific events, historical inaccuracies, and perspectives and connect them to this one interpretation of a key moment in United States history.

Consider the simple yet powerful role that the Internet had played in the lesson. The most valuable aspects of the experience—the thinking, the collaboration, the exchange of ideas, the background knowledge—all came from the students and the possibility of interacting with one another, extending their thinking, and building on each other's observations and connections to readings. Yet the anchor was the looming image of the painting, easily accessible at a moment's notice and available for viewing in tremendous detail. To me, this activity encapsulates the idea of "constructivism with online tools."

How Online Inquiry Can Increase Collaboration

Before our trip to Boston, the fifth graders researched a few of the documents that illuminate how societies grappled with changing notions of liberty and government prior to 1776. One of the activities was having small groups research the Magna Carta. After providing a brief introduction to it, I gave students time to investigate the document online. Rather than asking the students to answer a narrow set of questions, I hoped to encourage discovery and exploration. The students' goal was to use kid-friendly online resources to explain why the Magna Carta was important. Central to the task was that students would use what they knew about both collaboration and online research. Throughout the year, we had built up our skills in these areas. We had practiced evaluating website content, bias, and word choice to determine if a site was appropriate for a fifth grader. We also had practiced reading to sift through and sort information from various sources, both print and digital (Harvey and Goudvis, 2007). We had discussed how to take one bit of information and confirm it or connect it with other ideas or with our own background knowledge. We had also frequently talked about and reflected on how to work cooperatively in small groups. Central to student development in this area was the language and method described by Johnston (2012) as part of the "dialogic process" in which kids interact, question, reason, reflect, rethink, and analyze.

I recorded one group's conversation with my iPhone. When I listened to it later that evening, I was surprised at just how direct the students were with one another. They traded arguments about sources they deemed too difficult to read and engaged fully in Johnston's (2012) aspects of the dialogic process. Halfway through the recording, my voice is audible. I am checking in on the students' progress; at that point, they had already discussed their main ideas. The recording captured a key interaction: one of the students who was quiet early on eventually offered a quite salient point that tied together a few of the different ideas the groups had come up with about the Magna Carta. My presence was an opportunity for this student to consolidate his understanding and communicate his idea to someone new for the benefit of the group.

This brief anecdote demonstrates a different aspect of constructivism with online tools than I dis-

Transcript from Collaborative Activity:
Find a "Kid-Friendly" Site Explaining the Magna Carta

Context: after an introduction to the activity, a group of four students are around a table. Two are working with Chromebooks, two on iPads. The transcript picks up after a few minutes of reading and exploring. Student names have been changed.

Sarah: I'm just looking at Wikipedia.
Marvin: I'm just reading through one…
Sarah: Is there anything about where [the Magna Carta] came from or anything about the document that it was to limit the rights…
Marvin: Limit the rights of the king to like do stuff?
Stephen: Magna Carta for Dummies!
Anthony: Keep working!
Stephen: I'm going to narrow down.
Sarah: I'm gonna go 'Archives Government'…
Stephen: I looked at that, it wasn't that helpful…you can look at it, it kind of just tells you who it's by…
Sarah: [reading] The Magna Carta, what are human rights?
Anthony: Guys, what I found interesting is the Magna Carta limits the king's rights, but guess what, you know who signed it?! King John signed it!
Marvin: Well, King John signed it because the nobles would have beheaded him anyway, they had a whole…a very large group of nobles could go against him, and without nobles he would have no one to defend the king, if the nobles and the knights were against him he would have no one defend him.
Anthony: Yeah, that's a good point.
Marvin: And so he had to sign it, or else…
[Teacher arrives at the group's table]
Teacher: How's it going?
Sarah: You guys, freedom of religion!
Stephen: [reading] "The Magna Carta, the charter of English liberties granted by King John in 1215, under the threat of civil war."

cussed previously: its role in research and exploration in an online environment. During the activity, students sifted through multiple websites—some of which were more appropriate for fifth graders than others—encouraged one another, and ultimately critically analyzed the Magna Carta as a document; the students wanted to know who the rights enumerated in the Magna Carta were really for. The Internet, in this instance, served as a resource—a way to access a large amount of information, determine its accuracy, and connect ideas about the emergence of rights in European society. In my experience, an activity where each student sits alone reading an article online or in a book simply does not have the same effect. The value of the activity comes from the discussion, from having multiple minds sharing their thinking as the group constructs understanding together. Online tools were part of what made this a successful learning activity, but there was more to it than that. This was a powerful activity—one that students remembered months later on our trip to Boston when the Magna Carta came up on a tour—because it involved constructed understanding, not teacher-directed instruction. I feel confident that had I approached the lesson differently, only one or two students might have recalled in any detail the important features of the Magna Carta.

How Online Tools Transformed My Teaching

Online technology transformed my teaching. In a fundamental way, the focus of the classroom shifted from me to the students. Instead of leading the class in discussion, I spent my time roaming the room and conferring with kids. I offered points of clarification. I altered activities to accommodate the different learning styles I observed among my students. As a beginning teacher, I was suddenly able to spend time doing all the things I knew I had to do—converse, observe, assess, guide—but had had such trouble finding a way to do before, when my focus and energy were on management and content delivery. The students were not looking to me to solve their every problem. Instead they were creating, revising, and reflecting on their own work. I began guiding and scaffolding lessons rather than controlling them. As time went on, my emphasis changed from altering the daily lesson to altering my curriculum. I began to adjust my lessons and activities to align more fully with my progressive educational philosophy. I took tools that I used in my own life and reimagined how apps and online sources could be used with my students. Encouraging activities where students created maps, narrated movies, and interacted on online forums meant that the focus of each class shifted from teacher to student.

Teaching is, in its essence, a relational art. No invention changes this simple truth. I have worked with many families who remain skeptical and concerned about the encroachment of technology in the classroom. Yet the experiences I outlined here demonstrate just what teaching with online tools can entail. It does not have to mean simply that each student works in isolation on a computer. If teachers maintain a commitment to constructivist principles and design activities that involve discussion, collaboration, and critical thinking, students using online tools can engage in work in which there is more interaction than in the traditional model of instruction. The inclusion of digital tools in my classroom unlocked my potential as a progressive educator and profoundly impacted the nature of learning in my classroom. In the end, it made me a better teacher and helped students take even greater ownership of their own learning.

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Constructing Online Communities of Practice

Marvin Cohen, Babette Moeller & Michelle Cerrone

In an age of standards-based educational reforms that require fundamental changes in instruction, Communities of Practice (CoPs) have garnered considerable attention as a complement to formal professional development experiences. Wenger (2013) defines CoPs as "*groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly.*" According to Wenger (2013), CoPs have three key features in common:

1. They have a shared domain of interest. Membership in the community implies a commitment to the domain and a shared competence in it.
2. Members in the community interact and learn together. They engage in joint activities and discussions, help each other, and exchange information.
3. Participants in a CoP are practitioners, and through sustained participation in the community they develop a shared repertoire of resources or practice.

Research on effective professional development highlights the importance of collaborative and collegial learning environments and CoPs in schools (Darling-Hammond & McLaughlin, 1995; Knapp, 2003). They are recognized as a way to develop and sustain teachers' individual and collective capacity (Stoll, Bolam, McMahon, Wallace, & Thomas, 2006). Productive CoPs allow teachers to work together on instructional planning, learn from each other through mentoring or peer coaching, conduct research on the outcomes of classroom practices, and collectively guide curriculum, assessment, and professional learning decisions (Wei et al., 2009). A growing body of research has begun to document the positive impact of CoPs on teacher knowledge, attitudes, and practice, as well as student achievement (Carroll, Fulton, & Doerr, 2010; Fulton, Doerr, & Britton, 2010; Saunders, Goldenberg, & Gallimore, 2009; Stoll, Bolam, McMahon, Wallace, & Thomas, 2006; Vescio, Ross, & Adams, 2008).

While emerging technology and social media offer significant promise to support the kind of collaborative and teacher-directed ongoing professional development that research has shown to be effective, and extend it across time and geographic distances, little is known about how to effectively employ these tools to develop and support ongoing online CoPs. With funding from the Booth Ferris Foundation, Bank Street College has initiated a two-year investigation into how social media can be employed to create sustainable online CoPs that are consistent with Bank Street's commitment to progressive pedagogy and constructivist learning. This project offers the opportunity for the creation of experimental online CoPs and their iterative refinement through research and practice.

Our work is guided by the following questions:

- How does an online CoP evolve?
- What types of resources, practices, and experiences do participants in an online CoP share?
- How do participants interact in an online CoP?
- What is the impact of participation in an online CoP on teachers' repertoire of practice?
- What is the role of facilitation in an online CoP?

In this paper, we do the following: 1) share emergent findings gathered through the development and implementation of an online community of practice (Math with Your PJs On) for Bank Street alumni who teach math, as well as other progressive educators; 2) describe findings from a focus group conducted with a sample of participants; and 3) discuss the next steps we will take in our investigations based on lessons learned through research and practice.

Getting Started: Doing Math Together

Math with Your PJs On (PJs) is a free online CoP hosted by Bank Street College of Education in an effort to provide a forum for alums and other progressive educators trying to meet the challenge of implementing the Common Core State Standards in Mathematics (CCSSM). Graduates of Bank Street's Math Leadership Program (MLP) in particular had expressed concern about the challenges of implementing the CCSSM in the context of progressive pedagogy. PJs was also a response to the expressed desire of Bank Street College alums to stay connected to the College professionally. They wanted to be engaged in professional conversations and have access to colleagues and faculty to discuss what was going on in their classrooms, as well as what was happening in the field of education.

The PJs online CoP was started in February 2014 as a public community requiring an invitation from a MLP Faculty member who facilitated the discussion. In order to be invited into the community, participants needed to respond to an alumni email blast and fill out a short needs assessment. Other progressive educators could join if they came upon the site or were invited by an alum. New members were asked to briefly introduce themselves to the group.

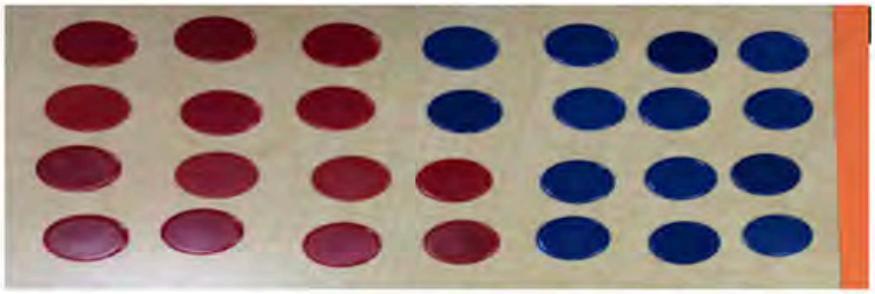
The goal for establishing the PJs online CoP was to engage participants in discussing and doing mathematics in a way that could inform their practice by helping them maintain their progressive stance while implementing Common Core State Standards-based mathematics.

Initially there were about 15 participants. The group mostly consisted of local alums from the NYC area who worked in diverse settings, including a public school in the South Bronx, and private schools such as Bank Street's School for Children. The group also included an alum teaching in England, and two MLP faculty members. Participants worked with various grade levels, ranging from first to ninth grade. Community exchanges were conducted using the Google community platform.

During the first year, participation in the PJs CoP fell into two categories. The first was doing math together and the second was sharing resources. For the facilitator, doing math together was critical; interest in mathematics was what tied the CoP together.

Participant 1
Doing math together – Feb 10, 2014

We're in the middle of our multiplication unit at the moment, so we've been doing lots of array work. This is how I thought of the problem immediately.



+2

Participant 2 Feb 12, 2014
I love that you used an array model. How can this visual be represented with an equation?

Participant 3 Feb 16, 2014
I have not had much exposure to array models, but I was really struck by how this model could clearly lead to algebraic thought. The equivalent number of red and blue discs can be seen to represent x, so that you have 36 = x + x + 8 . This array is a concrete, tangible representation of a pretty abstract concept. It's cool!

Participant 1 Feb 17, 2014
Ooh! I didn't even think of the algebraic representation that you just offered. That makes a lot of sense, though. I'm so curious to try a similar question with my class now. I have 20 kids (12 girls 8 boys) and wonder if I could rephrase the question so that the kids don't have to find the answer (since they already know it!) but have to figure out how to create an equation that would represent the difference.

Participant 1 Feb 17, 2014
Oops, just noticed [redacted] [Facilitator's] request for us to think about the content standards when commenting on the problems. I would say that this problem would cover 4.OA.A.3, and a little of 4.OA.B.4 (knowing the factors of 36 help with the array model).

Participant 4 Feb 18, 2014
Are your kids thinking about variables? I'm with first graders, and we're already realizing that sometimes we want to add a number and we don't know what the number is, so we put a question mark. I wonder if your students could take it to the next step by scaffolding a bit, first asking them how they would represent the number of boys, then how they would use that information to represent the number of girls, and then how they would combine them to find the class total. That's one strand, although it's not really creating any question - I just would be interested in seeing what the kids come up with when thinking about combining 2b. Tangent, sorry. Back to your idea, I'd be interested in seeing what visuals they come up with. We are currently working on "How much taller is x than y?" and our kids want to just say the tallest height. I bet your kids would have some cool visual representations for figuring out that there are 4 more girls.

Facilitator OWNER Feb 19, 2014
As I read both [redacted] [Participant 3] algebraic solutions I found myself taking the approach for granted because it looked so official. A colleague looked at it and immediately asked where the T chart was. I feel that would really help me see the connection. [redacted]: [Participant 3] could you post a T chart for us to think about in terms of the other models?

Figure 1. Sample Discussion of a Math Problem in the CoP

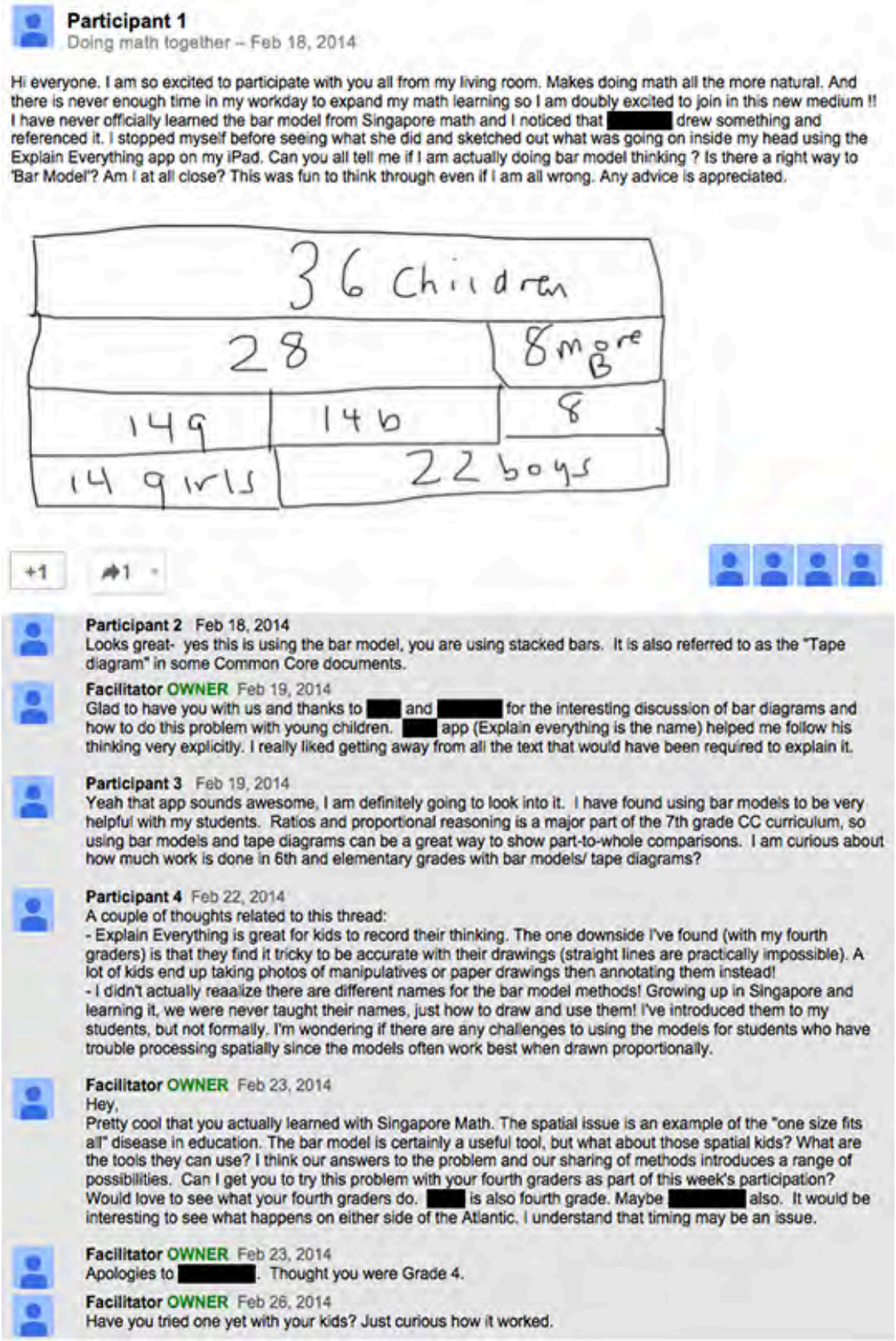


Figure 2. Bar Model Solution

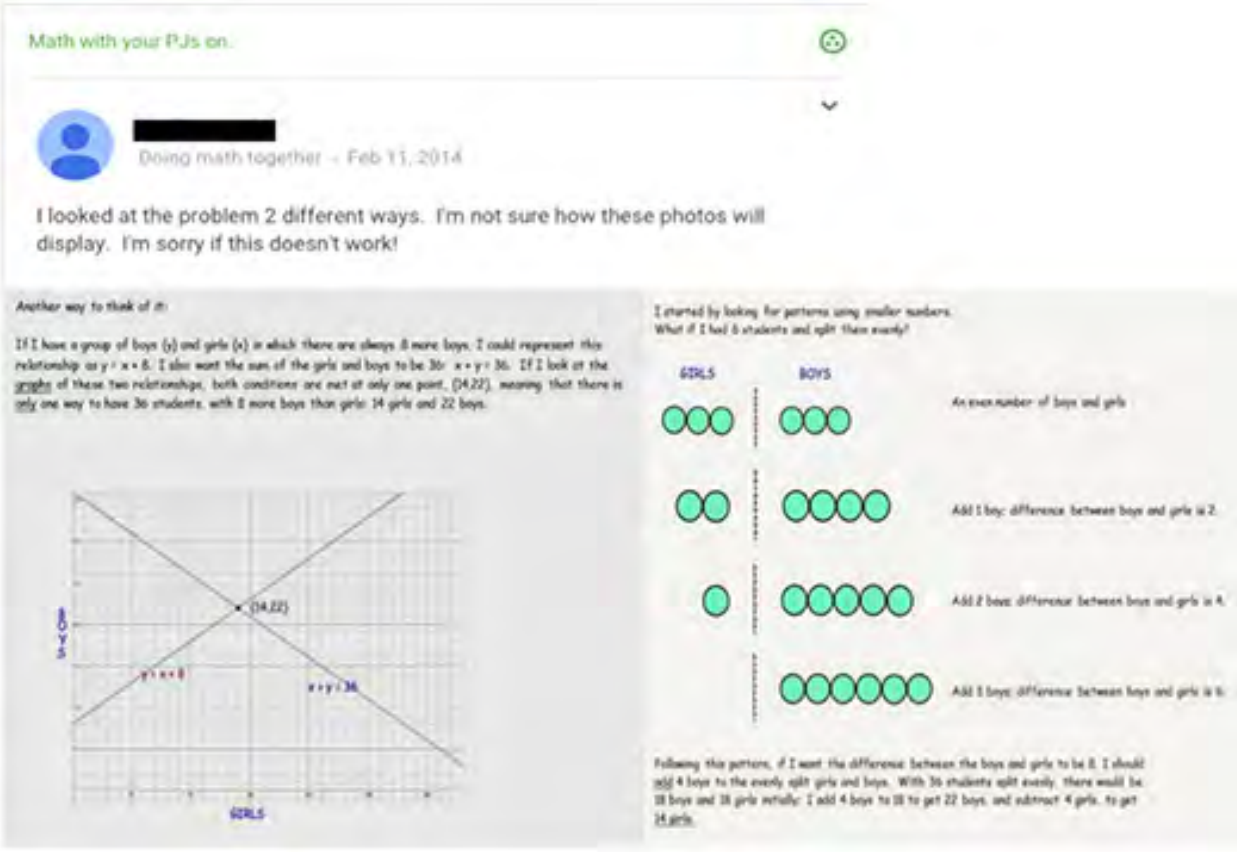


Figure 3. Alternative Solutions

During the first week the facilitator posted the problem below, and the PJtogCoP quickly began doing math:

> *Math Problem Week 1 (36 Children): There are 36 children in the class. There are 8 more boys than girls. How many boys and girls are there? How many ways can you resolve it?*

Figure 1 illustrates the discussion that ensued. Discussion of strategies for solving the problem quickly became a springboard for exchanging ideas for how to work on this type of problem with children at different ages, including how to model and represent it.

By posting the "36 children" problem, the facilitator generated a flurry of activity and discussion that was interesting and relevant, and could be brought to the classroom quickly. It was a task that could be adapted across the grades and had many possible solution strategies, some of which were surprising to the others. The discussion provided a place for people to do math themselves and to learn about pedagogy, two areas they were interested in. They were also invited to think about how they might present the problem to their math classes (Grades 1-9). Participants focused on various aspects of the problem. Some focused on the pedagogy (the array model above and the bar model below); others began to better understand the content and algebraic thinking (see February 18 and 19 postings in Figure 1).

From the discussion above we get a glimpse of teachers who feel that they have figured out the solution and understand the problem, but do not see the algebraic thinking that is implied by the February 11 posting. It is in this exchange that new mathematical understanding begins to be constructed. All posted solutions were correct. Participants knew that their solutions worked and made sense. By seeing the work of peers in the field that looked so different they were forced into a disequilibrium that connected their intuitive thinking to algebraic thinking (i.e., the generalization of the arithmetic involved), described in the presentation shown in Figure 3.

When this problem was posted, the PJs CoP had approximately 40 participants. About ten of them participated in the discussion. One of the challenges and frustrations for the facilitator was determining if the other 30 participants were also engaged. Were they listening? Were they thinking about the math and/or the pedagogy? The facilitator could not walk over and look at their work.

Those who were reading and not posting were asked to was determining if the other 30 participants were also engaged. Were they listening? Were thever, informal feedback suggested that participants only occasionally used this tool. There was no reliable way to tell if people were reading and not commenting. In hindsight, the facilitator sees that although he had posed a mathematical problem that lent itself to collaboration and constructivist thinking, he had not considered the tool the CoP was using, which lent itself to mostly linear conversations. He could have asked groups of two to four participants to set up small-group discussions in "virtual breakout rooms" and then go back and share with the larger group. The facilitator accepted the tool in its most obvious form rather than challenging it to support a different kind of learning. He likens it to walking into a classroom with desks in rows and not rearranging the furniture.

Growing & Maintaining the PJs Online Community

The original plan was to begin PJs in February and to support it for only twelve weeks. The inconsistent participation and membership growth led the facilitator to maintain the community, and it is still active. After the activity around the "36 children" problem, membership grew with a range of activities. Participants posted articles and shared problems. The group continued to be committed to constructivist learning, which was seen in their interest in solving problems themselves rather than being told answers. This evolved into participants seeking articles and pedagogy that addressed the challenges they were facing, and wanting to discuss these challenges with each other. Overwhelmingly, the comments and responses were brief and appreciative of a new resource.

Yet there was little dialogue among participants. Gallagher's (2006) metaphor of a conversational volley occurred on occasion, but came with the direction of the facilitator. Even as membership in the community grew, the level and style of activity did not increase substantially and remained inconsistent. One conversation that seemed to have legs of its own was prompted by a technology teacher who was interested in use of the whiteboard (see Figure 4).

This conversation continued with one other teacher joining the conversation.

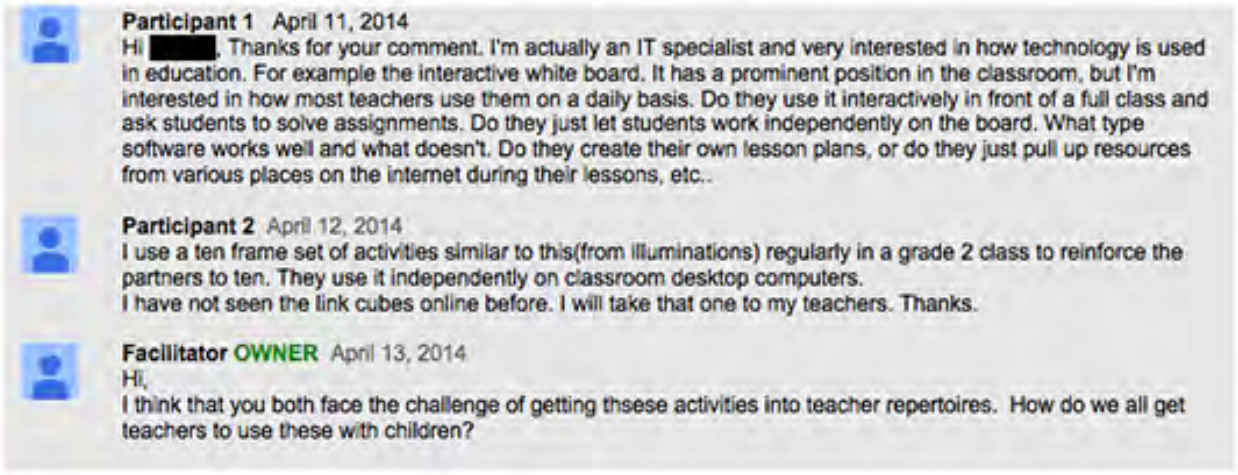


Figure 4. Technology in the Classroom

A range of interests seemed to invite comment. Others returned to PJs to share a lesson or a reading. Some participants did not contribute for a while, and then suddenly reappeared, wanting to agree or make a particular point, and showing that they were following the online conversation all along.

At another point, someone new to the CoP made a posting about "cute" girls and math that others who had been reading but not posting found to be sexist. There was a quick response from others that indicated that there were people reading but not participating in the dialogue.

For the facilitator this rhythm, albeit slow, has held his interest and gotten him to keep the site alive. After about 20 months the community has steadily grown and there are now about 240 members. There are three to ten members of the community who seem to keep the site alive, although some participants return after months of not posting. Activity often peaks on weekends. Usually a member posts a reading or responds to something the facilitator posts. They seem to have been following discussions, but not posting. Yet when they join the site they seem to do it with interest and enthusiasm, as illustrated by the postings shown in Figures 5 and 6. Both participants in the posts had not posted for several weeks, and were responding to an article about the parental pressure for children to know certain procedures by rote.

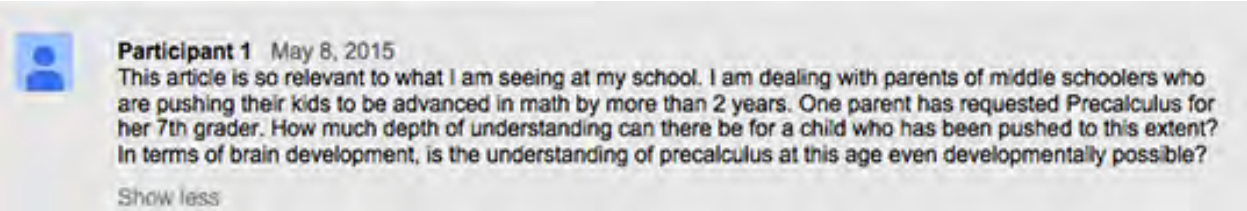


Figure 5. Advanced Mathematics for Middle School Students

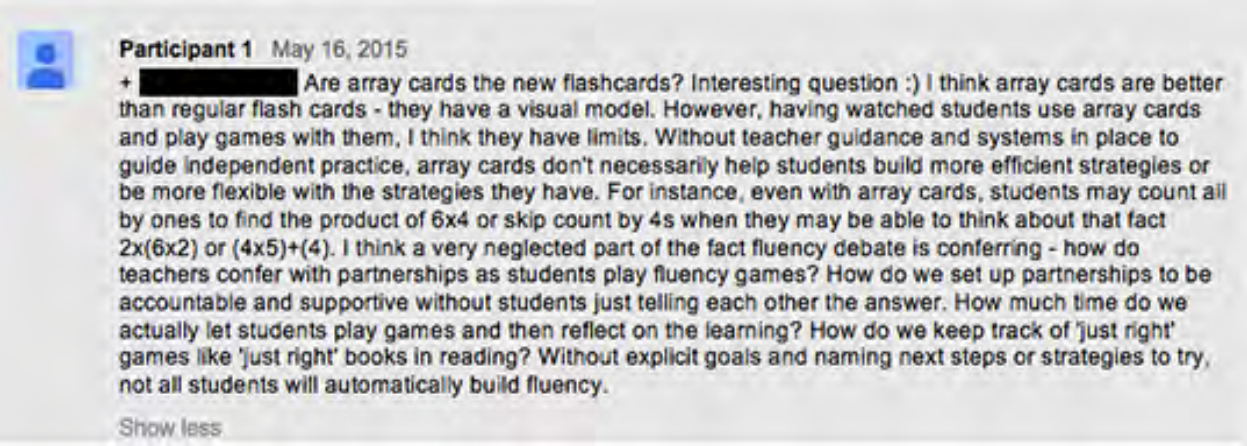


Figure 6. Array Cards

Focus Group

To better understand the experience of PJ participants, Bank Street collaborated with researchers from the Center for Children and Technology (CCT) of the Education Development Center (EDC), a non-for-profit educational research, development, and evaluation organization. EDC/CCT conducted a focus group with four members of the PJs CoP. At the time of the focus group, Math with Your PJs On had been running about five months.

The purpose of the focus group was to better understand participants' experiences and to collect feedback that would inform future CoPs at Bank Street. The focus group participants had a range of professional roles. One participant taught eighth-grade mathematics; two had supervisory roles at their schools; and one was a former teacher currently in Bank Street's math leadership program. Although three of the four participants had participated in or led an online course, only one had been part of an online CoP.

The focus group participants reported two main goals for joining PJs: 1) to connect with like-minded teachers and supervisors; and 2) to explore the potential of online communities that do not have built-in accountability mechanisms (i.e., grades). The reported level and type of participation among the four participants varied, though they all commented that their participation decreased over time. Participants said they were most active in PJs when it first started, and noted that they participated mostly as readers. Three of four participants said that when the community first started, they posted a few comments or solutions to math problems posed by the facilitator, but more recently found time to be a barrier to their participation. The other participant said she mostly read others' posts, but did not post anything herself. She attributed her lack of active participation to problems she was having with her own technology. Like the others, she reported that her engagement in the community decreased over time. Overall, the experience of the four focus group participants reflected the participation habits of the larger group.

The focus group was conducted synchronously online, using Google hangout, and audio-recorded. Interview questions probed for participants' experience with the PJs online CoP and their suggestions for future CoPs. To analyze the data, we transcribed the recording and analyzed the transcript thematically. Key findings from the focus group are detailed below.

Focus Group Results

Participants had access to resources directly applicable to their teaching needs.

Educators place great value on resources related to the content in their curriculum and that can be easily incorporated into their classrooms and the classrooms of the teachers they lead. The participants expressed appreciation for the resources and ideas they gained through PJs. According to one participant, "I love all the posts when people are like, 'Oh, I did this and this looked cool and that was neat.' All those things were fantastic and I think it's very helpful in that way." Another liked that she could bring the resources into her teaching "the next day." This teacher also said she shared some of the resources with her colleagues. Examples of resource sharing are displayed in Figures 7 and 8 below.

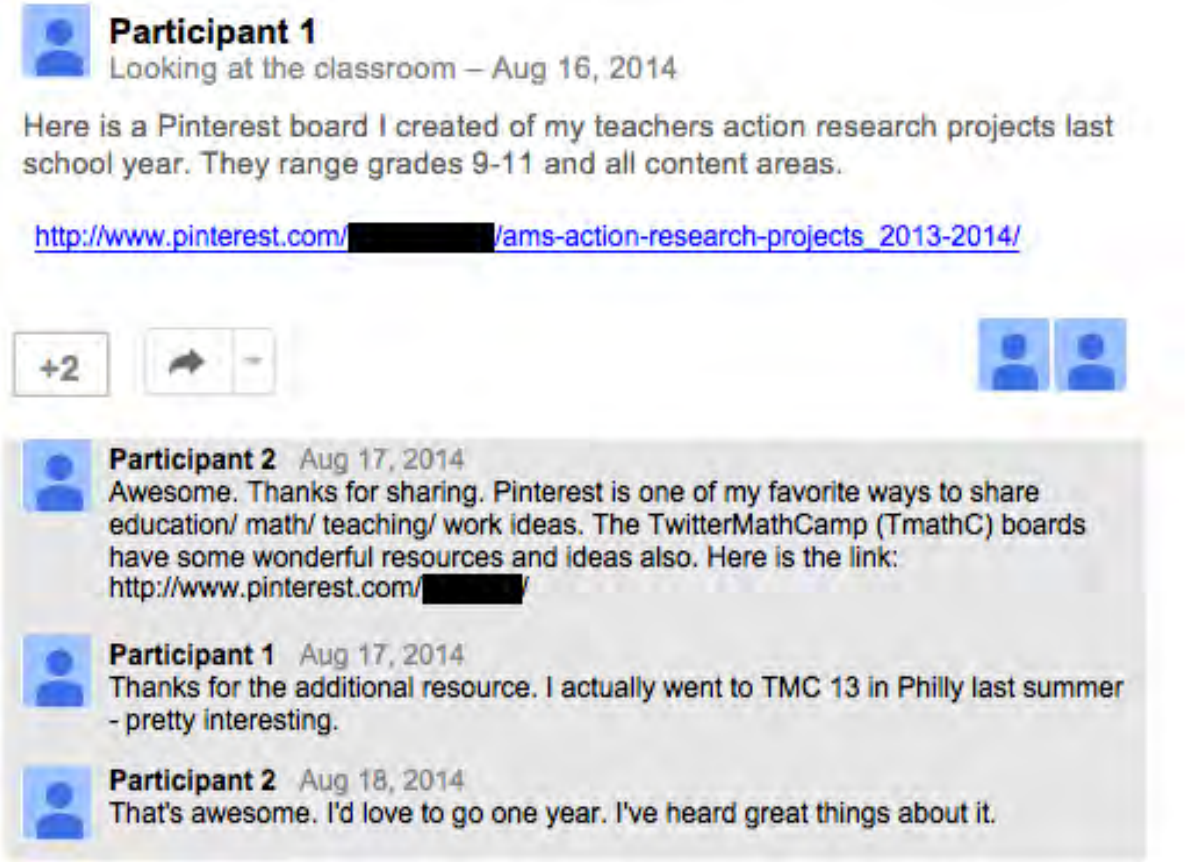


Figure 7. Resource Sharing: Pinterest Board

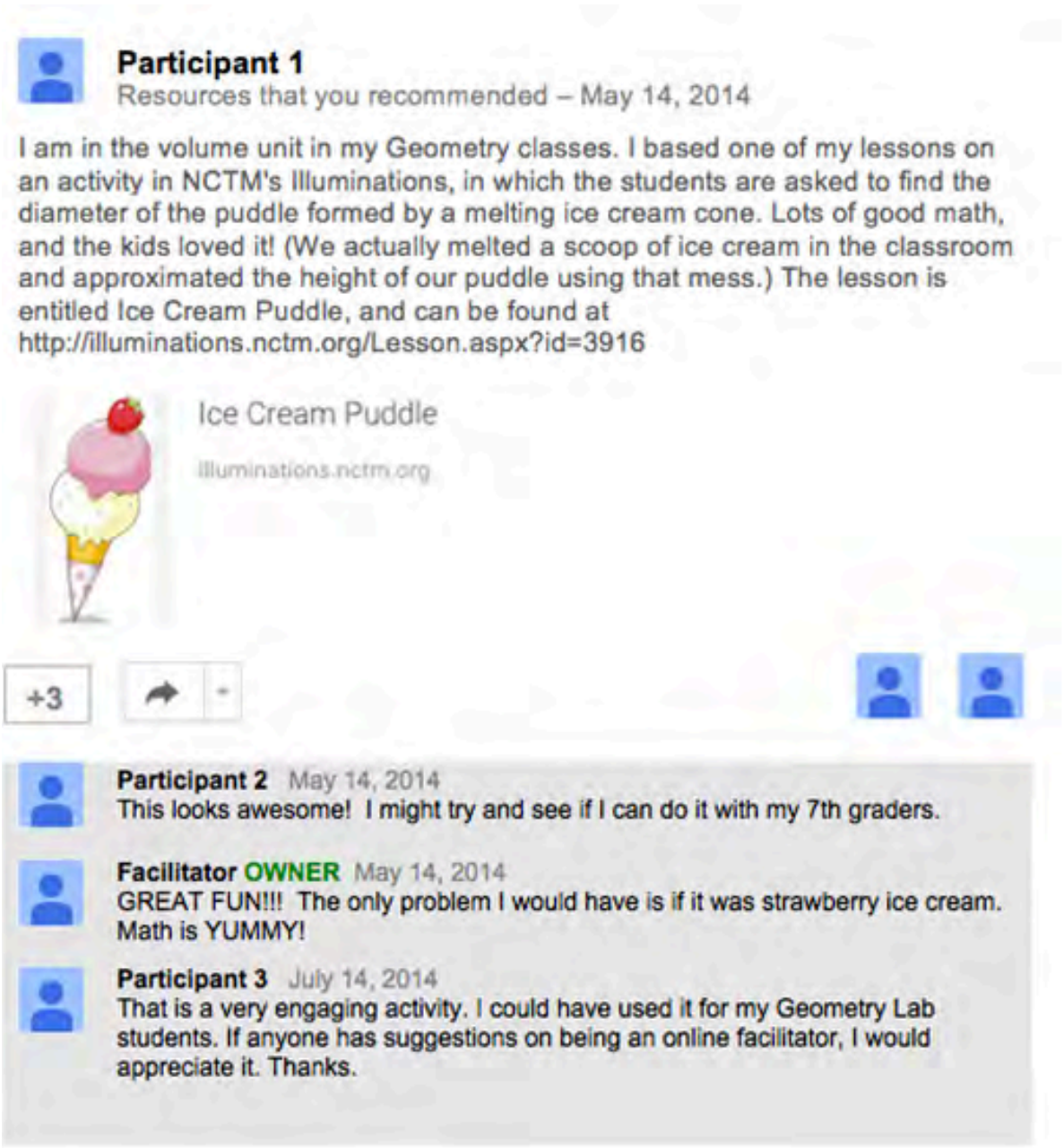


Figure 8. Resource Sharing: Ice Cream Puddle

Participants felt most connected to the community's facilitator, and noted his presence as one of the main strengths of the community.

Participants were particularly impressed with the facilitator, who they said nurtured a safe environment and was active without being overbearing. They commented that the guidelines he set for the first few posts helped establish respect for all participants in the community. They referred frequently to the questions the facilitator posed and liked that he provided space and time for teachers to reflect on the questions before responding: "He would pose questions and he would let them kind of sit with

people."

Participants valued the facilitator's frequent communication and felt he was deliberate in asking questions that would bring the community together: "He posts a lot—he initiated it by posing the questions, setting up the format. Tried to really keep us all involved in what he was doing…. He tried to get people to talk to each other by posing questions connecting the different activities."

Participants also reported that he responded to every post or comment they made and felt that this gave purpose to what they posted. According to one teacher, "I'm pretty sure he commented on everything that I posted…it was always nice to know that at least he had read it and could say something about it." Another teacher agreed, "It was just nice to know that someone was reading what I wrote, even if nobody commented. It could have been that many people read it, but you can't tell that….You can't tell if it's having any impact, so having at least the facilitator respond and give you some feedback, you just kind of know that there was a purpose to putting something out there."

Participants' experience increased their comfort with and willingness to join other online communities of practice.

While all of the participants had participated in or led an online course, they had much less experience with online communities of practice. The participants reported that being part of PJs had increased their interest and comfort in participating in online communities. One participant said that being part of this CoP made her "brave in this sort of world now." She continued, "To just get online and talk to a bunch of people that I don't necessarily know sounded really uncomfortable to me, but it is something that I'm beginning to get more comfortable with and I'm beginning to be more excited about the possibilities out there."

Another teacher said that her experience in PJs inspired her to explore social media venues where she can connect with others: "I've become very interested in other social media communities of math teachers…I'm curious about reaching out to other teachers and just seeing what else is out there…it's just made me want to go out and do that more."

Participants expressed frustration with Google community platform, and suggested that they may have participated more actively if the platform had been more user-friendly.

Participants agreed that the Google community platform was difficult to use, particularly when it came to navigation and searching for posts and resources. One participant commented, "I would get an alert on my iPhone, telling me somebody posted and then it would take me awhile to find it. Like I couldn't figure out how to navigate where we were in the problem. I don't think it was intuitive." The other participants agreed and noted that the format of the posts and responses made it difficult to follow and participate in conversations: "I think one of the things that really bothers me about it [Google community] is when there is a post and then people respond to it….The comments get listed just as a big, big long list and if you want to engage in a conversation and reply to somebody's comment, you can't do that…it gets added to the bottom of the list. You can put the person's name in, but it gets

very confusing and it's difficult to follow a conversation." Participants also agreed that changing to a different platform with more user-friendly features would increase participation.

Participants did not feel that they were part of a connected community, which they attributed largely to the Google community platform.

When asked how connected they felt to others in PJs, participants said that they did not feel as if they were part of a community. They agreed that the difficulties they experienced using the Google platform contributed to this, but recognized that fostering a sense of community in a strictly online environment is no small task. According to one participant,

> *It never really felt like a community to me and I think part of it is the platform, to be quite honest.... It felt like a place where you came and you put something, but it was hard to sort of really build up around that. But I also think it's very difficult to build a community online. When I've participated in other communities online, it's always been something that has an online component. But for me, in my experience, there's always been some sort of other connection that was established beforehand.*

A few participants also noted that they had been "overwhelmed" by the number of participants:

> *Just the idea that there were 119 people out there. It did seem really big and very broad and people had very different interests...I think people brought so many different interests to the group, but maybe they weren't articulated, maybe even for themselves at all times. So I'm wondering how that contributed to the experience of being in the community.*

Along those lines, participants wondered if having a synchronous meeting at the start might help bring people together and possibly foster small groups of shared interest within the community.

Participants see great promise for Math with Your PJs On and offered recommendations to help future CoPs evolve to better meet the needs of educators.

Participants see great promise for *Math with Your PJs On* and believe it needs more time to grow and evolve. Four major recommendations emerged from the discussion:

- *Consider using a different platform.* Participants felt that the Google community platform was not user-friendly and suggested that they may have participated more actively if doing so was easier.
- *Create sub-divisions of participants based on interest.* Participants liked the idea of having more focused sub-groups within the community and believed this would help make the CoP more applicable to individual needs.

- *Add a synchronous meeting at the start.* Participants agreed that adding one or more synchronous online meetings at the start would help foster relationships among participants and perhaps help create sub-divisions of participants who could connect around more focused topics of interest.
- *Create accountability.* Participants noted that communities of practice tend to lack accountability. As a result, there is very little urgency to post or respond to posts, which they said makes it easy to stop participating altogether. One participant thought pairing up participants might increase motivation to be more active in the community. This is addressed in the next steps.

Next Steps

Prior to the PJs experience, we believed that Bank Street alumni were a natural community of practice. They have shared interests and have articulated an interest in learning and working together to build repertoire. What we came to learn through the focus group, however, was that although there were several Bank Street alums in PJs, the large size of the community was a limiting factor to its success.

From our previous work on professional development, we know that educators place great value on content and resources that are directly applicable to their instructional needs. Feedback from the focus group participants indicated that without sub-groups, it was difficult to find such resources and to connect with other educators who share the same interests. Given that PJs spans multiple grade levels, participants may share an interest in the same content area, but the particular aspect of the content area they are interested in may be markedly different.

Based on recommendations from the focus group and our own experience with PJs, we decided to pilot a set of 12 much smaller online communities of practice around more focused topics over a ten-week period. In doing so, we attempted to create experiences that are more targeted and relevant for the participants within each community. We recruited volunteer facilitators who are educators with a passion or a problem that they wanted to discuss with others. The groups include sharing cases, discussing school-based problems, and supplementing face-to-face work. Each facilitator recruited participants and developed their own goals and norms to pursue in their CoP. For each group, we provided an initial one-week orientation about the technology, facilitation, and the interaction of the two. Additionally, we created a community for the facilitators to connect with each other and with Bank Street faculty to discuss successes and challenges. Although these 12 communities are just ending and data collection and analysis is not yet complete, we have observed improvements that reflect the challenges we addressed as a result of the PJs online community. Each is discussed in turn.

The platform. We felt that a free and ubiquitous platform was important in spite of some of the challenges of Google communities. To address this we designed a one-week orientation called the OnRamp during which we worked with facilitators on the technical challenges that might occur and presented some strategies for supporting an online CoP. We also allowed one CoP to use Edmodo so we could see how another free platform might work. This group had selected this platform because

they were familiar with it from other work.

In addition we made Bank Street's tech support available to facilitators for unforeseen problems. We have also created a CoP manual to highlight the affordances of Google+ and head off any technical issues that might occur. This will be available online in Fall 2015 for general use.

Create sub-divisions based on interest. This was a primary concern. Google + is a bit clumsy for making groups within groups. It requires that one of the group members or the facilitator start a new group or establish an interest group. The latter seemed to create confusion for the participants since they were not sure where to post. For our new round of communities, we decided to set up smaller, interest-based local groups. The groups could then focus on local interests and concerns.

Synchronous meetings. We came to appreciate the value of synchronous meetings from discussions with colleagues and from the focus group. We included a synchronous "hangout" (a video conference) in the OnRamp to give people the technical experience and a better understanding of the value of the synchronous meeting. It was a chance for a diverse group of professionals to start feeling comfortable enough to begin sharing and thinking together. Modeling this activity helped participants see that the "hangout" can serve as an important trust- building tool.

Accountability. This is the most daunting of the issues that seems to face the online CoP. PJs is a CoP with no extrinsic motivator. People can come and go, post or not post, based on their interests. This can be both an advantage and a disadvantage. It is an advantage in that those who wish to just visit and collect resources can do so with no commitment. If the goal is a sustained investigation or conversation, the space becomes challenging because questions can be posted with no response. This then stands in the way of collaborative construction of knowledge and does not serve the progressive educator or alum who is philosophically alone in her/his school.

Discussion

Online communities of practice offer a forum for likeminded educators to connect across space and time. This project set out to explore how the affordances of social media outlets and tools can be leveraged to support long-term teacher professional development through online communities of practice. Our experience starting and maintaining PJs ish ong with feedback from the participant focus group – provided valuable insight into the value of online CoPs, and more importantly highlighted key considerations for creating and sustaining a successful CoP. Among the most notable considerations is the role of the facilitator, the focus content area or topic, and participant interest and engagement, or lack thereof.

Role of the facilitator

Facilitating an online discussion is both similar to and different from facilitating a face-to-face (f2f) discussion. The choice of task is central to nurturing participant engagement, and the facilitator must

decide when to participate and when to let the group interact on its own. In an face-to-face class the instructor typically has some idea about who is engaged or in need of support. Online, engagement demands new norms (e.g., signals, such as a "like") and new models for participation. On a Google community participants can "+1" a post or comment to indicate that they have read it. This is an easy way for participants, particularly those with limited time, to signal to the facilitator and other members that they are indeed engaging in the community. PJ participants did not make use of this feature, so it was difficult for the facilitator to know whether people were engaged and the extent of their offline participation. The challenge for the facilitator is therefore to invent other structures or activities to find this out.

More generally, facilitation needs to take into consideration the affordances of the technology when creating online activities to ensure that they can support dialogue and collaborative work, and ultimately lead to the creation of new knowledge. The tool can appear to be a barrier when face-to-face activities are simply transferred to the online medium. Forming smaller groups within the larger community is one way to address this.

CoP focus

A second key consideration is the focus of the CoP. We know from the focus group and our own work in the area of professional development that teachers are most interested in resources and strategies that address their instructional needs and can be easily incorporated into their teaching routine. Thus, participants are more likely to engage in a CoP that targets a specific content area than one that is more general. The decision of how narrowly or broadly to focus the CoP should be driven by the interests and goals of the participants. The dynamic and creative use of the platform will impact what is possible.

Participation

The final key consideration -- and one of the biggest challenges for online CoP facilitators -- is creating and sustaining participant interest and engagement. Several factors may contribute to low levels of participation. A major factor is time. Teachers have very limited time to engage in professional development activities. Although they may be interested in the content area of a CoP, they may struggle to find time to participate. The participants' and/or the facilitators' lack of familiarity with the online platform (e.g., Google community) may also partly explain decreased levels of participation. The frustrations often associated with learning and adjusting to a new platform may at first discourage participants from becoming an active member of their community. As these platforms become more ubiquitous, this should become less of an issue.

Accountability

Lack of accountability mechanisms within an online CoP also play a major role in participation. One of the major distinguishing factors between online communities of practice and online courses is the power wielded by the leader. In both forums, the facilitator (or instructor) can set expectations

for participation; however, facilitators do not have any effective incentives to ensure participation. In contrast, online course instructors assign grades to participants. By linking grades to participation, instructors have the benefit of a built-in accountability mechanism. Because no grades are assigned to members of a CoP, there is little incentive to participate. Including a statement of expectations in a CoP may affect the dialogue, but the facilitator has no "power" to insist on any participation. Participation is voluntary and at the whim of those involved. Though educators may join an online CoP with the best intentions, there are no tangible consequences if they do not participate. The facilitator must understand that this also means that the participants may not understand their responsibility to deepen and direct the community.

The results of this work support the notion that online communities are promising forums for teacher-directed, sustained professional development. In order for online communities of practice to work, however, additional research and experimentation is needed to identify effective incentives that will motivate sustained engagement. Facilitators and participants need to further reflect on how this new tool can work for them. Both need to imagine how to rearrange the furniture in this virtual room, and we as researchers and practitioners need to figure out which ways best support learning.

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