

## **Using Online Tools for Communication and Collaboration: Understanding Educators' Experiences in an Online Course**

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Recently there has been an explosive growth in online learning that is “rapidly transforming post-secondary education” (Moller et al., 2008, p. 66). A growing number of distance education initiatives are in the field of education and rely on the Web “as a primary medium for delivery” (Dickey, 2008, p. 507). As universities expand offerings of online courses, however, they are finding that one of their greatest challenges is how to design and implement courses that “provide a sense of community with constructive feedback and provide open forthcoming communications as well as recognizing membership and feelings of friendship, cohesion, and satisfaction among learners” (Desai et al., 2009, p. 333). Citing the work of Daviault and Coelho (2008), Dickey (2008) argued that all too often, “Web-based instruction is reduced to uninspiring content presented in a linear text-based format” (p. 506). Research studies indicate that teaching online requires a different pedagogy and a unique set of skills from that of traditional classrooms (Fetherston, 2001; Hardy & Bower, 2004). Researchers argue that educators in the distance medium “are faced with new pedagogical issues surrounding student interactions, course content design and delivery” (Moller et al., 2008, p. 67). They claim they see a systemic lack of awareness when it comes to appropriate uses of technology in the field of education (Desai et al., 2009). The purpose of this study was to explore educators’ experiences in an online course to better understand how course design and pedagogical delivery can best support student learning. More specifically, the study explored how the Cognitive Apprenticeship Model (CAM), which was used to inform course design, helps shed light on the learning opportunities that were offered to students who took the course. Using the CAM as a theoretical lens, researchers investigated the following questions: 1) What methods of instruction, as described by the CAM, supported educators in learning how to use technology to support online communication and collaboration in their respective fields of study? How were these methods introduced and used? and 2) What evidence exists to show that these methods of instruction had a positive impact on students’ changing knowledge, skills, and/or dispositions of technology integration?

### **Theoretical Framework**

To inform the design, development, and implementation of the course and its influence on participants’ online experiences, researchers used the Cognitive Apprenticeship Model (CAM) as their theoretical lens. The CAM is a framework that is situated “within the social constructivist paradigm” (Ghefaili, 2003, p. 9). The cognitive apprenticeship, as described by Ghefaili (2003), is a “representative of Vygotskian ‘zones of proximal development’ in which student tasks are slightly more difficult than students can manage independently, requiring the aid of their peers and instructor to succeed” (p. 9). The CAM states that when students are learning in an academic environment, they do not usually have access “to the cognitive problem solving processes of instructors as a basis for learning through observation and mimicry”

(Collins, 2006, p. 48). Before apprenticeship methods can be applied by students to learn cognitive skills, the learning environment “has to be changed to make these internal thought processes externally visible” (Collins, 2006, p. 48). The CAM is designed so that these cognitive processes can be brought into the open where individuals can “observe, enact, and practice them” (Collins, 2006, p. 48). The CAM is a design framework that “holds relevance for both modeling the effective use of technology for pre-service P-12 teacher education students and as a method for the design of a Web-based learning environment” (Dickey, 2008, p. 507). A number of researchers have already begun to explore the integration of technology using cognitive apprenticeship methods, but further research is needed to inform the pedagogy of online teaching and learning (Hendricks, 2001; Liu & Hsiao, 2002; Liu & Pedersen, 1998; Pahl, 2002; Schrader et al., 2003).

According to the CAM model, there are four dimensions that constitute an effective learning environment: *content*, *method*, *sequencing*, and *sociology*. Content identifies the types of knowledge that are required for expertise, including subject matter knowledge, knowledge of learning strategies, and knowledge of how to direct one's own learning. Method refers to the teaching methods associated with the cognitive apprenticeship, including such things as modeling, coaching, and scaffolding. Sequencing covers the ordering of learning activities and illustrates how tasks can increase in both complexity and diversity. Sequencing can describe how learners conceptualize tasks and move from global to local skills (Collins, 2006). Finally, the sociology of learning, as defined by Collins (2006), highlights various social characteristics of learning environments.

When describing the various methods of instruction that were used to support online teaching and learning, we found it helpful to consider three groups described by Collins (1987) when first introducing the CAM. Collins (1987) introduced six different methods and categorized them into three different groups. He explained that the first three methods (modeling, scaffolding, and coaching) are the core of the cognitive apprenticeship, “designed to help students acquire an integrated set of cognitive and metacognitive skills through processes of observation and of guided and supported practice” (p. 15). The next two methods, articulation and reflection, are methods “designed to help students both to focus their observations of expert problem solving and to gain conscious access to (and control of) their own problem-solving strategies” (p. 15). The final method, exploration, is focused on “encouraging learner autonomy not only in carrying out expert problem solving processes, but also in defining or formulating the problems to be solved” (p. 15).

### **Methodology**

This study followed a design-based research model where a research team, which included the course instructor and course developers, engaged in a continuous cycle of data collection and analysis (Reinking & Bradley, 2004). According to Cobb et al. (2003), the theoretical products of design-based research “speak directly to the types of problems that practitioners address in the course of their work” (p. 11). The Design Based Research Collaborative (2003) argued that design-based research “can help create and extend knowledge about developing, enacting, and sustaining innovative learning environments” (p. 5). While engaging in this method, practitioners and researchers “work together to produce meaningful change in contexts of practice” (p. 6). Using information from a previous study that explored the development and implementation of effective online learning environments, the research team

developed an online course titled, “Introduction to Web 2.0 Tools,” and followed participants’ experiences throughout their involvement in the online course.

“Introduction to Web 2.0 Tools” was an online, graduate level course designed to help educators develop proficiency in educational technology, addressing the challenges of preparing learners for the demands of our information rich, Digital Age society. In this course, students explored collaborative web 2.0 tools, addressed issues related to Internet safety, critiqued lesson plans for their use of educational technology, and created an educational project that incorporated technology integration. Many students chose to create teacher websites for their projects. Students had various opportunities throughout the semester to engage in both individual and collaborative, project-based activities that emphasized inquiry-based learning. This occurred through online discussion forums, working in collaborative groups, and giving feedback to one another on project drafts using various types of multimedia. Some of the tools that students used to communicate and collaborate online included wikis, Thinkfinity.org’s online discussion forums and recorded screencasts. In addition to collaborating on projects, students explored theories of learning based upon how they inform the effective uses of technology in educational environments. Additionally, they investigated what the latest research has to say about the integration of technology in educational settings.

One course instructor and 11 graduate students participated in the study. Students came from a variety of educational backgrounds, including preservice teachers majoring in language arts, secondary English education, middle school math education, and middle school science education. Practicing teachers included 2 individuals who were working toward doctoral degrees in science education. Participants gave researchers access to all online discussions, course postings, and assignments. Students in the course also completed surveys given at the beginning and end of the semester. Three out of 11 students were interviewed at the middle and end of the semester. Additionally, the instructor engaged in ongoing discussions with the researchers throughout the semester and participated in two formal interviews. All interviews lasted approximately 40 minutes each, were audio recorded, and transcribed.

As data were collected and analyzed throughout the study, findings informed the ongoing design and development of the course. For example, at one point in the middle of the semester students were asking specific questions about the use of technology in their respective subject matter areas. Since the instructor was not a math expert, she introduced an expert in the field to be a guest speaker in the course so that he could answer students’ questions related to technology use in mathematics instruction. All data and research notes, which included comments from informal conversations with the course instructor, were uploaded into the qualitative software program NVivo. Data were deductively and inductively analyzed using constant comparative methods (Glaser & Strauss, 1965). Researchers deductively coded data using the four dimensions of the CAM. Particular attention was given to instructional methods as defined by the CAM (Collins, 2006). In addition, they coded data for evidence where participation in the course had an impact on participants’ teaching and/or learning. Researchers also noted other recurring themes, met to compare coded text, and discussed differences until consensus was reached on descriptions for new coded categories. New categories were created and reconfirmed as needed as researchers periodically revisited the data and coding categories throughout the study.

## **Findings**

In the following sections, we describe methods of instruction, as described by the CAM, that supported online communication, collaboration, and learning in “Introduction to Web 2.0 Tools.” Methods of instruction have been organized into the categories of *modeling*, *scaffolding*, *coaching*, *articulation*, and *reflection*. Following the discussion on methods of discussion, we then describe how they positively impacted students’ knowledge, skills, and dispositions of technology integration.

## **Modeling**

Modeling, as described by Collins (1987), is a process by which students learn through observing an expert perform tasks. It involves having an expert carry out a task “so that students can observe and build a conceptual model of the processes that are required to accomplish the task” (p. 15). In cognitive domains, this requires the “externalization of usually internal (cognitive) processes and activities--specifically, the heuristics and control processes by which experts make use of basic conceptual and procedural knowledge” (Collins, 1987, p. 15). Modeling can be overt or covert. Research in the past has shown that modeling is an effective way of learning than simple trial and error (Bandura, 1977). The CAM was not originally designed to inform online learning. With this in mind, the way in which students “observe” expert practice differs from having students in a face-to-face learning environment. When engaged in online learning, experts can use such things as videos, screencasts, podcasts, discussion forums, and other online tools to model their practice and externalize their thought processes.

Findings from our study revealed that modeling was presented in various ways throughout the course. The responsibility of providing modeling was initially vested with the instructor, but as the course progressed, students and guest experts also played their role in modeling best practices. Throughout the course, several videos were made by guest experts and the instructor to demonstrate the use of various Web 2.0 tools for educational purposes. Jonassen (1999) refers to behavioral and cognitive modeling as two kinds of modeling under the CAM. Videos created during the course demonstrated both types of modeling. Besides using these videos to share and discuss methodological procedures, the instructor and guest speakers also used them to model their thought processes when choosing and using a variety of online tool for online instruction. In addition, the instructor and guest speakers described real life situations where technology was used to support teaching and learning. While sharing these examples, they also explicitly described the pedagogical decisions that were involved when planning such instruction.

The instructor of the course was aware of her role as a mentor, and based on this role she discussed how she made informed choices regarding methods to communicate with students. In one of her interviews, she stated,

I did an audio intro, a video intro. I did screencasts of the syllabus. The other thing I realized is that all the technology that you use to communicate with them, you are actually modeling the technology itself because later on, I saw that a students who also had another online class took the thing that I used for the screencast on the syllabus, and used it in her project for a different class and actually wrote about that. You really can see everything cycling around.

Students, in addition to the instructor and guest speakers, also provided modeling to one another. Citing the work of King (1999), Dennen (2003) described how learners can engage in peer modeling “even without instructor design or direction” (p. 817). Peer modeling exists when learners observe and follow strategies used by others who are working on similar tasks (Dennen, 2003). Peer modeling increased as the course progressed, and it was more evident in the last part of the course. As students developed course projects, they frequently gained ideas and made revisions based on each other’s ideas and responses. For example, during one interview a student described how she added a widget to her blog after observing how it was used on a classmate’s blog. In another example, some students used screencasts to provide feedback to one another after observing how another student had provided feedback through video rather than through writing.

Dennen (2003) described how “the impact of modeling is strongest when it is an explicit process” (p. 817). When the instructor and guest speakers described various ways that they used technology to support teaching and learning, their modeling was explicit and visible. There were a number of instances, however, where modeling occurred more implicitly amongst instructor, guest speakers, and students. For example, even though there were numerous instances where students learned from one another after observing and following strategies that were presented by one another, we cannot be certain that individuals were always cognizant of the role that modeling played in their own learning. Students did not always verbalize and make explicit their thought processes when sharing their coursework, so the “externalization of usually internal (cognitive) processes and activities” (Collins, 1987, p. 15) was not always present. It is possible that additional learning could have occurred if such modeling were made more explicit.

## **Scaffolding**

Scaffolding refers to “the supports the teacher provides to help students carry out a task” (Collins et. al, 1987, p. 20). Scaffolds exist in the form of “a framework or a model to foster students’ understanding of a concept from a certain perspective” (Walton & Archer, 2004). Scaffolds are required to support students in tasks that they would not be able to complete when working alone (Hannafin, Land, & Oliver, 1999; Vygotsky, 1978). These supports can take a variety of forms depending on students’ needs. They can range from abstractions like suggestions to physical supports like cue cards etc. (Dennen, 2003). Based on their functions, scaffolds can be divided into four categories: conceptual, metacognitive, procedural, and strategic (Hannafin et al, 1999).

The design of the course provided many scaffolds to students. According to Walton and Archer (2004), one way of providing scaffolding is by building on the previous knowledge that learners possess. All the instructional modules in the course were sequenced progressively, building upon knowledge and skills that were provided by the other. For example, the purpose of the first module was to make students receptive to understanding the importance of integrating technology into classrooms. The subsequent modules provided knowledge and skills to further deepen this understanding, thereby scaffolding student learning. Additionally, the instructor provided students with rubrics that were used to assess all major course assignments. In addition to clarify expected standards and outcomes, these rubrics served as a way structure and scaffold learning activities. Students were able to use these rubrics to guide and reflect upon the progress of their work.

While reviewing success factors of online courses, Tallent-Runnels and her colleagues concluded (2006), “It is the online instructor’s responsibility to organize online interactions that are sufficiently structured to benefit students’ learning” (p. 101). The instructor of “Introduction to Web 2.0 Tools” constantly steered discussions, using feedback as a form of scaffolding. She provided feedback on all the activities of students; however, feedback was public on some of the assignments (e.g., through discussion forum postings) and private on others (e.g., through private email messages). Throughout the semester, students were required to work in groups to complete projects, and the instructor grouped students according to their backgrounds in different subjects. She used this method of grouping as another form of scaffolding. During an interview, she explained how she grouped students by subject area because she “wanted them to get to know other people in the class that were in a similar subject area so they could make connections to each other.” She described how there were “several math people, several science people, and two engineers” in the class, so she formed a STEM (science, technology, engineering, and mathematics) group where they shared instructional ideas with one another. Both the STEM students and the instructor described how content-specific discussion groups supported student learning, thereby acting as yet another scaffold for learning.

In addition to integrating a number of scaffolds through both the structure of the course and assigned activities, the instructor also offered virtual office hours and answered students’ concerns through private emails. In this way, the instructor provided additional scaffolding to help resolve questions and concerns related to course content and assignments. The instructor provided assistance to resolve technical difficulties, shared instructional resources with students, provided detailed feedback on assignments, and supported students in helping one another, thereby promoting “reciprocal scaffolding” (Holton & Clarke, 2006) amongst learners.

### **Coaching**

Coaching is defined as the “monitoring of students’ activities and assisting and supporting them when necessary” (Dennen, 2003, p. 814). Collins, Brown, & Newman (1987) similarly describe coaching as consisting of “observing students while they carry out a task and offering hints, scaffolding, feedback, modeling, reminders, and new tasks aimed at bringing their performance closer to expert performance” (p. 16). In this paper, we describe coaching as a type of instructional method and support provided through humans (i.e., instructor, guest speakers, other students) rather than through non-human support systems. Coaching of this nature requires repertoire of strong communication skills such as the ability to “empathize, listen, and build relationships and trust” (Knight, 2007, p. 13). To accomplish this, the instructor made use of a variety of modes to communicate with students. Depending on the type of coaching that was required, the instructor used videos, screencasts, or emails to convey feedback and/or support. In addition to having the ability to appropriately support learners in meeting their goals, instructional coaches must also be able to “facilitate teachers’ reflections of their classroom practices” (Knight, 2007, p. 13). To this end, the course was imbedded with reflective and collaborative activities that were designed to guide students in addressing their own practice.

Our study highlights some of the effective ways in which the instructor, guest speakers, and students provided coaching throughout the semester. For example, one guest speaker, a technology expert, coached students on how to effectively use SMART boards in educational settings. Specifically, students were able to not only troubleshoot issues they had with the

SMART boards, but were pushed to consider this technology in new ways. In addition, the data highlight some of the obstacles the instructor faced in being an effective coach in an online setting. As stated by Collins and his colleagues (1987) when describing the CAM, a large component of coaching is directing “students’ attention to a previously unnoticed aspect of the task or simply remind the student of some aspect of the task that is known but has been temporarily overlooked” (Collins, Brown, & Newman 1987, p. 16). Effective coaches not only provide clear feedback, but they do so in a highly interactive manner (Collins, Brown, & Newman, 1987). Our study revealed that the instructor provided a tremendous amount of coaching to students through private emails, while giving feedback on assignments, yet she struggled with how and when to provide feedback and coaching in a more public environment. Specifically, she was unsure whether feedback and support, especially in the form of constructive criticism, should be offered on a public forum or through private messages. The source of this conflict stemmed from the instructor’s desire to foster an online community while still meeting the needs of individual students. At times, the lines dividing these two spheres blurred, and she did not always know how her students would respond to her feedback and suggestions. In addition, she felt that some students would be uncomfortable and possibly even embarrassed if some of her constructive criticism were made available for all to see.

In addition to receiving coaching from their instructor and guest speakers, the way that the online course was designed allowed students to have numerous opportunities to coach one another. Findings revealed how participating in online forums fostered learning communities, and within these communities various types of online interactions led to peer-to-peer coaching. For example, students sometimes asked for help from their classmates while seeking resources to support their course projects. They discussed course content while pushing each other to think more deeply about issues related to technology integration in classrooms. Students explored new concepts with one another, gave feedback to each other on assignments, and offered suggestions and advice to one another when asked for help. One student participant remarked “I have learned that input from my fellow teachers is really important to creating something of this [website] magnitude.”

When peer-to-peer coaching occurred in the online discussion forums, the instructor, wanting to foster such collaboration, was at times unsure how to handle her role as coach. She elaborated upon this during an interview stating,

I’m afraid that I’ll squash or stifle... I notice their tone changes if I say something when they talk each other, so I want to give them that freedom without making them feel like I’m not paying attention. I wrote them a private message every time they posted for each module, and several of them wrote back and said thank you for the private feedback. I think that was a good way to go with them.

Data revealed that when student became effective peer-to-peer coaches when they engaged in projects and activities. As Lucas (2001) found in a related study, coaching, in this course, was most effective when it focused on activities that the coachee could not complete alone. These types of activities encouraged a spirit of collaboration, community, and “generally created a closer relationship between the mentoring pair” (Dennen, 2003, p. 821).

## **Articulation and Reflection**

The fourth aspect of Collins' (1987; 2006) methodology principle within the Cognitive Apprenticeship Model is articulation, which involves having students identify their thought processes when carrying out a given task. The fifth aspect of the methodology principle, reflection, entails having the students compare their own work against that of their peers, as well as their teacher (the expert other), with the ultimate goal of honing their *own* expertise (Collins, 1987; 2006).

When it came to the methods of articulation and reflection, the researchers noted how the course provided students with unique opportunities to learn from one another as their thoughts and reflections were shared in public spaces. Through various methods of instruction, students were given the opportunity to articulate and reflect upon their ideas in public. This supported them in their learning and allowed them to engage in authentic discussions, centering on real problems of practice and possible solutions, which fostered a supportive online learning community.

Artifacts collected and coded over the course of the study included students' blog posts, essay reflections, discussion posts, lesson plans, and website development plans. Many of these documents revealed students' articulation and reflective practices in situ. Examples of these two elements often appeared in tandem with one another throughout the course. When students articulated their thought processes while developing projects or while formulating discussion posts, they also frequently reflected on their prior learning experiences. Discussions included classroom applications as well as knowledge gained from other students enrolled in the course. In some instances, however, students associated their course content backgrounds with an inability to articulate their thought processes. One student who was part of the STEM discussion group elaborated stating,

Well, I think it's a lot more work than I thought it was going to be. I'm not a big writer; I'm a math major, so I take a lot of math courses. I don't really - I've never been a big blogger or online journal type person, so writing stuff takes a lot of effort for me. That's probably most people; I just don't like to do it. So that aspect has been a little bit tougher for me because I have to put my thoughts in writing all the time.

This student wrote that he believed the online learning format was going to involve less work than what in typical face-to-face courses. As a math major, he shared with the researchers his frustration with "hav[ing] to put his thoughts in writing all the time." He made the assumption that others in the class, perhaps those with a background in English or the humanities, might have an easier time with creating blog post assignments, as writing comes more naturally to them (so he thought) than himself.

Of all the artifacts collected throughout the fifteen-week course, student blogs revealed the most about students' personal thoughts on technology integration in classroom settings. Discussion posts also demonstrated students' reflective practices, particularly when a dialogue ensued between one or more students on a given topic. At times students initially answered discussion prompts by simply retelling information that came from the text, resulting in a response that seemed more formulaic than authentic and reflective. This exchange became vastly more intellectual and reflective, however, when students made connections to their own teaching and learning. For those students who were not yet teachers, such responses were noted when they reflected upon their learning experiences that occurred during student teaching, which occurred



the semester prior to when they were enrolled in the course. When students offered their own perspectives during these responses, their thoughts and reflections demonstrated more meaningful, deeper learning amongst course participants. Comparisons of each other's work samples also led to additional reflective practice. At times, students stated that they would never have thought to incorporate a particular tool within their wiki or website project until they saw it exhibited on a fellow student's page. As one student explained,

Viewing my own classroom website and many of the sites my peers have been making, I really started to understand how technology can be used in so many different ways. Almost all of the sites that I viewed that my classmates created were something that was being used to enhance the educational experience of their students... I think it is important to recognize that few to none of my classmates set out to create a website that was made to replace other experiences that take place off the Internet... I think it is important to always remember that technology is a tool, not a replacement for classroom education, paper portfolios, or discussions amongst professionals and students.

Our purpose for doing this research sought to reveal what particular aspects of the course prompted students' *actual* learning: Was it the discussions via Thinkfinity? The required blog posts throughout the semester? Unfortunately, it was rather difficult to link responses posted on blogs and discussion forums to what prompted *actual* learning unless if students explicitly stated from where their new ideas came. It was our hope that the articulation and reflection elements of the CAM would allow us to take a more critical lens to this aspect of our study, but we found that most times students made comments about their new insights and learning without identifying from where these new insights came.

Overall, reflection on learning was somewhat limited. Reflective responses on the utilization of technology were much more prevalent. One guest speaker's video discussion on the role of social networking seemed to prompt some more in depth discussions on learning. In addition, some students' critiques of online lesson plans revealed a more critical and reflective view on learning. When students saw their peers' technology utilization, read each others' blogs and saw various uses and structural elements of blogs being put into effect, they frequently took pause to reflect on their own websites and blogs, considering how to alter them. At times, the changes seemed to be more structure oriented, rather than having a specific focus on teaching and learning with the tools themselves. At face value, this appears to be a very rudimentary acquisition of skill use and development; to alter the appearance of a blog may not seem much more than a change in aesthetics.

In some instances, students explained what incited the alteration (e.g. a peer's blog utilized a more friendly user format); more often than not, however, it was the professor prompting students to expand on their thought processes that led to a more in-depth, reflective focus on their own learning. When commenting on one student's blog posting, the instructor of the course wrote,

I really like the way you utilized the chart to support your argument for blogs. I think you are right that blogs can help to lower technological barriers and that they can help teachers to find ways to "modify their pedagogy." I think it is

interesting that you say that blogs allow for the "ultimate in independence." Can you elaborate on this?

After the instructor prompted the student to elaborate on his reasoning behind labeling blogs as the "ultimate in independence," the student responded in the "Comment" section of his blog. He wrote, "To me, blogs offer a great deal of independence for several reasons (these are in general, i.e. not for a class blog)." When listing his reasons, he grouped them into a variety of themes, which included the following: less self-censorship, technological freedom, and no oversight. Under each, he then proceeded to list several supporting statements and then a lengthier, more elaborative response that explained his rationale for calling blogs the "ultimate in independence."

The dialogue that took place within the Comments section of this student's blog was much more reflective than the student's original post. Fellow students also reacted more to the comment section than to the original post. This exchange led to a more authentic learning experience between the poster and his peers, including a discussion on the ability to maintain anonymity on the Internet, even when one is using a screen name or pseudonym to post.

The instructor often scaffolded reflective practices "behind-the-scenes," and she additionally encouraged students to be more articulate in their thoughts when responding to their work through emails or even by telephone. By asking students to articulate and elaborate what their thought processes were engaged in course activities, she consequentially influenced the ways in which they reflected on their own teaching and learning.

In the end, reflection, the process by which students analyzed and evaluated their work, and articulation, the verbalization of the results of this process (Dennen, 2003), manifested in a variety of ways. For example, they occurred when students viewed screencasts created by others, when they compared their websites to others, and when they read their classmates' blog postings. Readings, particularly those from the text *Leading 21<sup>st</sup> Century Schools: Harnessing Technology for Engagement and Achievement* by Schrum and Levin, also appeared to prompt more discussions where students articulated reflections on their own learning. The following quote sums up nicely how one student's major course project changed as a result of the aforementioned resources:

From the **readings, input from my fellow pre-service teachers and looking at other teaching websites**, I feel that there are changes and additions I can make. First, I think I should add a calendar listing the topics and concepts we will be covering. I feel that this would allow me to specify what concepts I want them to discuss and post about, rather than having them focus on topics that may be just in their comfort level and that we have covered already. [Bold added for emphasis]

As was the case with the qualitative study conducted by Hayward, et al., (2001, as reported by Dennen, 2003), both mentor and mentee learned from the processes of reflection and articulation. The instructor teaching the course, serving in a mentorship capacity to the students (mentees), honed her own online pedagogical practices in accordance with the needs and expectations of her students. Symbiotically, students learned from the instructor alternative ways in which to reflect and articulate their own learning experiences (i.e. prompting additional discussion on ideas addressed within blog postings). Ultimately, the CAM allowed for mutually

beneficial learning of both instructor and students through the processes of articulation and reflection.

## **Exploration**

When describing exploration as a method of teaching, Collins (1987) explained that it involves not only setting general goals for students, but also “encouraging them to focus on particular subgoals of interest to them or even to revise the general goals as they come upon something more interesting to pursue” (p. 18). The goal of exploration, he also stated, is to “find general tasks that students will find interesting and turn them loose on them, after they have acquired some basic exploration skills” (Collins, 1987, p. 18). Through assigned class projects, students in “Introduction to Web 2.0 Tools” were provided with a number of opportunities for exploration.

Opportunities for exploration, which included goal setting and following individual interests, occurred in a variety of ways. For example, after students expressed a need to problem-solve instructional challenges related to their specific content areas, the instructor put them into content-specific online community groups so that they could pursue topics and share ideas with one another. Presumably, the content area that they were focusing on within their studies was an area of interest for students, which ultimately capitalized on the sociological principle of “exploiting cooperation” within Collins’ CAM model.

A second example was illustrated through students’ website design project. For this project, students were provided with the opportunity to design a website that met their interests and needs while also simultaneously allowing them to demonstrate their understanding of course content. Students were encouraged to create a website related to a topic of interest that would be useful to them as they planned technology interaction for their classrooms.

A third example was seen through students’ technology implementation project. The purpose of this project was to give students the opportunity to apply what they were learning in the course to their own teaching practice. Students decided upon, planned, and developed lessons and instructional units that incorporated technology. The project was designed so that students could work with their peers to develop and improve upon an instructional plan of interest. Many students chose to work and improve upon lessons that they had previously used in their classrooms. Through these projects and others, the instructor provided opportunities for students to set their own goals and pursue individual topics of interest. Students brainstormed problems of practice while receiving feedback from others. The instructor provided various tasks (website creation, for example) and prompts for inciting discussion within each working subgroup, while students added their own content-oriented perspectives to each activity.

## **Impact on Students**

Based on data of pre and post course surveys and interviews, students were positively impacted by taking the online course. Students showed an increase in their ability to utilize educational technology for the purposes of teaching and learning, including creating classroom websites, using online tools to foster communication and collaboration, and using web-based tools and websites to advance their own continued learning. For example, one student remarked, “This course is fully responsible for my classroom uses of technology. This class made me realize the importance of professional development and continuing learning because teaching in

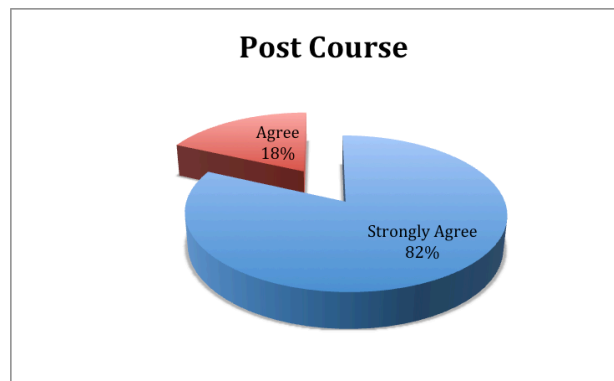
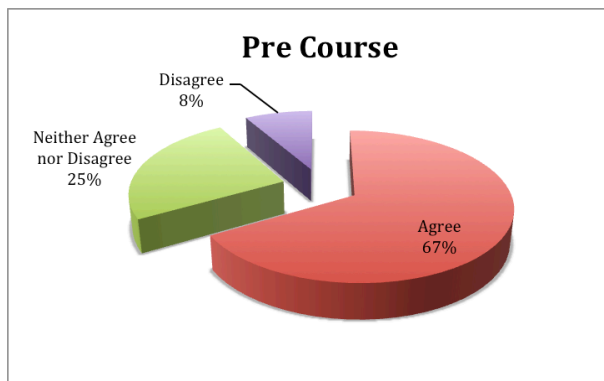
conjunction with taking classes allows you to try out so much and really apply what you are learning. We are lifelong learners!”

Students also demonstrated that taking the course had an impact on their overall thinking about their own instruction, and it impacted how they planned and carried out their lessons. A number of students described that, as a result of taking the course, they had developed a new way of thinking about technology and how it related to teaching. For example, one student stated, “When I write my lesson plans now, I carefully look through the technology standard and 21st century skills standards to see where I can implement them or redesign some of my lessons to incorporate them.” Some students shared that they were able to implement what they had learned into their classroom instruction right away. They also explained how their own uses of technology had an impact on their students’ learning and overall engagement.

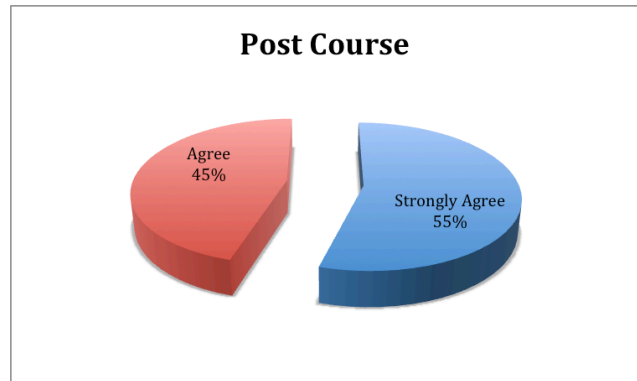
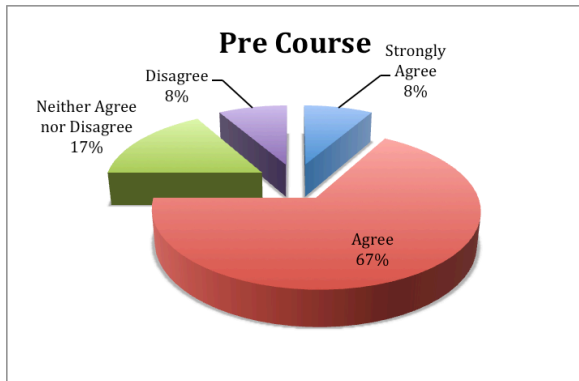
When responding to pre and post survey questions, students were asked to describe their level of understanding of technology and ways to integrate web-based tools into classroom instruction. They were asked to rate their ability to use content-specific tools to support learning and research. In addition, they rated their ability to create websites that could be accessed by students during instructional lessons. As seen from the charts below, all post survey responses revealed that students had a stronger understanding of technology and ways to integrate it into classroom instruction. Students were more confident when it came to creating classroom websites and using content-specific online tools to support teaching and learning.

### Pre and Post Survey Results

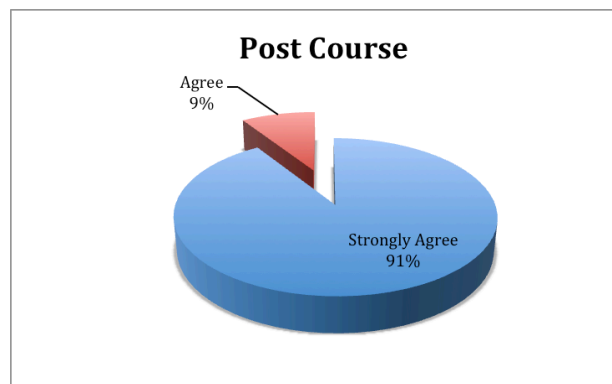
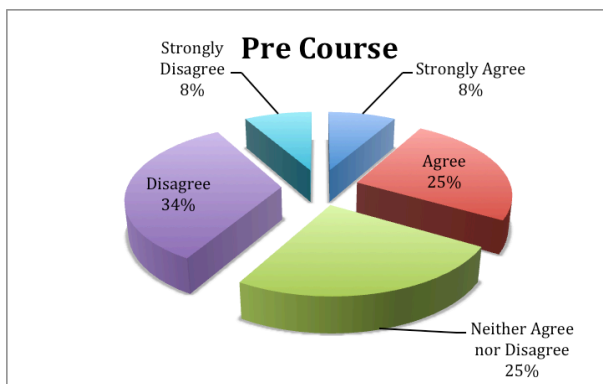
I have a strong understanding of technology and ways to integrate it into the classroom.



I can use content-specific tools (e.g., software, simulations, graphic calculators, etc.) to support learning and research.

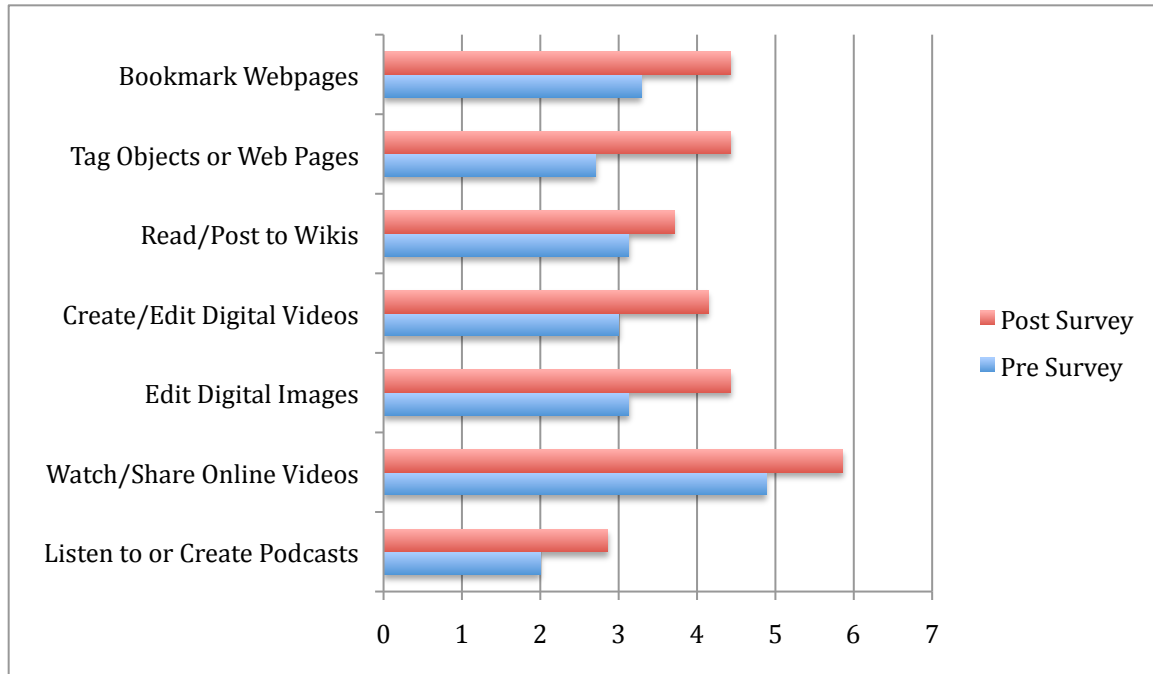


I know how to create my own website to be accessed by my students as part of their lessons.



Pre and post survey questions also asked students to rate their level of use for various online activities and web-based multimedia tools. Their responses varied from ratings 1 through 6, with a rating of 1 indicating “never / never heard of it.” Amount of use then increased from “less than 1 time a week,” “one time a week,” “once a day,” “a few times a week,” to “several times a day.” As seen from the graph below, all areas showed an increase in use when comparing pre and post survey responses.

### Pre and Post Survey Responses to Technology Use



After completing their final website projects, all students demonstrated both the knowledge and ability to design classroom websites that could be used to inform both teaching and learning. In addition, final website projects illustrated that all students were able to design websites that incorporated interactive components that supported online communication and/or collaboration. For example, a number of students created a section on their website that allowed parents to post comments to teachers. End-of-the-semester classroom implementation projects also illustrated students' ability to design lesson plans and instructional units that incorporated the use of web-based technologies to enhance classroom instruction.

### Conclusion

Students' social interactions can be a key to their learning success in web-based learning environments; however, one of the major complaints about computer-mediated communication is the lack of social cues (Hill et al, 2009). When cues are filtered out, communication can become more "task oriented, cold and less personal than face-to-face communication" (Walther, Anderson, & Park, 1994, p. 461). Researchers and practitioners are in general agreement that interaction is a key variable in learning and satisfaction with distance education courses (Wanstreet, 2009). Studies reveal that developing and teaching online courses demand adaptations in teaching practices (Fetherstone, 2001). This research highlights how the CAM can inform course development. It illustrates how online courses and specific methods of instruction can inform educators about using Web 2.0 tools to support online communication and collaboration.

As indicated by Hoskins (2011), online and blended courses "are experiencing demand and continued growth at all levels of higher education, professional development, and k-12 education" (p. 57). As educators continue to increase their offerings of both blended and online instruction, research has shown that they will face a number of challenges along the way. This will be especially true for those individuals who do not have expertise in online learning and who

struggle to envision the use of Web 2.0 tools in their teaching. As we move forward, we will use the findings from the study to inform future iterations of our online course and to inform future research. We believe that many educators can benefit from our own learning experiences.

When redesigning future courses, we believe it will be useful to be even more explicit with students about the methods that are being used for instruction and why these methods are being used. In addition, we believe it would be helpful to have students think more critically about these methods in relation to their own teaching and learning experiences so that they can then be more critical when designing their own online or hybrid learning environments. Collins (1987) stated, “Reflection is the process that underlies the ability of learners to compare their own performance, at the micro and macro levels, to the performance of an expert. Such comparisons aid learners in diagnosing difficulties and incrementally adjusting their performance until they reach competence” (p. 3). By being more explicit about how course was designed based on the CAM and by being more explicit about the rationale and purpose for the various methods of instruction that are used, instructors can give more insight into how “experts” in the field used such ideas to inform course design and instruction.

We believe making such thought processes more visible to students would help them be more thoughtful and reflective in their own work. Instructors can make use of various types of multimedia, such as videos and screencasts, to help share their perspectives and views with their students, thereby making their thought processes more visible to less experienced educators. In addition, students can also use these tools to share more of their thinking with their classmates. Collins (1987) explains how modeling in cognitive domains frequently requires “externalization of internal (cognitive) processes” (p. 15). Technology provides various ways in which these thought processes can be shared and made more public. As we move forward with future courses, we will continue to place an emphasis on online communication and collaboration. According to Collins (1987), cooperative learning can help “foster the situated articulation of processes and concepts, thus helping student to gain conscious access to, and control of, cognitive and metacognitive process...” (p. 22).

As educational researchers and our own research team plan for future studies, we believe the effectiveness of various types of online scaffolds and the ways in which they are used need to be studied. The specific ways in which they can most effectively be used to support modeling, coaching, reflection, articulation, and exploration still need to be explored. For example, are there times when instructor coaching on an online forum is not as effective as providing feedback to students through methods that are more individual and private? Are different modes of communication and collaboration more effective in different types of environments? For instance, are there times when students would be best supported through video based feedback compared to feedback provided through online, text-based forums? Finally, which are the best methods of online instruction for encouraging authentic articulation and critical reflection for students? It is clear from our own study and from the research literature that is available on online teaching and learning, we have not yet begun to even scratch the surface when it comes to understanding the most effective pedagogical practices that should be used to maximize student learning in online environments.

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