
Professional Development 2.0: Transforming Teacher Education Pedagogy with 21st Century Tools

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Abstract

This paper discusses the outcomes of a professional development project offered to faculty of Arizona State University's College of Teacher Education and Leadership. The goal of this project was to assist instructors with progressing technologies and to help them transform their pedagogy to leverage the affordances provided through the integration of Web 2.0 tools. Through the redesign of an instructional unit to incorporate social networking, instructors experienced positive outcomes. Findings suggest that the benefits of integrating social networking tools used in a meaningful way while carefully considering how they fit within specific content areas and teaching methodologies included increased feedback for students and a more student-centered approach to teaching. These are important considerations for teacher education programs of the 21st century. (Keywords: professional development, social networking, and technological pedagogical content knowledge, TPACK)

With an understanding of the collaborative possibilities provided by Web 2.0, progressive university instructors have begun to dabble with how to make use of the myriad of social networking tools in their teaching. However, it is difficult for faculty to imagine what possibilities of implementing such technology exist when they are constrained by old paradigms of teaching (Kuhn, 1970). Even with these confines, Garrison and Akyol (2009) note a recent shift toward collaborative constructivist approaches in university coursework, possibly

because “the idea of sustained learning communities made possible with new and emerging instructional technologies is challenging passive learning environments in higher education” (p. 20). It is true that university instructors who adopt this way of thinking about teaching and learning are pioneering the movement toward a collaborative pedagogy. At this early stage, little exists in the literature to help them proactively address transformative changes in their teaching as they work to build and sustain learning communities through their coursework (Hemmi, Bayne, & Land, 2009). This is why professional development opportunities to assist faculty with benefits of increasing their technological pedagogical content knowledge (TPACK) (Mishra & Koehler, 2006) are important in transforming teaching practices in order to capitalize on the affordance of social networking tools.

Mary Lou Fulton Teachers' College (MLFTC) (formerly know as the College of Teacher Education and Leadership) at Arizona State University has a rich history of supporting faculty efforts to integrate and implement future educators' technology, pedagogy, and content area knowledge. According to Mari Korner, Dean of MLFTC, “We understand the importance of technology being integrated into the very fabric, if you will, the DNA, of what we do” (AACTE Best Practices Award Entry for Innovative Use of Technology, 2009). Faculty development has been supported through the efforts of a series of large federal grants, including a recent Preparing Tomorrow's Teachers to Use Technology (PT3) grant. In addition, the Professional Development School Teacher Education Network of Excellence through Technology (PDS TENET) project has enabled

the college to be able to offer state-of-the-art distance learning opportunities for state, regional, and national audiences, including the cutting-edge use two-way video and online distance education to positively affect practicing teachers in high-need content areas. These efforts, supported by the administration and mission of our college, are a part of an ongoing endeavor to assist faculty with increasing their ability to effectively integrate technology into their teaching.

Although Mary Lou Fulton's Teachers College has a distinguished history of efforts to integrate technology into the curriculum, it became evident to the educational technology faculty that the college as a whole was not keeping up with the latest in the use of new technologies, and especially with the pedagogical possibilities made achievable by the development of Web-based social networking tools. Consequently, the educational technology faculty applied for an internal Excellence in Research Award (ERA) to support the college to refocus attention on maintaining the school's identity as a progressive college that infused technology throughout the curriculum.

The ERA grant was based on the assumption that, although faculty may not be digital natives to social networking technologies, they must become wise digital immigrants who plan for them in effective instruction. For example, more than half of our students have Facebook or MySpace accounts. Students have embraced new technologies, but, largely, MLFTC faculty have not. Technology is a compelling mechanism to facilitate learning of content and applied skills, and its use will be instrumental in realizing every aspect of a 21st century education system (Vockley, 2008). Students will not develop 21st century skills

without the use of technology, however, and making sense of the importance of integrating these skills and developing appropriate uses of tools in the content present great challenges for teacher educators.

How do these technologies become part of the teacher education program? What are the possibilities for social networking tools in education? To address this issue, the grant provided optional professional development opportunities for the education faculty at our university. The two goals of this professional development were to (a) provide models for faculty to keep up with rapid changes in technology, and (b) promote transformation of pedagogy. Thus, the ERA leadership team designed a series of summer workshops and follow-through activities to engage faculty in examining 21st century skills, learning Web 2.0 or social networking technologies, designing or redesigning a lesson or unit to be taught the following semester, and assessing student achievement, all in a way that would emulate the tenants of social constructivism philosophy.

Twenty-six out of 70 full-time faculty agreed to participate in this professional development opportunity. Participants included 10 tenured or tenure-track faculty and 16 clinical teaching faculty who did not have research responsibilities. They represented a wide array of teaching education content areas, including early childhood, elementary education, secondary education, and graduate studies, and each had at least three years of K–12 teaching experience. These faculty attended an 8-hour initial exploratory, “working” workshop where they would use the professional development leaders and each other as resources to develop a unit of study for one of their courses; implement the unit in the fall semester; evaluate the unit implementation through a project-provided survey administered to their students; and attend a capstone workshop to reflect on their efforts, changes in teaching, and suggestions for future college-wide directions. Twenty faculty were able to fulfill all of the requirements, and they received a small stipend provided by the ERA grant.

The goal of the professional development plan was to enable faculty to create and implement a course-embedded unit that addressed the 21st century skills of collaboration, communication, and problem solving. The workshop was facilitated by the educational technology faculty who modeled the potential uses of social networking tools and created an environment in which colleagues could serve as resources to one another.

An outline of workshop topics included:

- An overview of 21st century learners and the workplace environment
- An overview of Web 2.0 tools and participant outcomes/products
- Demonstration of curricular uses of Web 2.0 tools
- Time to plan curriculum; select a tool or tools; discuss the roles of teacher and students; and connect curriculum, tools, and 21st century skills
- Time to plan for action research on the implementation
- Time to share curriculum plans on the project wiki

Participants in the workshop experienced a variety of Web 2.0 tools through hands-on exploration, an introduction to the ways the technology could benefit learning, the chance to explore the integration of technology into the curriculum, and collaborative conversations about potential uses. Examples of tools included: Google products (e.g., Google Docs, Calendar, Sites), social bookmarking/Web-based information resources (e.g., Delicious, PB Wiki), audio/video tools for project-based learning (e.g., VoiceThread, Audacity), and reference tools (e.g., RefWorks).

Perspective/Theoretical Framework

Koehler and Mishra (2005) define TPACK as the connections and interactions between and among pedagogy, content, and technology, which are the components needed to ensure quality instruction. TPACK incorporates an understanding of the complexity of relationships among students, teachers, content, technologies, practices, and tools. In crafting professional develop-

ment programs, the areas of pedagogy, content, and technology need to be addressed to ensure that the experience is as transformative as possible. This model is useful in addressing professional development, as it integrates technology with the domains of content and pedagogy rather than allowing technology to be taught in isolation. As Harris, Mishra, and Koehler (2009) articulate:

... typical approaches to technology-related professional development are based on the assumptions that it may be enough to just expose teachers to particular educational technologies and possible curriculum-based uses of those tools and resources. Approaches that teach only skills (technology or otherwise) are insufficient. Learning about technology is different than learning what to do with it instructionally. (p. 402)

This lens offers a way to begin looking at how these domains are currently addressed within teacher education and professional development programs, and how they need to be altered to meet the needs of teachers entering 21st century classrooms (see Figure 1, page 6).

Using TPACK as a framework for effective professional development and concentrating on helping instructors leverage the affordances of technology to most effectively teach their curriculum, faculty can use social networking to capitalize on the social aspects of learning and allows students to move beyond the acquisition of foundational knowledge to a depth that enables implementation in teaching and learning. This kind of learning requires active participation of the sort that binds participants together in meaningful ways (Vygotsky, 1978; Wenger, 1998). The recent surge of collaborative online tools takes advantages of a social learning paradigm, because faculty couple collaborative actions with the read-write capabilities of Web 2.0 tools to provide a level of connectivity among users not available in the static era of the Web 1.0. The inherent possibilities have been referred to as “architecture of

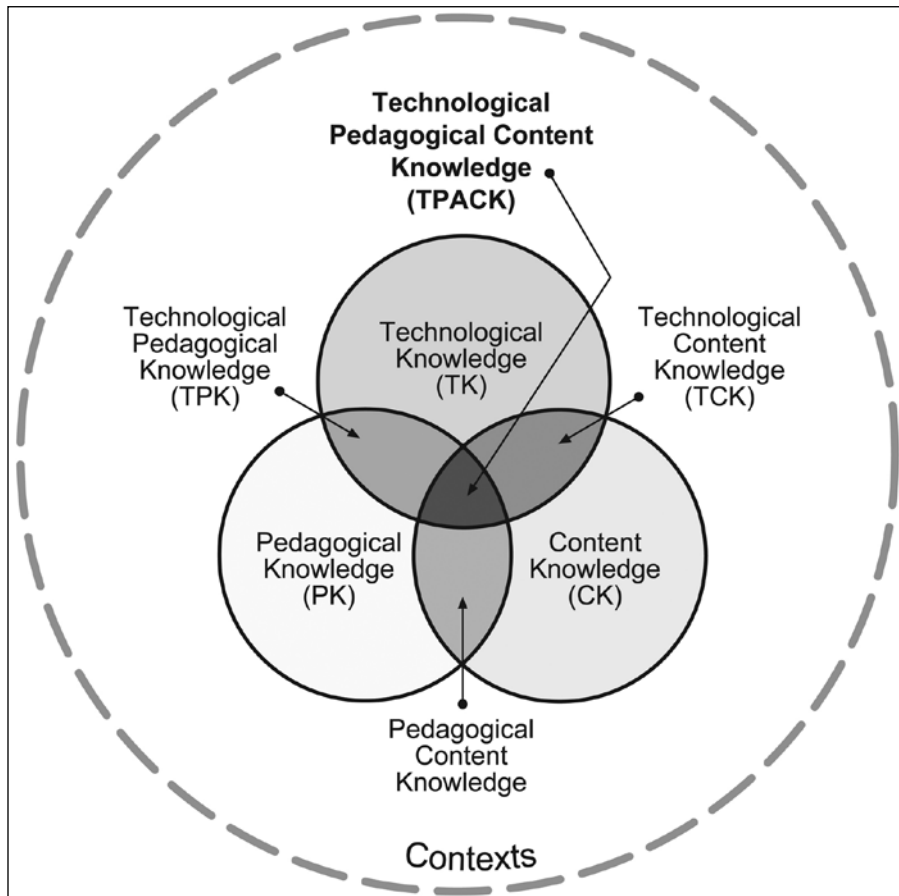


Figure 1. Graphic representation of Technical Pedagogical Content Knowledge (TPACK).

participation” because these technology systems are designed with social connectivity in mind, making it possible for users to contribute to their collective intelligence (O’Reilly, 2004), which creates new possibilities in the collaborative landscape. This ties closely with the notion of TPACK, working to take advantage of the power of technology to transform the pedagogy and content to provide a richer, more meaningful learning experience for students.

Methods

This paper discusses the results of a constructivist-based professional development model and its capability to transform pedagogy among education faculty, as evidenced by instructors’ first attempts at teaching the units they created that melded 21st century goals and social networking technologies. The following questions guided our analysis of outcomes of the professional development experience:

- What were instructors’ perceptions of the Web 2.0–infused curriculum project?
- How did these curriculum projects address TPACK?
- How did instructors view the impact of their redesigned instructional units on student achievement?
- How did instructors perceive a change in their role as a result of the ERA workshops/activities?

All instructors were asked to reflect about the curriculum revision process and the impact of their teaching on student achievement. With regard to the former, this involved responding in writing to a series of questions provided by the faculty researchers. These writing prompts were open-ended questions delivered in a Web-based questionnaire so that the researchers could capture reflections electronically and analyze them systematically. We gathered responses to a Web-based survey we administered at

an exit meeting of all participants at the end of the semester.

The research team developed the questions collaboratively with an aim of addressing the research questions concerning instructors’ perceptions of the Web 2.0–infused curriculum project, the redesign process, and the change in their role as a result of the professional development. Questions included the following:

- What was the most difficult part of creating a unit of study that relied upon social networking tools?
- How did you overcome it?
- Was the use of social networking tool(s) successful?
- What data or other information leads you to believe this?
- If you were to teach this same unit over again, what would you do differently?
- What data or other information suggests this?
- How are you different now as a technology user? As an instructor?
- Has your role as a teacher changed in any way?
- How do your students see you now?
- How do your colleagues see you now?
- What teaching goals do you have now as related to the use of technology? As related to pedagogical shifts?

A requirement for receiving the stipend associated with this professional development opportunity was that participants would survey all of their students to obtain feedback concerning the use of the social networking tool(s) during the unit of study. The research team developed a Web-based survey tool made it available for faculty to administer to their students at the conclusion of the unit. Faculty reviewed the results and then summarized student perceptions in a written activity during the exit meeting.

Analysis of Data

One strategy for conducting qualitative analysis is homogenous sampling, in which a group of similar cases is examined in depth in order to describe a particular subgroup (Patton, 1990). In

this study, teacher educators redesigning a unit of their curriculum to include Web 2.0 tools were considered a group because they participated in the professional development opportunity and faced similar issues of technology integration within a parallel context. Using this approach, we used a content analysis strategy to make sense of the resulting open-ended response data. We analyzed all of the data from the Web-based survey, including faculty perceptions regarding the unit redesign, the impact of the integration on teaching and learning, and faculty impressions of student achievement. We examined and reexamined these artifacts, noting prevalent themes from each of the key areas of the TPACK framework. According to Glesne (1999), “Coding is a progressive process of sorting and defining and defining and sorting those scraps of collected data” (p. 135). Because coding provides the foundational framework between raw data and analyzed data (Charmaz, 2006), we analyzed survey responses using open coding to provide a means of identifying critical concepts and themes (Strauss & Corbin, 1998). The following section discusses the results.

Results

Participants involved with the professional development opportunity identified changes in their teaching along the TPACK framework. The following section describes overall findings related to technological pedagogy, technological content, and technological pedagogical content knowledge. We gathered all referenced quotations throughout this article from faculty responses to open-ended survey questions administered on January 15, 2009.

Shifts in Technological Pedagogy

According to Mishra and Koehler (2006), technological pedagogical knowledge is “knowledge of the existence, components, and capabilities of various technologies as they are used in teaching and learning settings, and conversely, knowing how teaching might change as the result of using particular technologies” (p. 1028). As with the

codified themes found in the transformations of overall pedagogy, nine instructors (45%) found that the incorporation of technology within their curricula facilitated the process of providing feedback as well as communicating. One instructor commented:

My students used Google documents in order to draft and write their Sheltered Instruction Observation Protocol (SIOP) unit plan throughout the course. Rather than wait until the end of the course, the students worked on the unit plan throughout the course—receiving feedback from the members of their Professional Learning Community in order to constantly reflect and improve their plan before turning in the final draft.

Another faculty member shared a similar experience:

I think having a peer review process encouraged most students to work on major assignments earlier and conduct more revision. I also think that having students share to the learning community (blog activities) provided examples of relevance that enhanced student interest throughout the course.

This comment from another instructor is also in line with a shift in technological pedagogy:

The pedagogy changed from more instructor led learning to students helping and leading each other. Also, they learned from each other by using the social networking tools.

These reflections illustrate the advantage instructors experienced through the integration of Web 2.0 technologies. Faculty reported that their students now provide feedback to one another and learn from their fellow classmates rather than relying solely on the instructor. According to the faculty, this review process resulted in additional reflection and refinement of student work. This is a major benefit to student learning through the integration of social

networking tools into teacher education curriculum units.

Another theme related to technological pedagogy was allowing students to take ownership of their learning, to teach one another and collaborate together to share their learning experiences through the use of social networking technologies. One faculty member stated:

Through this workshop, I increased the use of innovative technologies by allowing students to take over class, teach, and work with each other to explore topics and gain their own understandings using technologies.... I'm also planning on doing this with my doctoral course this semester.

Another instructor echoed this sentiment:

According to my overall course evaluation, they still see me as a good-excellent instructor, but mentioned very often on this instrument that the best part of this class was this unit, they were excited about teaching it themselves and being allowed and free to do so, they appreciated my responsiveness especially because I was now a resource.

Through the integration of social networking tools, instructors were able to provide more feedback to students, and students were able to collaborate effectively with one another, which represented a shift in technological pedagogy.

Shifts in Technological Content

Technological content knowledge is the understanding of how representing and presenting content is transformed through the integration of technology. According to Mishra and Koehler (2006), “Although technology constrains the kinds of representations possible, newer technologies often afford newer and more varied representations and greater flexibility in navigating across these representations. Teachers need to know not just the subject matter they teach but also the manner in which the subject matter can be changed

by the application of technology” (p. 1028). Five participants (25%) in the ERA grant found that their content changed in meaningful ways with the integration of social networking tools. One instructor commented:

The content of the unit changed in the following ways: 1. Instead of focusing on the relationship between reading and writing poetry, I focused on the importance of creating images for students as they read poetry. 2. Instead of focusing on pedagogy (how to teach poetry and the writing of poetry), I focused more on content (students selected a poet, described his/her life, and taught two poems using voicethread).

Other instructors saw technology as a vehicle to allow their students to more fully concentrate on the content at hand. The increase of technological content knowledge afforded them the ability to focus on the content itself:

It was easier to teach because I was able to adapt the unit builder template from TaskStream to more accurately represent the reality of planning a thematic unit for early childhood students. There was much less teaching time devoted to how to use the unit builder feature of TaskStream so I was able to spend more time teaching content rather than how to use a web-based productivity tool.

Another instructor noted a similar experience:

The content and theory of the unit remained the same. Reliance upon social networking tools allowed my students to concentrate more on the quality of the product than how to use the technology.

Shifts in Technological Pedagogical Content Knowledge (TPACK)

TPACK involves an understanding of the complexity of relationships among students, teachers, content, technolo-

gies, practices, and tools. According to Koehler and Mishra (2005), “We view technology as a knowledge system that comes with its own biases, and affordances that make some technologies more applicable in some situations than others” (p. 132). We asked instructors to give their feedback regarding how their pedagogy shifted as a result of implementing Web 2.0 tools in their teaching. The majority of instructors (n = 10, 50%) reported that their teaching became more collaborative through the use of technology. As one participant stated, “Last year, I did not have the students collaborate with each other and give feedback on unit plans. They did their own plan and turned it in to me to be the sole provider of feedback.” This theme was echoed concerning the amount of feedback students were able to give one another when collaborate tools, such as Google Docs and Sites, were used. The notion of being able to communicate more effectively between class meetings was one of the major shifts that occurred as a result of the implementation of Web 2.0 tools. As one participant indicated, “I have experienced a pedagogy shift away from the traditional forms of communication among all of the populations of the education community (teachers, students, other resources, etc..).” Another participant commented, “The input into the unit focused more on time spent on task rather than time trying to exchange information. The inputs were more meaningful, and students were shocked by the fact that it was so easy to complete the task.” Overall, the change in technological pedagogical content knowledge as an outcome of the curriculum unit redesign resulted in increased feedback on the part of both the students and instructors and the ability to more effectively and easily communicate with one another.

Several instructors realized the level of transformation of their teaching and the nature of the content as a result of the inclusion of Web 2.0 tools. One instructor commented on the shift in teaching and the way in which technol-

ogy was used to present content:

With the Google sites group web page project the content changed in a positive way because students included much more on the web page than they had in previous semesters with a presentation in class. They were able to more easily embed videos, websites, etc. Also, I used the comments area of the Google site for the class peers to add and comment on other group’s sites. This added content by students in different groups adding resources to the site.

Another faculty member specifically mentioned the relationship between pedagogy, content, and technology:

I want to design a unit on the teaching of poetry that reflects a smooth relationship between pedagogy, content and technology so that pre-service and in-service teachers feel empowered to use their final projects in their secondary English classrooms. It may take a couple of semesters—but we’ll get there.

Finally, a third instructor relayed her experience:

I think the students knew ahead of time that I was trying a new technology. I assured them that although the assignment would take additional time for us all, we would all learn content and technology in ways that would benefit us as educators and learners.

Impact on Student Achievement

In addition to analyzing data along the TPACK framework, we were also interested in how instructors viewed the impact of their redesigned instructional units on student achievement. Sixteen of the twenty participants (80%) believed that the integration of social networking tools had a positive impact on student achievement. Justifications included improvements in the quality of the products that students created. When asked, “Did the use of social networking tool(s) ef-

Table 1. Coding Scheme Used to Classify Instructor Responses to Survey Question*

Code	Definition	Number of Respondents	Percentage of Total
Facilitator	Role has been changed such that it is less "teacher led" and is now more student centered. Students have taken a more active role in their learning, and less emphasis has been placed on direct instruction.	8	42%
Feedback	Role was enhanced through the use of social networking tools to enable instructor and students to provide additional and ongoing feedback.	3	16%
Expanded	Role was enlarged, extended, or broadened beyond what it was before going through the process of redesigning and teaching the updated unit.	2	11%
Learner	Role has changed to include instructors becoming more student-like, acquiring new skills and knowledge through the curriculum redesign process.	2	11%
Planning	Role changed to require additional preparation time to effectively integrate the use of technology in the teaching/redesign of the curriculum.	2	11%
No Change	Role did not change as a result of the professional development/curriculum redesign process.	1	5%

* "Did the use of social networking tool(s) change your roles and responsibilities as an instructor? If so, in what way? Give an example if possible."

fect student achievement? What data or other information leads you to believe this?" one instructor commented:

Definitely. By working on the unit plans throughout the course and getting feedback from each other, their unit plans were incredible—very well rounded and well thought out for English language learners.

Other reasoning echoed the transformation in pedagogy, citing the increase in students and instructors being able to provide additional feedback and the ability to communicate more efficiently. Two instructors shared related thoughts. One stated, "Again, we had a high response from students that being able to communicate encouraged their understanding and completion of the work. Another faculty member commented, "Peer reviews and ongoing feedback from the instructor pushed student achievement." One instructor, representing 5% of the responses, had a mixed response when it came to student achievement. This was primarily due to that faculty member's limited technological skills and the inability of some students to post their work using a wiki. It was difficult to gauge a positive or negative reaction, but this participant conveyed both elements:

Some of the techy students served as helpers when others got stuck and I could not help. I found that those with more web experiences were able to figure out the next steps by themselves. They liked

that we had class time to begin the project. Several students were unable to post their information on class wikis.

Finally, 3 of the 20 respondents (15%), did not feel that the implementation of social networking tools had an effect on student achievement. As one participant put it, "I do not believe that use of social networking tools effected student achievement. However, it was easier for me to grade the work because I had control of the form the project took." Another instructor comment was focused more on student perception: "In the 598 [course], students explained in surveys that they felt that it was just one more thing to do, and did not change their achievement." One instructor took a more methodological approach to the question in her response:

Not significantly different (not that I ran the statistics but pretty sure). The end of the course final showed no substantial difference; however, the final is comprehensive and was not focused on just this unit. What might be an extension to this study is to take comparable classes, teach the unit traditionally vs. the new way, pre/post the students, and then see if student achievement differed.

Instructor Role

Although 15% of grant participants did not see an impact on student achievement, the majority of instructors did see benefits regarding the change of their role in the classroom as a result of being involved with the professional development. The Web-based survey asked fac-

ulty, "Did the use of social networking tool(s) change your roles and responsibilities as an instructor? If so, in what way?" Based on open coding of instructor responses to this question, we identified five profiles, which are displayed in Table 1. The distribution of responses is displayed in Figure 2 (page 10).

Eight (42%) saw themselves more in a facilitator role after they experienced the professional development, which was the largest response. One participant commented, "Yes. I often felt more like a facilitator than the focus. I believe students took more responsibility for their own learning, and in general, worked together well." This sentiment encapsulated the majority of responses. Three instructors (16%) felt that they were able to give more feedback as a result of the incorporation of the social networking tools, as demonstrated by the following response: "These tools allowed an opportunity for me to assess student work on a continual basis. The exit ticket spreadsheet feedback also allowed the opportunity to address student concerns and needs on an ongoing basis."

Another way in which participants felt their roles changed included having their role expanded as the instructor, reported by two individuals (11%). One commented concerning their expansion of both technological content knowledge: "My roles as an instructor expanded to include not only mathematics but technology knowledge. I felt limited in this role but received help from the students who were more techy."

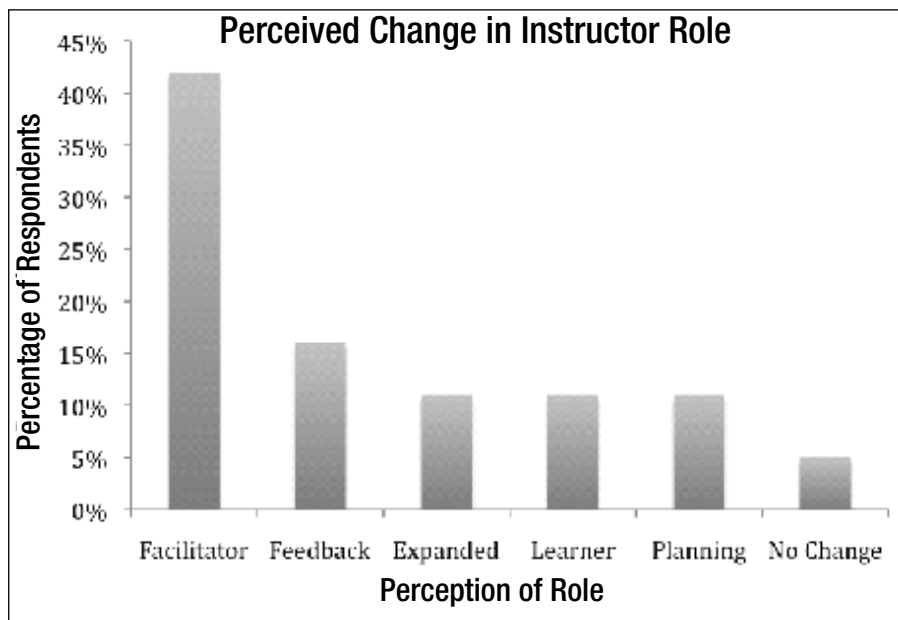


Figure 2. Coded responses for survey question: “Did the use of social networking tool(s) change your roles and responsibilities as an instructor? If so, in what way? Give an example if possible.”

Two other participants (11%) felt that their role involved becoming a learner themselves: “Yes, it made me a student—I completed the same project with my students—and some of their projects were better than mine—it was pretty neat to see—they [students] are so computer savvy.”

Finally, two instructors (11%) saw the need for planning when it came to the use of technology and felt that the use of technology could be a helpful tool during the curriculum planning process. The following comment summarized this sentiment:

Because I asked each group to present their powerpoints, this took up an additional half hour of instructional time. I often found myself compacting my portion of the class due to this reduction of time. I did feel that it was worth it but I hadn’t thought about that before it first happened. I had to rethink how I would arrange the rest of the class time and pare out less important activities that I might have included in the past.

The remaining participant who responded did not experience a change in his/her role.

Discussion

Many models of professional development are designed to help educators integrate new technologies into teaching and learning. Our project looked at the transformations that occur in educators’ pedagogy through integration processes and how those transformations had a perceived impact on student learning and instructor role. We found that through the use of social networking tools, instructors and students were able to provide more feedback to one another as well as communicate more efficiently and effectively. This has implications for the way that teachers and students communicate in and out of the classroom. Because social networking tools allow for greater access and communication, students can receive more immediate and ongoing feedback through their use. This use of formative feedback is important for supporting learning (Higgins, Hartley, & Skelton, 2002). According to Boulous and Wheelert (2007), “Web 2.0 also encourages significantly more interaction between users, a feature that many theorists argue is vital in e-learning. Interaction encourages deeper and more active learning engagement, builds communities of learning, and enables feedback from tutors to students” (p. 4).

Participants also saw transformations in both their teaching and their content as a result of the integration of Web 2.0 technology. The majority of instructors felt that the incorporation of social networking tools enhanced and increased the quality of student work within their classrooms and saw themselves as more of a facilitator rather than point person when it came to teaching. This is consistent with a literature base that suggests the impact that technology can have on influencing the role of the teacher (Dexter, Anderson, & Becker, 1999; Sandholtz, Ringstaff, & Dwyer, 1997). As the technology has progressed, including changes in the ways in which it is being incorporated in online and blended course environments, instructors’ roles are dramatically changing. As Beldarrain (2006) writes, “Emerging technologies that foster different forms of interaction may also affect the role of the instructor... Emerging technologies afford new opportunities as well as responsibilities. Besides being a resource manager, the future instructor may have to be more of a ‘partner in learning’ than a facilitator. The instructor must view the students as contributors of knowledge, and thus allow them to participate in the creation of content” (p. 149). This shift in instructor role to more of a facilitator and a learner was evident in our study.

The increase of feedback for students, coupled with a more student-centered approach to teaching, is an important benefit of leveraging the capabilities of social networking tools for educational purposes. The benefits of integrating such tools in a meaningful way, mindful of how they fit within specific content areas and methods of teaching, are important considerations, especially for teacher education programs.

This study highlights the positive outcomes of creating professional development opportunities for faculty that center on the affordances of social networking tools to improve good teaching practices. Through a small, internal grant opportunity offering a modest stipend, we were able to offer faculty an incentive to redesign a unit of study and provide faculty development that was ongoing,

content focused, and site based and involved teachers as active learners. These characteristics make for a more effective professional development experience (Birman, Desimone, Porter, & Garet, 2000). Literature also documents that technology-related faculty development should include an awareness of what the specific type of technology has to offer with relationship to learning, the chance to explore the integration of technology into the curriculum, time to learn the technology and apply it to teaching, and, finally, a reflection on the outcomes of the teaching (Howland & Wedman, 2004). The current study affirms that a process-driven model, such as the one described, can have a positive impact on the beliefs and teaching practices of faculty.

However, additional research in this area is warranted, specifically studies that focus on how to help faculty transform pedagogical practices using the power of the read/write Web in teaching as well as to build and sustain active learning communities to assist in these efforts. Also, the current study was limited by relying on faculty perceptions of how student achievement was affected rather than being able to gather this data directly. Specific studies related to the ways in which these tools can be used to increase student achievement would be beneficial.

Our findings may have important implications for teacher education programs that are seeking to prepare teachers to teach in 21st century classrooms. Through providing professional development opportunities that tackle the effective use of social networking tools, instructors can begin to reap the benefits of their changing roles as they work with their preservice teachers, who in turn might expand these possibilities as they adopt social networking tools with their K–12 students.

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