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Through the Wicked Spot: A Case Study of Professors' Experiences Teaching Online

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in

Educational Leadership

by

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2009

The Dissertation of Linda C. Scott is approved, and it is acceptable in quality and form for publication on microfilm and electronically:

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DEDICATION

I dedicate this dissertation to my close friends and family who gave me tremendous support during this journey. Judy Leff, my sister friend, was always available for a long walk and discussion and read countless versions of my preliminary drafts. As a teacher, she understood the power of the research I was exploring, pushed my thinking, and implemented some of these concepts in her own work. When her eyes would light up and she asked for a reference, I would know I had a juicy topic.

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ABSTRACT OF THE DISSERTATION

Through the Wicked Spot: A Case Study of Professors' Experiences Teaching Online

by

Linda C. Scott

Doctor of Education in Educational Leadership

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Professor Marisol Clark-Ibáñez, Chair

Due to the exponential growth in demand for online courses, there is a need to better understand how to prepare faculty to successfully teach in the online environment. Based on the Technological Pedagogical Content Knowledge (TPACK) framework, this study examined how two professors with different levels of online teaching experience integrated technology, pedagogy, and content into their online courses. In addition, connections between TPACK and the Concerns-Based Adoption Model were discovered. This two-case study included questionnaires, document analysis, and screen-capture elicitation—a new method for observing online courses. Extensive online teaching experience was not found to be necessary for achieving TPACK. A more important factor was professors' understanding of how to use the technology to support their content in the online environment.

Key words: online teaching, TPACK, higher education, online pedagogy, online courses, distance education

CHAPTER 1

A virtual tidal wave of demand for online courses is about to hit the shores of higher education, yet many institutions are hunkered down behind walls of brick and mortar too brittle to sustain the impact without damage to their ability to meet this demand. According to survey responses from more than 2,500 U.S. colleges and universities (Allen & Seaman, 2008), the higher education population is growing at a rate of 1.2% per year but the online population is growing at 12.9%. During fall semester 2007, almost 3.9 million students were enrolled in at least one fully online course and more than 20% of higher education students in the United States took an online course. The growth of online learning is not limited to the United States. In a 2008 survey that included corporate executives and academic institutions in the United States, Europe, Asian Pacific Rim, and other parts of the world, "Sixty percent of those polled say that the technological change occurring in our midst will alter the perception of the college campus from a one-dimensional (physical) concept to a multi-dimensional (physical and online) one" (The Economist Intelligence Unit, 2008, p. 5).

Looking into the future, the role of online education may be even more extensive. A weak economy is expected to increase the demand for higher education and, more specifically, for online courses (Allen & Seaman, 2008). When there are fewer jobs, many people make the decision to retrain and return to school. The flexibility and convenience of online learning appeals to returning students with families and job responsibilities. Increasing gasoline costs in 2008 fueled students' choice of online courses (Allen & Seaman, 2008).

In addition, many higher education institutions with a commitment to increase access to education are looking to online learning as one way to fulfill their mission. The University of Illinois' Chief Information Officer (CIO) and Associate Dean for Online Learning, Scott Johnson, explained, that his university views online learning as a tool to help fulfill their mission of increasing access to parents, full-time employees, nontraditional students, and those who cannot attend a full-time residential program. The anytime, anywhere aspect of online learning increases access for many groups not easily served by a brick-and-mortar institution (The Economist Intelligence Unit, 2008).

The College of 2020: Students, a 2009 Chronicle of Higher Education research report, predicts that the demand for online learning will continue to increase. By the year 2020, the report states:

> More students will attend classes online, study part time, take courses from multiple universities, and jump in and out of colleges. Students will demand more options for taking courses to make it easier for them to do what they want when they want to do it. And they will make those demands for economic reasons too (p. 1).

For online learning capacities to grow to meet this demand, colleges must develop new online programs quickly but also maintain face-to-face programs. Many students take only one online course to allow flexibility in their schedule, but still take most of their courses in a traditional classroom. From the 121 institutions responding to a survey, almost a third expect up to 60% of their students in 2020 will take all of their courses online even though none do currently (The Chronicle Research Services, 2009).

To learn more about the expectations of the higher education students of 2020, many of whom are currently in elementary school, we can look to existing K-12 online programs. Significant online learning opportunities for students are now available in 44

states (Watson, Gemin, & Ryan, 2008). “Significant” for purposes of the *Keeping Pace With K-12 Online Learning* study is defined as “programs that students (with the help of their parents) can find a publicly-funded online course or fully online school in their state that they can attend” (Watson et al.). Significant opportunities range from supplemental programs to fully online programs. Some states are even requiring an online learning component for high school graduation. Looking at implementation across the United States, 23 states offer significant supplemental programs, 4 states offer significant full-time programs, 17 states offer significant supplemental and full-time online programs, and only 6 states do not offer either program. Clearly, the rapid growth of online learning is not confined to higher education. Soon students will be graduating from these online programs and arriving at institutions of higher education with expectations for online options.

Despite the data that predicts a spike in online learning demand, faculty interest in teaching online is growing at a slower pace (Allen & Seaman, 2007; MacDonald et al., 2005; Prensky, 2005). Some faculty resistance is based on lack of administrative support and lack of faculty development opportunities (Covington, Petherbridge, & Warren, 2005; Shea, Pickett, & Li, 2005). Another point of resistance is higher education instructors are comfortable teaching in a traditional classroom setting and may be reluctant to invest the time and effort to learn how to teach online (The Economist Intelligence Unit, 2008). Teaching online involves a different pedagogy than face-to-face instruction (Graham, Cagiltay, Craner, Lim, & Duffy, 2001; Palloff & Pratt, 2005; Xu & Morris, 2007). Faculty resistance is often cited in studies as one of the obstacles to the

growth of online learning programs. (Covington, Petherbridge, & Warren, 2005). Whatever the reasons, resistance to new modes of instruction is not a new phenomenon.

Historical Context of Distance Education

Throughout the history of distance education, changes in modes of instructional delivery have been met with vocal resistance. First, let's define the term: "Distance education consists of all arrangements for providing instruction through print or electronic communications media to persons engaged in planned learning in a place or time different from that of the instructor or instructors" (Moore, 1990). Thus, online learning fits into the larger category of distance education. Distance education extends back three centuries and its relationship to technology reveals patterns that persist today. Increased convenience and access are two of the often-noted attributes of online learning, but these advantages were true of the earliest incarnation of distance education. In 1728, a teacher advertised in *The Boston Gazette* that shorthand lessons could be sent to the countryside (Bower & Hardy, 2004) allowing students to learn in the convenience of their own homes. Throughout the 1800s, distance education relied on mail delivery and correspondence courses were popular.

Academic recognition for distance education began in 1892 when the University of Chicago offered a program through the mail. The university president, William Rainey Harper, developed a correspondence program that allowed students to take up to one-third of their courses toward a degree through correspondence (Larreamendy-Joerns & Leinhardt, 2006). Teaching by mail allowed the University of Chicago to reach out to students who would not otherwise be able to attend. These efforts did not go

unchallenged and the program was attacked as a frill. Quality was also raised as an issue. Throughout the history of distance education, each new mode of instruction was compared to classroom instruction. Advocates were expected to show that the new form of distance learning was as effective as face-to-face instructions (Larreamendy-Joerns & Leinhardt). Such concerns are still voiced today about the newest incarnation of distance education—online learning.

The evolution of distance learning has mirrored the growth of technology (Casey, 2008; Dillenbourg, 2008). With the development of the radio, distance education expanded beyond text. Now students could hear their instructors. In the 1920s many universities were granted educational radio licenses and by 1946, the Federal Communications Commission (FCC) had granted more than 200 licenses to colleges. Live radio also reduced the delivery time of course content and increased the sense of immediacy.

With the advent of television in the 1950s, distance education had a new method of delivery. Students could now see and hear their instructors and many colleges and universities invested in new infrastructure to support broadcasting courses (Bower & Hardy, 2004; Casey, 2008). Telecommunications provided many instructional options, but the communication between student and teacher was still slow. Satellite technology introduced in the 1960s and widely adopted in the 1980s increased access even more.

The birth of the World Wide Web in 1992 (Casey, 2008) continued the evolution of distance education. Interactive, virtual classrooms were now possible and the growth of learning management systems like Blackboard and WebCT harnessed the power of the Web for those who were not Web designers. In the 1890s the University of Chicago was

challenged for the quality of its correspondence courses and today there are many skeptics who doubt an online education can match the rigor of a face-to-face education (Allen & Seaman, 2008; Bower & Hardy, 2004; Dillenbourg, 2008; The Economist Intelligence Unit, 2008). Recent research has finally resolved the question of the quality of online education.

Some stakeholders in higher education question the quality of online instruction (Allen & Seaman, 2008; Bower & Hardy, 2004; Dillenbourg, 2008; The Economist Intelligence Unit, 2008). Much research has focused on the question: Is online instruction as effective as face to face? Hundreds of studies examining the difference between online and face-to-face courses have been completed and the question of quality has been resolved in the literature. Dillenbourg concluded that most researchers would agree that the quality of online learning is as varied as face-to-face learning. Factors such as teacher effectiveness, quality of the learning environment, student attitudes, and software all come into play. Russell (2001) reviewed more than 300 comparative studies, and concluded there was no significant difference.

Perhaps the U.S. Department of Education's 2009 report will finally put this concern to rest. This literature review and meta-analysis based on empirical studies of online learning from 1996 through July 2008 concluded, "On average, students in online learning conditions performed better than those receiving face-to-face instruction" (p. ix). The researchers cautioned that these results may not be due to the change in mode of instruction but to additional learning time, resources, and collaboration. Nevertheless, online learning has been established as a viable mode of instruction. Much of the previous research on online learning has focused on the issue of quality or a comparison

to face-to-face instruction. My study focuses on the more timely issue of effective integration of technology, pedagogy, and content.

Technology Innovation and Change Process

Many of the early online courses were developed by "zealots" and the results were often uneven in application, approach, and instructional design (Oblinger & Hawkins, 2006). Rogers's (2003) theory of diffusion of innovations showed that with a technology innovation, only 16% of people fall into the innovators' and early adopters' categories combined (see Figure 2), which would include the "zealots" previously mentioned. To support the growing demand for online courses, the needs and concerns of the middle group of faculty—both the early majority and the late majority—need to be addressed. To even begin to develop the online programs that the future demands, will require recruiting most of the 68% of Roger's middle groups: the early majority and the late majority.

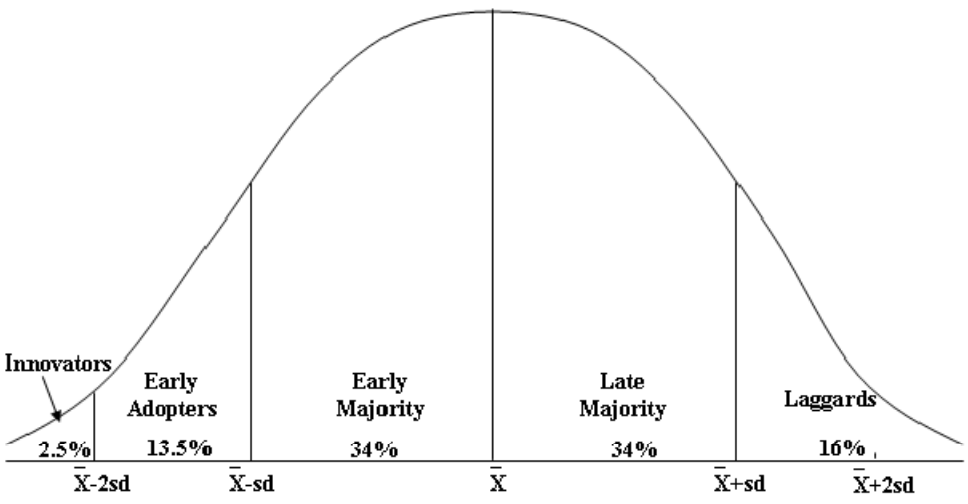


Figure 1: Adopter categorization on the basis of innovation (Rogers, 2003)

Supporting change for these larger groups will be very different from supporting change for the earlier groups. The innovators and early adopters are enthusiastic about the change and need little support. The larger middle groups, early and late majority, may be more reluctant to change the way they teach. Despite the fact that online courses are growing in popularity with students, many campuses are only now beginning to recognize this unmet demand and deciding how to meet it (Allen & Seaman, 2007; The Chronicle Research Services, 2009). Allen and Seaman (2008) have noted an increased interest in providing online learning in the last four years and state that online learning is thought to be key to the future of most of the institutions of higher education in their study. My research focuses on the middle groups.

The middle groups on Rogers's graph may have more concerns about teaching online and integrating technology into their existing face-to-face courses than the innovators and the early adopters (MacDonald et al., 2005). These concerns need to be addressed before an innovation can be successfully adopted (George, Hall, & Stiegelbauer, 2006). There can be a steep learning curve with new technology, so many campuses provide technology assistance and even instructional designers to support faculty in this area. Faculty members are scholars and content experts, not technologists, yet learning to create digital content can empower their teaching (Mishra & Koehler, 2006). Instead of focusing on faculty in Roger's categories, my study looks at faculty with little experience and significant experience teaching online. My focus is not on promoting an innovation and looking at the implementation curve, but on analyzing how users of the innovation of online teaching implemented the innovation. So the group terminology from the Concern-Based Adoption Model of experienced and inexperienced,

explained in Chapter 2, better suited my purpose. Instead of focusing on early adopters as much of the literature on online learning does (Brooks, 2003), my study looks at the change process for instructors with different levels of experience with online teaching and examines how they integrated technology.

For professors to become knowledgeable about academic technology and its application to their area of study, faculty development workshops must also change. No longer is it sufficient to tell professors where to click to add a discussion board to their learning management system. Both pedagogy and content are critical in making these technology decisions. So, preparing large groups of faculty to effectively teach online is not a simple task.

Statement of the Problem

There is tremendous demand for online courses. The burgeoning programs in the K-12 schools will only increase this demand as students used to taking online courses enroll in universities. These future college students will certainly expect and no doubt demand the convenience and flexibility of online options. As the history of distance learning has shown, resistance to changes in modes of instruction is predictable and quality is always called into question. However, recent studies affirm that online teaching can be as effective as face-to-face and, some studies show, even more effective (Dillenbourg, 2008; Russell, 2001; U.S. Department of Education, 2009). The question of quality is no longer an issue to delay the growth of fully online programs in higher education. If the predictions for the year 2020 (The Chronicle Research Services, 2009) come even partially true, there is a tremendous need, almost a crisis, to support faculty

coming later to the online environment as they make the transition to become effective online professors.

As the director of academic technology at a state university in the western United States, I am personally involved in supporting this transition and am deeply interested in the most effective ways to support willing faculty. I have talked to professors who have struggled to make this transition on their own by forcing successful face-to-face strategies into their online course with limited success and much frustration both for students and the instructor. I have also met with faculty almost terrified to move their course online in a limited time who worked closely with instructional developers and multimedia specialists to harness the power of the online environment for teaching their content. One such professor recently told me some of her students had commented that her course was the best organized online course they had ever taken. My underlying purpose is to discover how to help faculty make the transition to teaching effectively online in order to increase understanding of how to assist faculty to meet the growing demand for online learning from a place of confidence and commitment, rather than from a place of resentment or compliance.

The Wicked Spot

For this study, I needed a way to look at the complex integration of technology, pedagogy, and content for online teaching. The new conceptual framework developed by Mishra and Koehler (2006) met these needs. At the 2008 Annual Meeting of the American Educational Research Association (AERA), Mishra and Koehler explained their new framework:

> We introduce the Technological Pedagogical Content Knowledge (TPACK) as a way of thinking about the knowledge teachers need to understand to integrate technology effectively in their classrooms. We argue that TPACK comprises knowledge of content, pedagogy, and technology, as well as understanding the complex interaction between these knowledge components. We argue that teachers who have this type of understanding are characterized by the creative, flexible, and adaptive ways in which they navigate the constraints, affordances, and interactions within TPACK framework (p. 1).

Dealing with this new mode of instruction forces professors to re-examine all three elements (technology, pedagogy, and content) and question their pedagogy, something most seasoned faculty members may not have done in many years (Peruski & Mishra, 2004). My study focuses on two faculty members who faced this very concern. They re-examined what they taught, how they taught, and how technology fit into the mix as they revised online courses to meet the needs of their students.

Currently, a lively scholarly discussion about how to identify and measure TPACK is widespread in journal articles, conference presentations, wikis, blogs, and even on Twitter. TPACK is used extensively in current research about the change process in technology integration, and educational technology leaders have been enthusiastic. At the 2008 International Conference of the Society for Information Technology and Teacher Education, Mishra and Koehler were main speakers and an entire conference strand on TCPK was included. Also in 2008, the International Society of Technology in Education (ISTE) hosted a Webinar on “Technology Integration in Teaching: The TPACK Framework.”

Mishra and Koehler’s (2006) framework offered a powerful way of conceptualizing what professors in my study experienced. Mishra and Koehler elaborate on their framework:

> Our framework [Figure 3] emphasizes the connections, interactions, affordances, and constraints between and among content, pedagogy, and technology. In this model, knowledge about content (C), pedagogy (P), and technology (T) is central for developing good teaching. However, rather than treating these as separate bodies of knowledge, this model additionally emphasizes the complex interplay of these three bodies of knowledge (p. 1025).

Effective faculty development in support of online teaching needs to address all of these elements. Just focusing on learning about technology or online pedagogy or content is not enough. As Figure 3 illustrates, it is at the intersection of the three that Tecnological Pedagogical Content Knowledge (TPACK) exists.

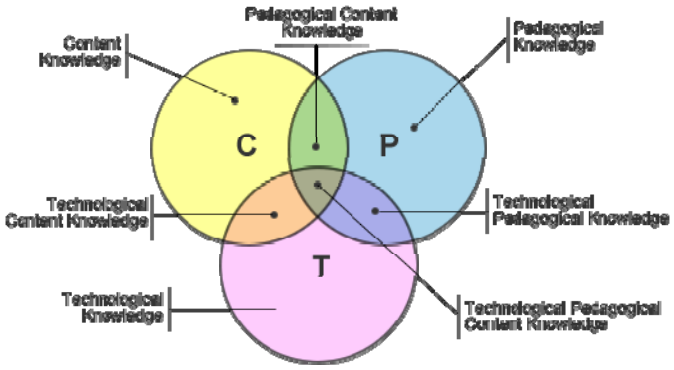


Figure 2: TPACK—Technological Pedagogical Content Knowledge (Mishra, 2008)

Mishra and Koehler consider technology integration a "wicked" problem based on Rittel and Webber's (1973) definition of tame and wicked problems. Wicked problems "have incomplete, contradictory, and changing requirements. Solutions to wicked problems are often difficult to realize (and maybe even recognize) because of complex interdependencies among a large number of contextually bound variables" (Koehler & Mishra, 2008, p. 10-11). Wicked problems call for innovative, customized solutions.

My dissertation title extends Mishra and Koehler's figurative language (with acknowledgement of Rittel and Webber's original terminology) and names the center point where all the knowledge bases overlap (Technological, Pedagogical, and Content Knowledge in Figure 3), the wicked spot. My study focuses on professors' attempts to integrate technology, pedagogy, and content in their online courses. Harris, Mishra, and Koehler (2009) called for studies like mine: "Given the ever evolving nature of educational research and practice, and of TPACK's defining elements, it is clear that what we face is at once a tall order and an appealing opportunity: to continue to invent, revise, expand, update, test, and otherwise explore the ways in which we understand and help teachers to develop TPACK" (p. 413). I took this "appealing opportunity" to learn more about TPACK and how it can be identified. I look at two professors' journeys as online instructors to reach that wicked spot and examine if they scored a bull's-eye.

Concerns-Based Adoption Model

My study is the first I could find that combines TPACK with elements of the Concerns-Based Adoption Model (CBAM). CBAM provides a well-established way of looking at teacher change and in my study I use CBAM to look at how faculty concerns about teaching online changed over time. CBAM was developed by researchers at the Research and Development Center for Teacher Education at the University of Texas at Austin in 1973 (Hall, Wallace, & Dossett) to understand how change facilitators can better support school improvement. CBAM is a "conceptual framework that describes, explains, and predicts probable behaviors throughout the change process, and it can help educational leaders, coaches, and staff developers facilitate the process" (Georg et al.,

2006). CBAM is a model used to examine instructors' concerns when faced with a change in how they teach.

When successful face-to-face professors consider teaching online, they need extra support. Information about their current concerns about teaching online allows facilitators to be more responsive. If concerns are not addressed, faculty's online teaching expertise may never match their success in the face-to-face environment. My study looks at how those concerns changed for both an experienced and an inexperienced online instructor. To measure faculty's changing concerns, I used a CBAM research instrument that measures levels of concern about an innovation in teaching—the Stages of Concern Questionnaire (SoCQ).

Individuals naturally experience concerns when faced with a dramatic change in how they teach, and teaching online is a dramatic change. George et al. (2006) found that "Stages of Concern About an Innovation appear to progress from little or no concern, to personal or self concerns, to concerns about the task of adopting the innovation, and finally to concerns about the impact of the innovation" (p. 8). It is not until online instructors are concerned about the impact of online learning that they are ready to attain TPACK. Knowing which stage a teacher is at can help facilitators support the teacher's professional development. CBAM research has shown that helping teachers deal with or resolve concerns identified can be very effective (George, Hall, & Stiegelbauer, p. 9). When faculty are adapting to a new mode of instruction, that helping hand can make the difference between success and failure.

Since its inception, the CBAM has been applied extensively in the K-12 environment. More recent applications to higher education and online learning are

discussed in Chapter 2. The CBAM is an effective theoretical basis to examine the change process. Because I am interested in exploring the change process that faculty experience as they teach online, the SoCQ is a powerful tool for generating profiles that portray that change over time. Many of the studies discussed in Chapter 2 relied heavily on this one tool, but I added qualitative methods to delve deeper into the change process experience to better understand what happened.

The Online Environment

The online environment is very different from the face-to-face classroom. Although almost all professors have been students in a traditional classroom, many have not taken an online course (Briihl, 2001) and the environment is foreign to them. Teaching online for the first time, particularly for individuals who have not taken an online course as a student, is a jarring experience. Suddenly professors are strangers in a strange land. Even for the most effective face-to-face instructors, and maybe especially for these instructors, tried-and-true instructional strategies no longer work in the same way. Many instructors' first reaction is to use the online tools to teach in the same way as before (Koehler & Mishra, 2008). This reaction is typical whenever there is a technology innovation. When movie cameras first became available, early directors set up a camera in front of a stage and filmed actors performing a play (Papert, 1987). Directors tried to use the new tool to do the same things they always had—still unaware of its new affordances.

I have observed the same response from faculty using new tools for online instruction. Professors began recording lectures with a new platform that recorded video

and synchronized it with computer screen captures. Several professors began publishing their PowerPoint slides along with their video lecture (even though the platform did not limit them to capturing only PowerPoint presentations). Soon 2 ½-hour PowerPoint lectures were being published, but the usage statistics showed that not even the most dedicated students watched the entire 150 minute lectures online. Just as film directors have evolved from standing in front of a stage and capturing only what is in front of them, so too have online instructors evolved as they have learned what works and what doesn't work when teaching their content in this new environment for learning. These lessons are important for understanding how to support the transition of faculty as they prepare to meet the tsunami of demand for online courses.

Learning to teach online is not a simple task and involves much more than a "curriculum conversion" (Palloff & Pratt, 2005). Teaching an online course requires learning to teach using a different format. Teaching in a fully online environment requires different strategies to connect with and engage learners (Graham, Cagiltay, Craner, Lim, & Duffy, 2000). Promoting interaction to avoid student feelings of isolation is important (Briihl, 2001). Bower and Hardy (2004) concluded that online learning has resulted in major changes in content, instructor roles, communication, and assessment. Just moving face-to-face content online will not result in an effective online learning experience.

Creating an online course requires preparation time and a new pedagogy (Beard, Harper, & Riley, 2004; Palloff & Pratt, 2005). Many instructors begin the process with a hybrid model where students meet both face to face and online. More content is moved online to enhance the face-to-face experience. Adding online components to a face-to-

face course can actually increase the interaction in the classroom (Keefe, 2003). After developing a fully online history program at a new university, Winsboro (2002) took a more skeptical view of the changes required by online learning. He concluded that technology and online learning are inevitable, but noted that technology often interfered with the online learning experience for students because of technology glitches and technology phobias of students and faculty. Winsboro's caution about technology infrastructure must be taken seriously as no online learning program can flourish when faculty and students cannot be confident that the technology is stable, dependable, and easy to use.

My study includes two participants with different levels of experience in online teaching. This study looks at participants after they have completed a hands-on workshop where they redesigned their online courses with support from both instructional developers and multimedia specialists. Professors are content experts, not technologists. Instructional developers are technologists, not content experts. To build an effective online course, both skill sets are needed. Because developing an online course requires a variety of skills, a team approach is optimum (Koehler, Mishra, & Yahya, 2007; Oblinger & Hawkins, 2006). Online learning demands a new way of teaching.

Purpose of the Study

Much of the research on online teaching focuses on efforts of the "Lone Rangers" (Oblinger & Hawkins, 2006) or the technology-savvy faculty member who embraced online learning in its infancy. "The earliest pioneers began their efforts just over a decade ago; 15% of institutions with current online offerings introduced their first online courses

prior to 1999" (Allen & Seaman, 2008, p. 7). With the rapid growth of the last five years, online learning is becoming mainstream. To meet the growing need for online courses and programs, faculty members who have only taught in the classroom environment are often encouraged, and sometimes pressured (Winsboro, 2002), to teach online. What needs to be better understood is how to prepare faculty to successfully teach in the online environment. The purpose of this study is to examine how two participants integrated technology, pedagogy, and content in the online environment and to discover how faculty concerns about the innovation of online teaching changed over time.

My study was guided by the following research questions:

1. In what ways did instructors *knowingly* integrate technology, content, and pedagogy in these online courses?
2. How do participants' concerns about the innovation of online teaching change over time and did their relative experience teaching online shape their attainment of TPACK?
3. Did instructors have to let go of certain highly revered processes that they had used in the past? If so, what did they let go of?

Overview of the Methodology

As director of academic technology at San Martin State University[1], a mid-sized state university in California, part of my job is to support the development of online courses and programs. Currently about 5% of the university's courses are offered online

[1] All names, places, courses, workshops, and organizations related to my participants have been given pseudonyms.

and there are no fully online degree programs. Based on faculty interest in online teaching, a summer 2008 workshop was offered on learning to teach online. The hands-on workshop was designed based on the TPACK conceptual framework, discussed earlier, which posits a complex interaction among pedagogy, content, and technology. However, the focus of this study is not to evaluate the workshop. The workshop is an annual academic technology event open to all faculty (see Appendix A for email announcing the workshop), who receive a stipend for participation. Ten faculty members applied and all were accepted. Nine completed the two-week workshop and all planned to teach an online or hybrid (partially online) course during the 2008-2009 academic year. I followed up with two of these instructors to explore the change process they experienced and learn how they integrated technology. (More details about the study participants appear in Chapter 3.)

I administered the SoCQ as part of the workshop evaluation to identify participants' stages of concern about the innovation of online teaching. All faculty members participating in the 2008 workshop completed the questionnaire before and after the workshop. For my study, I reviewed the SoCQ results to identify participants who were inexperienced and experienced users (these CBAM terms are defined in Chapter 3). Once the potential participants agreed to be in the study, they completed the questionnaire once more after they had taught their revised online course. Hord, Rutherford, Huling, and Hall (2004) recommend using profiles to identify where individuals are in their concerns about an innovation and even make recommendations for facilitating change based on the profile. I relied on Hord et al. to guide my

interpretations of the profiles generated by the SoCQ data. Profile information was confirmed with participants in a process described below.

Screen-capture elicitation interviews, a method that I created, allowed me to "visit" my participants' online courses so I could learn how they decided to integrate technology into their online courses and see what technological, pedagogical, and content changes they had made. I used Mediasite, which records screen shots, video, and audio, to record their comments about the technological, pedagogical, and content decisions they made when revising and then teaching their courses. During the interviews, participants logged into their online courses to show examples as they answered questions about these areas. Mediasite recorded both audio of the participants and captured their online course content as they shared different course components. It is difficult to "observe" an online course and this strategy, based on video elicitation (Clark-Ibáñez , 2004; Gauntlett & Holzwarth, 2006; Sewall, 2007; Starr & Fernandez, 2007), allowed me to collect rich data for further analysis. In addition, I shared information from their SoCQ profiles and asked them to elaborate on their stages of concern. Finally, I reviewed course documents to see what elements of technology, pedagogy, and content participants incorporated into their course and looked for themes that emerged in the interviews.

This two-case comparison allowed me to look for evidence of TPACK and explore changes in concern about the innovation of online teaching and examine what actually happened when participants first taught online after redesigning their courses. The combination of quantitative and qualitative data provided an in-depth look at the

change process these individuals experienced and these two case studies provide a real look at TPACK.

Significance of the Study

Since online learning's explosive growth is expected to continue (Allen & Seaman, 2007; Allen & Seaman, 2008; The Chronicle Research Services, 2009; The Economist Intelligence Unit, 2008), this study reveals important information about how to effectively support faculty as they begin transitioning their traditional courses to the online environment. There are many studies about innovators and early adopters who teach online, but there is less information about helping traditional faculty with that transition. Some interesting connections were discovered between the well-established Concerns-Based Adoption Model and the very new Technological Pedagogical Content Knowledge framework. Also, there is a need for case studies that focus on TPACK. In this study I found that faculty can combine their deep content knowledge with new knowledge of online pedagogy and technology to aim for the wicked spot where it all comes together.

CHAPTER 2

Review of Related Literature

The literature on online teaching is increasing almost as quickly as the number of online courses. In this review I begin with an examination of factors that motivate faculty to teach online and barriers that discourage them. Higher education faculty are not embracing the online environment with the same enthusiasm as students and understanding why is critical. Because teaching online involves a different pedagogy, it is also important to examine what the literature says about effective online teaching. A third area I will examine is professional development programs that support faculty as they learn to teach online. What do these studies reveal about what is effective in supporting this transition? TPACK, introduced in Chapter 1, gives us a way to look at technology integration into online courses and there is a growing body of literature around this promising new framework. And finally, the Concerns-Based Adoption Model (CBAM) describes and predicts instructor behavior related to an innovation in teaching and provides a way to look at change. CBAM studies on distance education in higher education will be discussed.

Motivators and Barriers to Online Teaching

Although the demand for online courses is expected to continue to escalate, this demand cannot be met without the participation of many of the 68% of professors in Rogers's large middle groups, the early majority and late majority. The concerns of these professors must be understood and addressed for the current growth rate in online courses to be sustained. These factors have major implications for the growth of online teaching.

Technology holds great promise for online teaching, but faculty must be willing to implement the technology (McLean, 2005). In the studies found on motivators and barriers to online teaching, factors were often grouped into intrinsic and extrinsic categories.

Intrinsic factors.

Convenience of teaching online emerged as a top motivator in many studies discussing intrinsic factors. Professors appreciated the anytime, anywhere aspect which allowed them to travel, attend conferences, and save commute time (Liu, Kim, Bonk, & Magjuka, 2007; Maguire, 2006; Parker, 2003; Sammons & Ruth, 2007; Shea, 2007). Another highly valued intrinsic factor was the high level of interaction with their students. Through discussion boards and email, faculty noted that they interacted with their students individually more often and enjoyed the opportunity to get to know their students (Cavanaugh, 2005; Zhen, Garthwait, & Pratt, 2008). Some faculty commented that students who were reluctant to participate in face-to-face courses, were more communicative online. Interactions were noted to be more frequent and higher quality. In a literature review of more than 100 journal articles, Parker (2003) concluded that online faculty value the same intrinsic incentives as face-to-face faculty: self-satisfaction, flexibility, and broader audience.

Increased access to higher education for more diverse students is a highly valued intrinsic motivator. Faculty noted that the anytime, anywhere aspect was also a benefit for working students and students with families who could not come to campus on a weekly basis. In a study interviewing 28 professors about their experience teaching in an

online MBA program, the diversity of the online students was listed as a benefit of teaching online (Liu et al., 2007). The online students had a more diverse background than the residential students in the program. Professors commented that they enjoyed teaching these online students because they were self-motivated, had business experience to share, made real world connections, and were from different countries. Their papers were interesting to read and they participated actively. The researchers acknowledged that these characteristics could be limited to this particular group of students but the increased diversity was a motivating factor for the faculty.

Another motivating factor for faculty was the pleasure of learning something new, the technology, and re-examining how they taught in the classroom. In a large study of 913 professors who taught online at 33 colleges, 97% either agreed or strongly agreed that technology had a positive impact on their online teaching and 85% felt it would positively impact their classroom teaching (Shea, Pickett, & Li, 2005). In one study where focus group interviews explored motivators and "de-motivators" for online learning, faculty shared that learning new technologies enhanced their creativity in teaching (Hiltz, Kim, & Shea, 2007). Some faculty also enjoyed the greater flexibility for teaching and learning that academic technology like learning management systems allowed.

Not all professors use technology in their teaching and some are not interested in teaching online. Intrinsic barriers include a resistance to change and fear of technology. Change can be threatening and some faculty fear being replaced in the process of developing online courses (McLean, 2005; Sammons & Ruth, 2007). Professors who are comfortable and effective teaching face to face may see no need to move their courses

online. In fact, some faculty perceive online learning to be of lower quality and even view it as a threat to higher education (McLean, 2005; Osika, Johnson, & Buteau, 2009). Self-concerns about professors' own competency with technology is a major intrinsic barrier. Seasoned professors who are comfortable teaching their content may be reluctant to add a new variable, technology, where they feel less competent (Osika et al.). Others question the quality of the online experience (McClure & Woolum, 2006). Perceptions of online learning were studied in a survey of 75 faculty members at an urban, Midwest university (Osika et al.). While all respondents agreed that online courses would provide more flexibility for students, 53% believed that online courses were not as rigorous as face-to-face courses. Although the 2009 study by the U.S. Department of Education disputes this perception of lack of quality, such perceptions remain and are barriers to faculty considering teaching online.

Extrinsic factors.

Institutional support is a key external motivator for faculty. This support includes professional development opportunities, clear policies on distance learning, class size, reliable infrastructure, and technical support for students and instructors (Hiltz, Kim, & Shea, 2007; Osika et al., 2009; Sammons & Ruth, 2007). Recognition for online teaching also is a powerful external motivator but the lack of such recognition is often cited as a barrier.

A major concern about teaching online is the impact on tenure and promotion (Hiltz et al., 2007; Maguire, 2006; Schell, 2004; Zhen, Garthwait, & Pratt, 2008). Administrative recognition for online efforts is consistently listed as one of the top

external factors motivating faculty to teach online. Faculty have many concerns in this area. Will professors become less visible if their office hours are online and they teach from home instead of from campus? Will their colleagues and deans think their courses are of lower quality because they are online? And the greatest concern, will their chances for achieving tenure be decreased because of the time and effort they spend teaching online? Zayim, Yildirim, and Saka (2006) looked at technology adoption with medical school faculty and indentified the early adopters and the mainstream faculty, which included Rogers's early and late majority combined. They found that both groups felt a promotion system that values innovative teaching was essential for large-scale technology integration to take place.

Shea conducted a study on motivation and barriers in a large state university system (2007). More than 500 participants from 36 universities completed the questionnaire. One of the interesting findings was that young faculty with some experience with online learning are often cautioned not to devote time to teaching online as it could be detrimental to their career progress. The questionnaire was only sent to online instructors so the barriers to online instruction were being solicited from those who seemed to have overcome those barriers in some way. The results might have been very different if those in this state university system who did not teach online had been included. In another study, Zhen, Gartwait, and Pratt (2008) wanted to discover what inhibiting factors affected non-adopters of online teaching. They surveyed randomly selected faculty who were teaching at least one course (online or face-to-face) in fall, 2007. The response rate was 55% and self-efficacy was the most significant independent variable. When faculty have positive beliefs about their efficacy in using online tools to

teach, they are more motivated to do so. The researchers concluded that if faculty believed their students could learn online as well as or better than face-to-face, they were willing to teach online. Faculty who did not believe online teaching was effective were not motivated to do so.

If online programs are part of an institution's vision, administrators need to make that vision clear by formally recognizing such efforts through tenure and promotion guidelines that value online teaching (Maguire, 2006) and investing in professional development efforts. Investing in the infrastructure alone is not enough (McLean, 2005). Lack of a clear vision is closely tied to concerns about recognition for efforts to develop online courses and programs (McLean) and concerns about peers' and administrators' attitudes toward online teaching.

Financial incentives are also motivating factors. Increased salary, stipends for course development, and grants encourage faculty to teach online (Sammons & Ruth, 2007). Compensation can also include a new computer or other technology tool. Most faculty feel they spend more time teaching online but do not have a lower course load or additional pay. Time is considered an extrinsic factor as release time or other options fall under administration discretion (Maguire, 2006).

There is general agreement that creating an online course is more time-consuming than creating a face-to-face course. This course development time takes away from other activities like research and service. It is estimated that it may take two to three times as long to create a new online course as it would to create a new face-to-face course (Bruner, 2007; Sammons & Ruth, 2007). Cavanaugh conducted a time-comparison study of teaching an economics course face-to-face and online (2005). He found that twice as

much time was spent on the online course due to communication with the students. Time increased proportionally as numbers of students increased. However, even though more time was involved, he found teaching online less burdensome than the increased time implied because he appreciated the flexibility and enjoyed the format. Despite the increased time demands, this professor found many advantages to teaching online. His conclusion is echoed in other studies. The amount of time required to design and teach an online course is an issue experienced online instructors have overcome but it is a barrier frequently mentioned by professors who do not teach online (Hiltz et al., 2007; Zhen et al., 2008). Increased levels of satisfaction were found in faculty who had spent more time developing their online course (Shea et al., 2005). Other extrinsic factors include stipends, release time, class-size reduction, and increased salary. Due to increased time demands for developing an online course, stipends or release time for course development were often listed as motivating factors.

One of the most frequently mentioned barriers was technology support (Maguire, 2006). This support included technology infrastructure, support for students during the online course, and instructional development support for learning how to teach in the online environment. In Maguire's literature review on barriers and motivators to online teaching, the barrier mentioned most often was the lack of technical support. Faculty are concerned about learning the necessary technical skills for creating their online course and lack of training is a barrier. Pressure to develop online courses comes from students, administrators, and even the community. For faculty to feel comfortable teaching online there is a need for workshops that focus on integrating technology for teaching and learning, not just technology in isolation (Hiltz et al., 2007; Liu et al., 2007; Zayim et al.,

2006). Faculty development that effectively supports professors as they learn to teach online is essential for those who have never taught online. The leadership focus at all levels needs to be on enhancing teaching and learning which requires institutional vision to drive change and an investment in people as well as infrastructure (McLean, 2005). As will be discussed in a later section, seasoned online instructors can play a significant role in these workshops.

For more faculty to make the choice to teach online, factors that motivate and inhibit them must be addressed. Administrators can play an influential role by clarifying the campus vision for online learning and providing recognition and support. Just knowing that teaching online would not hinder chances for promotion and tenure, would motivate many currently reluctant faculty. A dependable infrastructure and student support are other key factors. Many faculty do not feel confident using technology and do not understand how to teach in the online environment, so professional development is essential for supporting the transition to teaching online. Understanding online pedagogy and hearing from experienced colleagues that students can successfully learn online would also remove barriers. In the next section, online pedagogy is discussed.

Pedagogy of Online Teaching

Much of what is known about effective teaching in higher education can be found in the classic “Seven Principles for Good Practice in Undergraduate Education” (Chickering & Gamson, 1987). Based on decades of research findings on undergraduate education, Chickering and Gamson identified seven key principles. In 1996, Chickering and Ehrmann revisited these principles with the focus of technology showing how the

seven principles of good practice could be supported by cost-effective, appropriate ways to incorporate technology in higher education courses. More recently, a team of evaluators from Indiana University went a step further (Graham, Cagiltay, Craner, Lim, & Duffy, 2001). Through case studies of online courses, they looked at how these principles for face-to-face instruction translated into the fully online environment. Let's examine these seven principles in relation to online learning.

Principle 1: Good practice encourages student-faculty contact.

Learning management systems like WebCT and Blackboard provide many easy-to-use tools for faculty/student communication including announcements, discussion boards, internal mail, and synchronous chat (Pelowski, Frissell, Cabral, & Yu, 2005). Chickering and Ehrmann (1996) saw the option of asynchronous as one of the most powerful advantages of new technology: "Total communication increases and, for many students, the result seems more intimate, protected, and convenient than the more intimidating demands of face-to-face communication with faculty" (p. 2). Faculty list increased interaction with their students through discussion boards and email as a motivating factor for teaching online (Cavanaugh, 2005; Zhen et al., 2008).

Principle 2: Good practice encourages cooperation among students.

The same Indiana University study found that cooperation among students was supported by well-designed discussion board prompts (Graham et al., 2001). Palloff and Pratt (2005) see collaboration as the key ingredient of an online course: "In the online

environment, collaboration can be seen as the cornerstone of the educational experience. Just about everything that students engage in online, from participation on a discussion board to working in small groups, can be viewed as collaborative" (p. xi). Interacting with each other is one way for students to be "present" in an online course.

Principle 3: Good practice encourages active learning

Graham et al. (2001) concluded that presenting group projects online was a very effective addition to an online course. Group projects encourage active learning. Simulations are another example of active online learning. Palloff and Pratt (2005) suggested a variety of collaborative activities including role playing, case studies, blogs, debates, and WebQuests. Through asynchronous tools like discussion boards students can collaborate online at a time and place of their choosing.

Principle 4: Good practice gives prompt feedback.

Feedback can be divided into two categories (Graham et al., 2001). Information feedback provides answers to questions, grades, and comments on assignments. Acknowledgement feedback confirms that the instructor has received something from the student and will respond soon. Feedback is even more critical in the online environment where students can quickly feel alienated if their presence is not acknowledged (Briihl, 2001; Kim & Bonk, 2006). But technology can actually facilitate individual feedback both from the instructor and from other students. For example, here is a comment from an anonymous survey from a student in an online sociology course: "I love when I wrote

something and someone responded to it. It makes me feel like people care about what I have to say. I hate when I am in class and I raise my hand and say something, but no one responds" (Clark-Ibáñez & Scott, 2008). The opportunity for prompt feedback is enhanced by learning management tools that streamline the process.

Principle 5: Good practice emphasizes time on task.

Twigg's (2005) work in course redesign highlights many effective uses of technology to increase time on task. She noted, "Clearly, a key to increasing student success is to increase the amount of time students spend studying for the course" (p. 12). Through online course tools and tutorials, instructors can create an environment where learning is scaffolded to support student success. The U.S. Department of Education's 2009 report on online learning suggested that the additional learning time in online courses may be one of the factors that resulted in higher student performance in online learning conditions than face-to-face instruction.

Principle 6: Good practice communicates high expectations.

Important aspects in the online environment include, "Challenging tasks, samples cases, and praise for quality work communicate high expectations" (Graham et al., 2001). Graham et al. found that high expectations were communicated by posting clear expectations on the course Web site and giving positive feedback to students who were excelling. In addition, the researchers suggested that class feedback as a whole can be motivational. They also recommended sharing exemplary papers from previous semesters

and models of bulletin board postings so students would clearly understand the expectations.

Principle 7: Good practice respects diverse talents and ways of learning.

In their case study, Graham et al. (2001) noted that all four courses showed strength in the area of respecting diverse talents and ways of learning. Students were given choices of topics in one course. In another, an icebreaker activity encouraged students to share information about themselves, and the instructor attempted to learn about each student. Students were encouraged to express different viewpoints and course activities included real-life examples representing diverse perspectives.

This research shows that good teaching practice in the online environment parallels good teaching practice in the face-to-face environment—the principles are constant. However, the strategies and tools to support student learning are different even though the end goal—student success—is the same. In the next section, some professional development efforts will be examined

Professional Development for Online Teaching

Critical teaching and learning issues for 2009 identified by EDUCAUSE[2] include how faculty members are involved in the process of professional development and what mechanisms are in place to support them. Faculty coming later to online learning differ from the early adopters who love a challenge and happily wrestle with difficult

[2] EDUCAUSE is a nonprofit association that promotes the intelligent use of information technology in higher education.

technology. These later faculty are part of Rogers's middle groups, labeled "mainstream faculty" by Zayim et al. (2006), and have different characteristics and concerns than early adopters and, therefore, different support and training needs. They need to experience success with technology so they can increase their confidence in integrating technology into their content. As the earlier section showed, faculty barriers are not limited to technology issues. Professional development programs need to demonstrate the benefits of teaching online and show how technology integration can enhance teaching rather than resulting in obsolescence (McLean, 2005).

Faculty development programs to support the creation of online courses are becoming more common but range widely in approach. Covington, Petherbridge, and Warren (2005) studied the professional development activities created to support instructors from the North Carolina State University English Department as they prepared to move 20 of their 42 writing sections online the following semester. They posited that faculty needed support in three areas: administrative, professional development, and peer support. The writing faculty attended a weeklong summer institute as a cohort. In the mornings they learned about instructional tools, web design, online pedagogy, and their learning management system. In the afternoons they had time to apply their learning to their new course with extensive support from the technology support team. As one participant stated, "Overall, the experience was exhausting, overwhelming, and absolutely essential" (p. 8). The researchers concluded that the support of the department, peers, and technology support staff are essential elements to transition to online teaching.

The time required to develop and teach an online course was discussed as an inhibiting factor for faculty. Parker and Howland (2006) reviewed the literature on time

demands for online teaching to identify strategies that would enable instructors to streamline the process. Although they concluded that faculty support was critical, they also concluded that early adopters may not be the best peer mentors for faculty new to online learning. Early adopters tend to be very innovative and comfortable with technology which could intimate instructors who are less proficient in that area. Parker and Howland came up with the following recommendations:

1. Offer administrative direction, faculty development opportunities, preparation time, and instructional technology support.
2. Reserve “protected” time for a designated faculty champion or peer to assist and mentor colleagues; and
3. Support a local faculty interest group to provide additional support, education, mentoring, and sharing of Web-based resources (p. 271).

By freeing time for faculty to work with mentors, attend faculty development workshops, and make use of existing resources and support structures; more faculty will be able to transition their courses online without becoming overwhelmed by the time demands.

Developing an online course requires a broad skill set and many universities take a team approach. In a study by Xu and Morris (2007), four faculty members, one project coordinator, and an instructional developer worked together to create a fully online undergraduate research course. Two of the faculty members had previous online teaching experience. Despite additional time due to group collaboration and some conflicts with the coordinator, the faculty considered this experience a great professional development opportunity. Pairing inexperienced online faculty with experienced allowed the online

instructors to share their insight during the process. Xu and Morris conclude that faculty members may benefit greatly from working with a peer as they learn about online pedagogy.

A needs assessment for faculty development in online teaching was conducted by Ali et al. (2005) to determine how best to support faculty as they begin to teach online. The questionnaire established the instructor's perceived level of expertise with technology, identified priority topics for professional development, and inquired about other topics of interest not listed. The 65 participants were faculty from a Midwestern university and approximately one-third of respondents had experience teaching online. Faculty without online teaching experience rated themselves at the novice to advanced beginner stage with technology and online instructors rated themselves from advanced beginner to competent stage. The authors concluded that the implications for faculty development were for programs that focus on redesigning and rethinking faculty roles. Topics included technology, effective communication, online support systems and policies, time management, and collaborating with experienced instructors and instructional designers. These topics address many of the barriers to online teaching discussed earlier.

The role of pedagogy is essential. Too often workshops focus on how to use the technology only. Integrating technology into the teaching and learning process requires a paradigm shift where faculty evaluate how and when it is appropriate to use technology (McLean, 2005; Xu & Morris, 2007). Faculty need time to develop their online pedagogy and become familiar with the new environment. Faculty who have never taught online, need to experience the online environment (Borthwick, Cassity, & Zilla, 2002). If they do

not have time to take an online course, even visiting a colleague's online course will give them a better understanding of the environment. As one participant who developed his first online course stated, "It's a very gray and abstract idea of how to teach with technology, especially the online aspect of it, and . . . some people really need to see the hands-on and do the hands-on before they can actually picture how they're going to be delivering it to a class" (Borthwick et al., pp. 15-16). When the focus is completely on technology, faculty with low technology skills may not feel motivated to teach online or may not see the possibilities for their content. The next section on Technological Pedagogical Content Knowledge clarifies why a focus on technology alone is not effective.

Evolution of a New Framework

Technological Pedagogical Content Knowledge (TPACK) is an innovative framework that helps explain the intersection of content, pedagogy, and technology. Integrating technology into teaching to improve student learning is a complex undertaking, and there had been no widely accepted conceptual framework to support the understanding of this specific process (Robin, 2008). Mishra and Koehler (2006) developed the TPACK framework when they were studying university faculty who were designing their first online course with the assistance of a small team of graduate students.

Shulman's Pedagogical Content Knowledge.

Mishra and Koehler's conceptual framework (2006) is based on Shulman's thinking about teacher knowledge (Sparks, 1992). Schulman introduced the idea of

Pedagogical Content Knowledge (PCK), which represents the blending of content and pedagogy into an understanding of how particular aspects of subject matter are organized, adapted, and represented for instruction. Schulman noted that much staff development for teachers focused on the general. He said, “Teachers never teach something in general—they always teach particular things to particular groups of kids in particular settings” (Sparks, p. 14). Shulman introduced his framework at the 1986 Annual Meeting of the American Educational Research Association in his presidential address. In explaining pedagogical content knowledge, he said:

> Within the category of pedagogical content knowledge I include, for the most regularly taught topics in one's subject area, the most useful forms of representation of those ideas, the most powerful analogies, illustrations, examples, explanations, and demonstrations—in a word, the ways of representing and formulating the subject that make it comprehensible to others (Shulman, p. 9).

Although Shulman introduced PCK more than 20 years ago, the concept is still having an impact on education. His original address and the article he wrote the following year expanding on the concept have been cited in more than 1,200 peer-reviewed journals (Ball, Thames, & Phelps, 2008). PCK has been explored in most content areas, but almost a quarter of the journal articles are in the area of science (Ball et al.). In August 2008, *The International Journal of Science Education* published a special issue focusing on PCK and science education. One of the challenges PCK researchers face is also shared by those who now research TPACK: What is the relation to teacher practice? Ball et al. argue that a coherent PCK conceptual framework still needs to be developed and the focus should be on the use of knowledge for teaching.

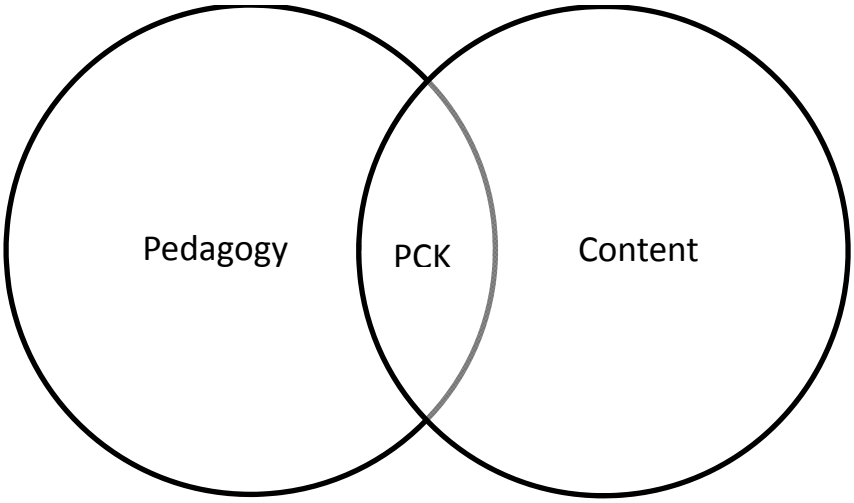


Figure 3: Pedagogical Content Knowledge

Mishra and Koehler depicted Shulman's Pedagogical Content Knowledge as two overlapping circles of knowledge, Figure 4. Shulman writes about the lack of training in pedagogy over the centuries with an over emphasis on content knowledge. He shares the example of a 13-year-old girl who took a county teaching exam in 1881 because she had tagged along to the exam with her older sister who was already working as a teacher. To her amazement and delight, she knew enough math, grammar, geography, and history to pass the exam and received certification to teach in Vermont for one year although she had absolutely no training in how to teach (1986). The emphasis in education in Vermont in the 1880s was on content. By the 1980s, Schulman felt the pendulum had swung too far in the direction of pedagogy. Content was no longer emphasized. His greatest concern was that content and pedagogy were divorced in teacher education programs. His AERA address was a call to connect the two knowledge bases. He argued that just because someone was an expert in algebra, did not mean he could teach it effectively to others. On the other hand, a teacher skilled in classroom management may not know enough algebra to effectively teach her students. Therefore, Shulman called for an emphasis in

teacher education on pedagogical content knowledge: the intersection of pedagogy and content where teachers have a special knowledge that allows them to be adaptive and creative to meet the needs of their students. He argued that there was not one right way to teach a subject and teachers needed to develop an arsenal of tools and strategies to meet the needs of a variety of students (1987).

Mishra and Koehler's TPACK.

Mishra and Koehler argue that there was no need for adding technology to the mix in the 1980s because technology was simpler to use: chalkboards, paper, pens, and pencils. The rich digital technologies now available add a complexity that changes the possibilities for teaching. Mishra and Koehler (2006) identify the relationships "between content (the actual subject matter that is to be learned and taught), pedagogy (the process and practice or methods of teaching and learning), and technology (both commonplace, like chalkboards, and advanced, such as digital computers)" (p. 1025). Developing good online content requires a thoughtful interweaving of all three sources of knowledge. There is no one right technological solution that applies to every teacher, every course, or every view of teaching. Mishra and Koehler's framework builds on Shulman's work and focuses on how "the relationship between technology and teaching can transform the conceptualization and the practice of teacher education, teacher training, and teachers' professional development" (p. 1019).

TPACK is not without its challengers. Cox (2008) conducted an extensive search of research studies related to TPACK and interviewed Mishra and Koehler. Despite her

obvious enthusiasm for the framework, she notes that although widely accepted, TPACK has not been analyzed or even well defined. Cox wrote, “The TPACK framework has been both beneficial and problematic since its inception in 2005. While it has provided focus for researchers in the field of educational technology as well as emphasis on the use of technology in the classroom, the definitions of and boundaries between the constructs in the framework have been somewhat ‘fuzzy’”(p.113). In her study, Cox clarifies definitions and explores cases that illustrate TPACK and each of its components.

Cox (2008) laments that most TPACK studies identify activities that demonstrate the integration of technology, pedagogy, and content but do not reveal the teachers’ knowledge. Both Shulman’s PCK (1986) and Mishra and Koehler’s TPACK (2006) are conceptual frameworks focused on teacher knowledge, not student knowledge. Cox points out the need for case studies where teachers’ knowledge can be identified and that go deeper than identifying activities that integrate content, pedagogy, and technology. She calls for case studies that examine teacher knowledge in these overlapping areas.

One of the earliest studies that led to the creation of the TPACK framework was a study of the experiences of three faculty members new to online teaching as they designed and taught their online courses (Peruski & Mishra, 2004). This study included experienced classroom teachers who were experts in their course content. One of the most interesting findings was that “designing a course for a new content led the faculty members to question their role as teachers” (p. 41). Professors also expressed anxieties about teaching with technology in the online environment. As their understanding of how to use technology for teaching increased, they also had new insights about integrating technology into their face-to-face classes.

In another study of faculty new to online teaching (Koehler, Mishra, Hershey, & Peruski, 2004), six faculty members led design teams composed of graduate students and worked as a team to create the online course. Data from multiple sources were collected including interviews, surveys, artifacts, and observations. The researchers found that some faculty made a significant shift in their attitudes towards technology because they wanted to effectively teach their online students.

The TPACK framework provides a way to understand how technology, pedagogy, and content work together, but how is such knowledge measured? There are efforts under way to assess TPACK through surveys. In a 2009 study, Archambault and Crippen developed a survey to measure and further define TPACK. Surveys were completed by 596 online K-12 teachers from 25 states. The instrument had been used in a previous study and was revised numerous times resulting in 24 questions to assess online teachers' knowledge. Teachers were asked to rate their own knowledge on a scale of one to five on tasks related to online teaching. The questions were based on definitions of the knowledge domains of TPACK.

Although a promising start, there are some serious limitations to this study. Validity issues were discovered when teachers in a think-aloud pilot had problems distinguishing questions related to pedagogy from questions related to content. A more serious concern is that teachers were self-reporting whether they performed or understood certain tasks related to online learning. The findings showed that these teachers were more confident in areas of pedagogy and content than in areas related to technology. Archambault and Crippen suggested that qualitative methods would help to follow up on their study and check for teachers' understanding and implementation of TPACK.

Just because a course activity includes integrated, innovative uses of technology, does not mean that the instructor knowingly created the activity with that intent in mind. Other efforts are under way to develop a survey instrument to measure TPACK. A paper presented at the American Educational Research Association Convention discussed the development of a new instrument—Survey of Preservice Teachers' Knowledge of Teaching and Technology (Schmidt et al., 2009). The developers of this survey include TPACK originators Mishra and Koehler in collaboration with other researchers. The core instrument includes 47 questions with a Likert scale for 5 responses ranging from Strongly Disagree to Strongly Agree. Like the Archambault and Crippen survey, it is designed to collect self-assessment data on TPACK's seven knowledge domains: technology, pedagogical, content, technological pedagogical, technological content, pedagogical content, and technological pedagogical content knowledge. Unlike the previous survey, the focus is on preservice teachers. Another difference is the specificity of questions in this instrument. Questions address specific knowledge in mathematics, social studies, science, and literacy. This survey is the first step in a longitudinal study that will follow these preservice teachers after they have completed content methods courses and again after they have completed student teaching. The survey is available online and will soon be translated into Turkish and Chinese.

How can we tell when an instructor hits that center, wicked spot, and scores a bull's-eye? I contend that if an activity in an online course appears to be the result of skillful, artful integration of these three knowledge bases, you still cannot conclude that the instructor knowingly made the complex decisions necessary to craft this activity. It could be the result of a modification of a textbook publisher's suggested project; it could

be a happy accident that will never be repeated nor deeply understood. Just as some classroom instructors collect polished pearls of activities from conferences and colleagues and string them together into a necklace of semester length with knots between each precious element preventing any integration or deep connections; the mere existence of a seemingly integrated activity in an online course does not provide convincing evidence of TPACK. One way to truly know is to ask the instructor open-ended questions, guiding them to reveal their understanding of the intersection of technology, pedagogy, and content knowledge.

Concerns-Based Adoption Model

The Concerns-Based Adoption Model (CBAM) is a conceptual framework for examining the change process professors go through when responding to an innovation in teaching. Anderson (1997) described CBAM as "arguably the most robust and empirically grounded theoretical model for the implementation of educational innovation to come out of educational change research in the 1970s and 1980s" (p. 331). The seven stages of concern are grouped into three domains: self, task, and impact which move from internal to external concerns (George, Hall, & Stiegelbauer, 2006; Hord, Rutherford, Huling, & Hall, 2004; Dobbs, 2005). George, Hall, and Stiegelbauer identified distinctive profiles for individuals with different levels of implementation experience: nonusers, inexperienced users, experienced users, and renewing users. The CBAM includes three instruments: SoCQ, Levels of Use (LoU) interviews, and Innovation Configuration (IC) maps. Interpreting profiles based on SoCQ data alone is not recommended and can be

misleading (George et al.; Julius, 2007). But there is more to understand about teacher knowledge during an innovation which CBAM does not claim to address.

The largest CBAM study found on the innovation of online learning in higher education focused on inexperienced and experienced users (Ansah & Johnson, 2003). SoCQ profiles were used to identify faculty concerns about online teaching to prepare both faculty and administrators for challenges with implementing online courses. One thousand SoCQs were randomly distributed to faculty at three universities and 334 were returned. Faculty from two of the universities had more experience teaching online than the faculty at the third university, which had very little. Just as CBAM would predict, participants where there was little implementation had profiles indicating high levels of concern about online teaching and what it would mean for them personally. Their concerns clustered at Stage 1 (information) and Stage 2 (personal). More experienced users had concerns clustering at Stage 4 (consequences for students), Stage 5 (collaboration), and Stage 6 (refocusing

Grouping SoCQ data by dimension can add to the interpretation of the data. The self dimension focuses on Stages 1 and 2 (information and personal), the task dimension focuses on Stage 3 (management), and the impact dimension focuses on Stages 4, 5, and 6 (consequences for students, collaboration, and refocusing). In a 2005 study on videoconferencing for distance education, Dobbs used these domains to interpret her data. She had three groups: a control group, a group that attended only classroom training, and a group that attended the classroom training and chose to participate in additional hands-on training in a videoconference laboratory. Although Dobbs analyzed the stages for each group, she also looked at the dimensions. She analyzed the data for the

group that participated in both the classroom and laboratory training and concluded, “this group had shifted its focus away from concerns primarily about self and had begun to evaluate the management, consequence, collaboration, and refocusing stages that are essential for the new innovation, distance education, to be successful” (p. 6). The control group (nonusers) showed high levels of concern about videoconferencing and what it would mean for them. Dobbs’s further analysis showed the importance of the hands-on training so faculty could focus on the needs of their students and move beyond their personal concerns about teaching in a different environment. One limitation of this study is the reliance on the SoCQ as the only measure. Dobbs drew conclusions about the profiles of the different groups but did not check these interpretations with the participants.

Other studies did supplement the SoCQ data with other sources of information. In addition to pre- and post-SoCQ data of participants in a professional development workshop on online teaching, Nevin (2003) included focus group interviews before and after the workshop. Nevin discovered that “as participants became familiar with the innovation, their personal concerns were alleviated while management, consequences, and redesign issues took on a higher relative intensity” (p. 4). In addition, focus group interviews reinforced the themes from the SoCQ data.

All three CBAM instruments were used in a study that examined the change process when educational technology professors supported four education professors as they integrated educational technology into their courses (Williams & Foulger, 2006) for preservice teachers. Pre- and post-SoCQ were administered, interviews on the Levels of Use (LoU) were conducted, and Innovation Configuration (IC) maps were created. The

interviewees were trained in administering and interpreting the LoU interviews. One of the study's main findings was that collaboration was key to the successful implementation of the change. The four profiles based on the SoCQ alone would not support that finding. Although the profiles showed some positive change in the stage of collaboration, one of the four participants had a lower post score in this area. However, through the Levels of Use interviews it became clear how important collaboration was to the change implementation. Williams and Foulger's study reinforces the importance of not relying on SoCQ data alone.

Perhaps more important, Williams and Foulger were looking at the extent to which technology integration occurred. Their study identified gaps in the education curriculum and then selected standards that could be addressed through innovative uses of technology that were developed by technology instructors collaborating with content specialists. Although this study was limited to the CBAM tools, it would have benefited from the inclusion of the TPACK model. The researchers concluded that the content area faculty who benefited the most were those who interacted the most with their technology colleagues. Comments from participants indicate a strong dependence on the technologists. Participant 1 agreed to continue with the technology activities in his course, "as long as the educational technology instructor will help him in upcoming semesters" (p. 18). When teachers do not integrate the technology themselves and rely on others for support, they are unlikely to fully employ the power of technology.

Conclusion

As the literature shows, many faculty are reluctant to teach online (Allen & Seaman, 2007; MacDonald et al., 2005; Prensky, 2005). They are concerned about what teaching online would mean for their career, the pedagogy of online teaching, and support for themselves and their students (Maguire, 2006; McLean, 2005). Motivating factors include the flexibility of teaching online, increased access for students, and professional development opportunities (Liu et al., 2007; Maguire, 2006; Parker, 2003; Sammons & Ruth, 2007; Shea, 2007; Zhen et al., 2008). My study provides insight into faculty experiences when they successfully integrate technology, pedagogy, and content in an online course. Research into effective faculty development in the area of technology shows how important it is to develop a workshop that integrates pedagogy, content, and technology (Borthwick, Cassity, & Zilla, 2002; Xu & Morris, 2007). Teaching where to "click" to add a discussion board is no longer enough.

The Concerns-Based Adoption Model was developed to look at educational innovations, and the Stages of Concern is a framework to understand the individual's perspective of a change process (George et al., 2006). In my study the SoCQ was a powerful instrument for monitoring concerns over time and gave me a much deeper understanding of the change process participants were experiencing. However, CBAM was developed as a model to look at any innovation in education and my study focuses more sharply on technology issues. The Technological Pedagogical and Content Knowledge (TPACK) framework was developed to provide a clearer understanding of the overlapping knowledge bases involved when an educator integrates technology. In taking a look back at the first 20 years of CBAM research studies in the United States and abroad, Anderson (1997) suggested directions for future research including the

integration of CBAM into other theories of learning. In my study, I build on the Stages of Concern data to better understand how professors teaching online develop TPACK. In order to explore the integrations of technology, pedagogy, and content in the online environment, I take a close look at an individual in the inexperienced and an individual in the experienced user group who have moved beyond concerns about self and on to concerns about task (stage 3) and impact (stages 4, 5, and 6).

So, is it true TPACK or the pearl-on-a-string syndrome? My study carefully examines participants' online courses and answers that question. In the near future more faculty than ever before will begin to teach online to meet the growing demand for online courses. Much of the current research focuses on the innovators and early adopters (Rogers, 2003), but my study will explore the change process that faculty coming later to the online environment experience. The TPACK creators themselves have identified the need for more studies to increase understanding of this promising new conceptual framework that has been widely accepted although not completely analyzed. In order to explore the integration of technology, pedagogy, and content in the online environment, I take a close look at individuals in the inexperienced user and experienced user groups. In the process, I find new connections between CBAM and TPACK. In the next chapter, I explain my methodology. In the next chapter I explain how I designed my study to answer these research questions:

1. In what ways did instructors *knowingly* integrate technology, content, and pedagogy in these online courses?

2. How do participants' concerns about the innovation of online teaching change over time and did their relative experience teaching online shape their attainment of TPACK?
3. Did instructors have to let go of certain highly revered processes that they had used in the past? If so, what did they let go of?

CHAPTER 3

Research Methods

A case study design with cross-case analysis was used to examine how two faculty integrated technology, pedagogy, and content in the online environment and to discover how their concerns about the innovation of online teaching changed over time. Case studies are most useful when "interest is in process rather than outcomes, in context rather than a specific variable, in discovery rather than confirmation" (Merriam, 1998, p. 19). I am interested in the process of change these instructors experienced and the way they integrated technology, pedagogy, and content into their online courses. My study meets the three reasons Yin (2009) identifies for selecting a case study. First, I am asking "how" and "why" questions and my interest is in process. Second, I have little control over the events in my study. I cannot determine when instructors will teach online nor can I control how they will teach online. And, third, "the focus is on a contemporary phenomenon within a real-life context" (Yin, p. 2). Online teaching is, indeed, a contemporary issue, although it has deep historical roots in distance education. Unlike face-to-face teaching where a researcher could arrange to observe a lesson or even an instructional day, it is more challenging to "observe" an online course. My study uses a new methodology that allows me to record a guided tour of an online course. In this chapter I will discuss how participants were identified, explain the instruments used to collect data, and identify the data analysis procedures that were followed.

Participants

My study included two participants representing different experience levels with the innovation of online teaching. Using the Concerns-Based Adoption Model terminology, Professor Robbins[3] is an "inexperienced user." She had taught fully online only once before the study began although she did have several semesters of experience teaching hybrid classes. Professor Montgomery is an experienced user with more than 5 years of online teaching experience. Professor Robbins is a tenure-track sociology professor in her 30s and Professor Montgomery is a special education lecturer in her 50s.

These faculty participants were part of a summer 2008 workshop at San Martin State University. The workshop consisted of 10 professors who were diverse in curriculum areas, teaching experience, gender, ethnicity, technology use, and online experience. Maxwell (1996) emphasized the importance of the selection process in qualitative research: "Selecting those times, settings, and individuals that can provide you with the information that you need in order to answer your research questions is the most important consideration in qualitative sampling decisions" (p. 70). Therefore, I used purposeful sampling to include members who represent inexperienced (have taught online at least once before) and experienced online instructors (have taught online multiple times). Because my research questions focused on issues that could only be explored by faculty with some experience teaching online, I excluded new online instructors. New users of an innovation in teaching have a very typical Stages of Concern Profile which focuses on self concerns and does not focus on impact on students or higher stages of concern (George et al., 2006). My research questions were best addressed by focusing on inexperienced and experienced online instructors.

[3] Professor Robbins and Professor Montgomery are pseudonyms.

In January 2009, I sent an email invitation to possible participants. The only restriction was that participants needed to have taught fully online since the summer 2008 workshop. Only three instructors from the workshop taught fully online during the fall semester 2008, and two of these instructors also fell into my preferred categories. Professor Montgomery and Professor Robbins were invited to participate and both accepted.

Although I only have two participants, a small multiple-case study can be rich in data. Yin (2009) warns against a single-case study because the results may be met with skepticism but he encourages the goal of having at least two cases. Yin explained,

> Alternatively you may have deliberately selected your two cases because they offered contrasting situations, and you were not seeking a direct replication. In this design, if the subsequent findings support the hypothesized contrast, the results represent a strong start toward theoretical replication—again vastly strengthening your findings compared to those from a single case alone (p. 61).

In my study, I included participants with contrasting situations: an inexperienced and an experienced online instructor.

Methodology

My study included both quantitative and qualitative data. Mixed methods are especially effective when you have both qualitative and quantitative data that together provide a better understanding (Creswell, 2005) of the research problem than either will alone. My quantitative data were collected from questionnaires and qualitative data from interviews through screen-capture elicitation and document analysis. An initial analysis of change profiles based on the questionnaires informed both my interviews and

document analysis. In the next section the tools that were used for data collection are discussed.

Stages of Concern questionnaire.

The Stages of Concern Questionnaire (SoCQ), part of the Concerns-Based Adoption Model (CBAM), was the basis for my quantitative data collection. Fuller found that when people are exposed to change they experience similar concerns (George et al., 2006). If an innovation (online learning, in this case) is to be successful, the concerns of the participants (faculty engaged in teaching online) must be addressed. An individual faced with implementing an innovation in teaching moves through several stages including:

- **Awareness:** Aware that an innovation is being introduced but not really interested or concerned with it.
- **Informational:** Interested in some information about the change.
- **Personal:** Wants to know the personal impact of the change.
- **Management:** Concerned about how the change will be managed in practice.
- **Consequence:** Interested in the impact on students or the school.
- **Collaboration:** Interested in working with colleagues to make the change effective.
- **Refocusing:** Begins refining the innovation to improve student learning results (Holloway, 2003, p. 2).

To identify which stage or stages of concern individuals were at, the CBAM researchers developed and tested the SoCQ. Hall and Hord (2001) determined that this instrument "has strong reliability estimates (test/retest reliabilities range from .65 to .86) and internal consistency (alpha-coefficients range from .64 to .83)" (p. 68). The questionnaire has five questions related to each of the seven stages. The raw scores are totaled for each stage and translated into percentile scores. Percentile scores are plotted on a graph to create SoCQ profiles like Figure 5.

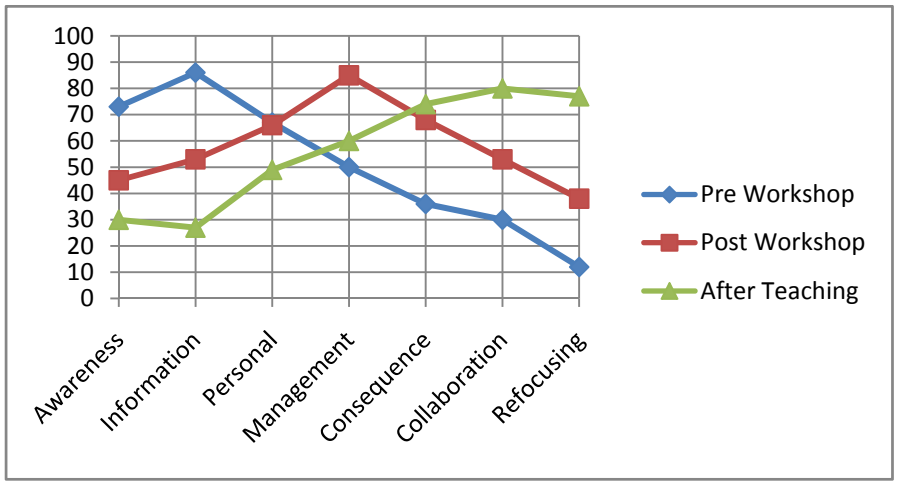


Figure 4: Sample Stages of Concern profile based on percentile scores.

This profile is a way of "seeing" where the instructor is in the change process and viewing the journey. In Figure 4, I can determine that before the training (blue line with diamonds) concern peaked at the information level, after the training (red line with squares) the highest level of concern was about course management, and after teaching online (green line with triangles) the concerns were both collaborating with others and modifying the course. Before the screen-capture elicitation interviews, I reviewed each participant's profile so that I could probe more deeply about the change process and

concerns, both past and present. I showed the participants their profiles, defined the stages, and asked for their interpretations. In one instance the participant was able to explain a very unusual profile which prevented a misinterpretation of the data. The experienced online instructor's profile showed high levels of concern at the personal stage which is a more typical profile for a non-use or a new user of an innovation. During the interview I discovered that her personal concerns were about finding time to implement online learning in all of her courses, and not about personal concerns about why she did not want to proceed with this innovation. In the next section I explain how important the development of a tool to "visit" online courses was in preventing erroneous conclusions about the SoCQ profile data.

Screen-capture elicitation.

Based on the literature on video elicitation, screen-capture elicitation is a new methodology for "visiting" an online course. After the study participants completed teaching online, I interviewed each individually and recorded the session with Mediasite. Mediasite is a tool that can capture audio, video, and content displayed on the computer screen and packages it together for later viewing. I used the audio recording and screen capture functions only. The participants were asked to show me their online course to illustrate changes they made related to technology, content, and pedagogy (specific questions are listed later in this section). When necessary, I followed up with prompting questions. As they navigated through their online course, anything they displayed on the computer screen was recorded along with their comments for later analysis.

This approach builds on a long history of visual methodology in the fields of sociology and anthropology (Gauntlett & Holzwarth, 2006; Mitchell, 2008). Rather than presenting subjects with a hypothesis to confirm, qualitative researchers Gauntlett and Holzwarth (2006) argue that visual methodologies "offer them [study participants] tools through which they can thoughtfully communicate their own meanings and understandings" (p. 85). Because I am interested in monitoring the change process these instructors experience, such a methodology is very appealing. I did not want to "guide" my participants too strongly during the interview but instead wanted to elicit their own reflections on the change experience and on the main constructs of TPACK. As Gauntlett and Holzwarth explain, "you draw together the researcher's horizon and the participant's horizon …as long as the participant's voice is dominant and the researcher is more of a guide" (p. 87). In my study these overlapping horizons greatly added to my understanding of the participants' experiences and knowledge.

Educational researchers also apply visual methodologies as Sewall (2007) demonstrated when she used Video Elicited Reflection (VER) as a tool for novice teachers to reflect on their lessons with their supervisor. She noted, "VER debriefings appeared to shift the 'ownership' of the teaching episode and ensuing debriefing from the supervisor to the NT [novice teacher]" (p. 48-49). During interviews, instructors take ownership of the conversation and highlight aspects of courses that they want to share. The recordings become an artifact for analysis.

By using software to record both audio and computer screen captures, instructors can "show" their online course and artifacts are created for later analysis. It is easy to observe a face-to-face class, but it is difficult to "observe" an online course. When

instructors answer questions about their online teaching while “showing” how they teach by displaying their course content on the computer screen, the researcher can explore existing content through the instructor’s eyes. In previous literature, when video elicitation was used in an educational setting, classroom lessons were recorded for later viewing and reflective discussion. In screen-capture elicitation, the instructor selects what to share with the researcher and then reflects while displaying the online elements of their choice. For example, Sewall had novice teachers select a lesson to videotape, view the video in private, and then meet with her to “think aloud” about what they had noticed. Sewall followed up with questions as necessary but the discussion was led by the novice teacher.

With screen-capture elicitation, both the audio and the screen capture are recorded during the interview. Participants do not have the option to view and reflect on the segments they record before hand as is so often the case with video elicitation. To offset this disadvantage, I emailed participants the topics to be discussed before our meeting so they had the opportunity to review their course content and reflect about what areas of their course to highlight before we met. I explained that screen-capture elicitation using Mediasite was a way to “visit” or “observe” their online course. I asked them to think about which parts of their online course that they would like to share in response to the following:

1. What would you show a biologist [I inserted their area of expertise] to demonstrate how you are focusing on the content?
2. What would you show a colleague who is curious about teaching online about how the pedagogy differs from a face-to-face class?

3. What technology tools did you add to your course or what tools did you use differently than you have before?
4. Were there approaches/strategies you rely on in the classroom that you had to let go of in the online environment?

The above prompts connect directly to the TPACK conceptual framework and address a gap in the literature. There is a need for case studies that explore teacher knowledge in this area. Cox (2008) notes the need for case studies where teachers' knowledge can be identified. She cites interviews with a TPACK expert to support her concern:

> Leatham argued this point most ardently in his interview, enumerating several questions that must be asked of teachers in order to better understand their knowledge as evidenced by a particular activity. Leatham states that one would have to ask questions such as, 'What were you thinking? What were you doing? Why did you choose to do that?' to get at were they really thinking about content when they were doing this or was it really more of a generic pedagogical decision (p. 54).

During the screen-capture elicitation I used Leatham's suggested questions to probe more deeply in the area of knowledge: "What were you thinking? What were you doing? Why did you choose to do that?"

At the end of each screen-capture elicitation interview, I transitioned to questions related to the CBAM framework. George et al. (2006) emphasized the importance of checking profile interpretations with the individuals so they could elaborate or clarify their concerns about the innovation. I showed the professors their profiles and asked if the concerns identified by the questionnaire were indeed concerns they had experienced. They were given an opportunity to elaborate on the change process they had experienced and their answers proved to be illuminating.

Documents

Creswell (2005) describes documents as a good source for a qualitative study as they already exist as text and there is no need for transcription. Merriam (1998) sees documents as an excellent source of data because, unlike interviews and observations, documents are usually not produced because of the research study. However, documents can be difficult to locate and gain permission to study. I collected the course syllabus and discussion board guidelines from each professor. These documents are elements of an online course and so the difficulty of finding documents was not an issue in this study. Yin (2009) notes that documents in case studies are important for confirmatory evidence that support other data collected. He also explains that documents can be valuable because they were not created for a research study but were created for another audience and purpose. In this study the course syllabus and guidelines were created for the purpose of clarifying course expectations for students. These documents provide an opportunity to look for confirmatory evidence to support statements made during the interview and also stages of concern depicted by the SoCQ profile.

Data Analysis Procedures

To analyze my data, I focused on one participant at a time. Detailed guidelines have been published for interpreting SoCQ profiles and in the "Interpreting SoCQ Data" section below, I explain how I used those guidelines. Later in this section, I also discuss how I coded course documents. First, though, I explain how I dealt with the data provided by my new tool—screen-capture elicitation.

Screen-capture elicitation analysis.

During the stage of data analysis, I focused on one participant at a time. Before I began coding my data, I viewed the entire screen-capture elicitation interview and made notes of interesting ideas. Then I read through the transcript of the same interview and marked several topics of interest. Finally, I wrote about each of these topics without focusing on my research questions but elaborating on points of interest. Next I began coding. The screen-capture elicitation interviews were transcribed and then coded by categories: technology, pedagogy, and content knowledge.

Table 1: Coding definitions used for transcripts of SCE interviews.

Codes	**Definition**[4]	**Example**
T=Technology	**Technology tools:** both commonplace, like chalkboards, and advanced, such as digital computers	Using plagiarism detection software for students to generate an original writing percentage score for an essay
P=Pedagogy	**How they taught:** the process and practice or methods of teaching and learning	Encouraging students to revise and resubmit essays to increase percentage of original writing and learn how to paraphrase effectively
C=Content	**What they taught:** the actual subject matter that is to be learned and taught	Scholarly writing for history students

[4] Definitions based on Mishra and Koehler (2006).

I also noted other categories that emerged. For example, I found some interesting comments on the impact of teaching online on face-to-face instruction. Because my screen-capture elicitation data included more than just audio, I viewed the interview again—noting what elements of the course each online instructor selected to illustrate the points they were making. The screen shots of the online courses were also a source of rich data. When Professor Montgomery discussed how she structured her course content into study guides, she showed me how each guide had an image that represented the content and a similar organizational structure (see Figure 5). In her study guide on classroom management, she included an image of a teacher sitting surrounded by her students and used the following study guide headings: Big Idea, Essential Questions, and Enduring Understandings. My findings were greatly enriched by having these course examples to illustrate the professor's comments.

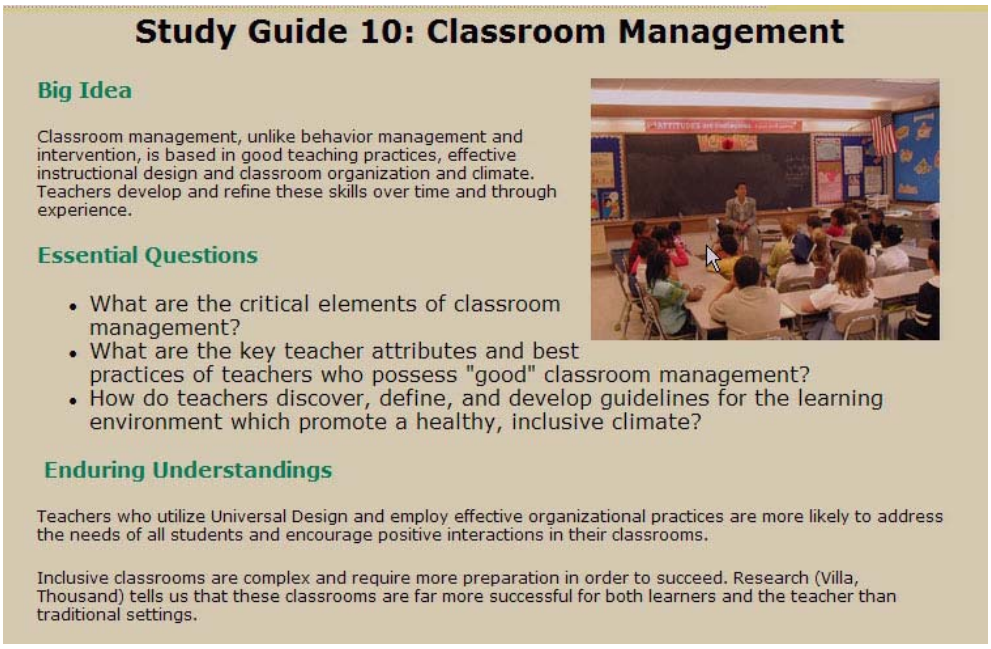


Figure 5: An excerpt from Professor Montgomery's Study Guide 10.

In Chapter 4, screen captures are included to illustrate findings. Viewing the recorded interview once again after coding the data was an enlightening stage as I found "new" information I had not noticed earlier. For example, Professor Montgomery discussed collaboration and described herself as a "change agent" but this comment eluded me during my first pass through the transcript.

After analyzing the transcripts I realized how screen-capture elicitation (SCE) worked as a method to have participants take ownership of the observation of their online courses. I structured the SCE to allow participants to led most of the discussion. Sewall noted that when she selected the video clips, her voice dominated the discussion but when her students selected the video clips their voices were predominant. Since we recorded during the interview itself, I sent the question prompts to participants before hand to give them an opportunity to think about what course components they would like to share. In preparation, Professor Robbins went through her course and typed up notes of elements she wanted to showcase. As the interviewer, I stated each prompt and tried to let the participant take the led during the course tour. Occasionally, I prompted them to show me examples in their course of what they were describing so I could tap into the benefits of recording their course content in addition to recording the audio. After asking the initial questions related to specific aspects of TPACK, I shared their SoCQ profiles and explained the stages of concern. More speaking was required on my part during these explanations. But then, once again, I let them lead the conversation. To discover if the conversation was participant-led, I calculated the number of my lines in the transcript of each SCE. With Professor Montgomery my percentage of speaking was 22% and with Professor Robbins my percentage was 26.5%. By sharing the questions beforehand and

staying in the background, I was able to use this method for participant-led tours of online courses. I think SCE has potential for future research studies where there is a need to "observe" an online course and understand why an instructor created the components.

Interpreting SoCQ data.

The SoCQ is a reliable tool with decades of implementation. An accepted way of interpreting the SoCQ data is to look at the two highest percentile scores (George, Hall, & Stiegelbauer, 2006). For more detailed analysis, graphing the data makes it easier to interpret the percentile scores for all seven stages giving a fuller picture of the individual's concerns. Typical profiles for profile analysis are presented in the research (Hord, Rutherford, Huling, & Hall, 2004) and guided my data interpretations. To begin my analysis, I focused on the two highest percentile scores before interpreting the complete profile for the individual. Then I examined the three sets of data together in a profile that reflects changes over time as depicted in Figure 4. The seven stages are also grouped into dimensions as shown in Table 3.

Table 2: Stages of Concern grouped by dimension.

Stages of Concern	**Dimension**
6 Refocusing	Impact
5 Collaboration	Impact
4 Consequence	Impact
3 Management	Task
2 Personal	Self
1 Informational	Self
0 Awareness	Self

The CBAM researchers (George et al., 2006; Hord et al., 2004) caution against drawing strong conclusions from profiles without checking interpretations with the survey respondents through an open-ended written question or interview. The screen-capture elicitation gave me an opportunity to discuss preliminary interpretations with each professor. I showed them their profiles, explained the stages, and asked for their interpretation of their concerns during those periods of time. Their explanations provided rich data I never could have extrapolated from the survey data alone and prevented me from drawing erroneous conclusions.

Analyzing documents.

The analysis of course documents, especially the syllabi, exceeded my expectations by providing content-rich data. The course documents were read and analyzed for support or contrast to the themes already discovered. I coded the documents using the same themes used for the screen-capture elicitation transcripts and defined in Table 1. I had expected the documents to provide confirmatory evidence to support my other data. However, each participant had created a customized syllabus for her online course that detailed her pedagogy and use of technology. I was able to reach a deeper understanding of each professor's attainment of TPACK by analyzing these syllabi. Examples are discussed in detail in Chapter 4.

Conclusion

Online education in the United States is growing at a rapid rate and the innovative professors who were eager to teach online more than a decade ago are not a large enough group to support the growing demand. By analyzing the Stages of Concern profiles of

two professors with different degrees of experience in teaching online, I saw some major changes in their levels of concern. The screen-capture elicitation allowed me to record their reflections on their online teaching experience in the areas of content, pedagogy, and technology while actually viewing their course content. Finally, their course syllabi allowed me to analyze this essential online document to see what they revealed about professors' technology, pedagogy, and content knowledge. This study brings together a well-established questionnaire (the SoCQ) with a new tool, screen-capture elicitation, and document analysis to generate rich data and results in some interesting findings.

CHAPTER 4

Major Findings

In this chapter I present my findings which ranged from interesting to surprising. My major finding, expanded below, was there is clear evidence of TPACK in the courses designed by both the inexperienced and experienced online instructor. I also noted a relationship between the Stages of Concern and TPACK through analysis of the SoCQ profiles, the screen-capture elicitation interviews, and document analysis. Both professors emphasized the importance of communication and technology support for students in the online environment. Surprising was each professor's difficulty in identifying elements of their face-to-face teaching that did not transfer to online courses. Each expanded on teaching modifications to make up for the loss of visual social cues. I begin with a discussion of evidence of TPACK.

Evidence of the Wicked Spot

The wicked spot is elusive and not easily attained. Earlier studies about TPACK and online teaching focused on participants new to the online environment. As Koehler and Mishra explained, adding technology requires an instructor to be aware of the dynamic relationship between and among content, pedagogy, and technology (2005b). I contend that this sensitivity is more likely to exist in professors who have had some experience in the online environment and enough mastery of the technology to knowingly integrate it in ways that support both their pedagogy and their content. Therefore, my study, unlike earlier studies, was limited to participants with online teaching experience. The major finding that I identified was that the conscious

integration of technology, pedagogy, and content (TPACK) was identified in courses developed by both Professor Montgomery and Professor Robbins but the examples found are very different. This difference appears to be more the result of their different content than their difference in experience teaching online but this point will be addressed in Chapter 5. I contend that once instructors understand how to teach in the online environment and have mastered the available technology tools so that they can adapt them, TPACK is within reach. In addition to different degrees of experience with online teaching, each teaches very different content. Through screen-capture elicitation, each professor gave me a guided tour of her online course as I hunted for the wicked spot. Table 3 depicts the elements of TPACK found in three examples for each instructor. In the next two sections I discuss this table in depth. There is no one overriding theme in how the participants demonstrated TPACK and the discussion that follows examines their different paths.

Table 3: Examples of the wicked spot from online courses developed by Professor Montgomery and Professor Robbins

Codes	**Professor Montgomery**	**Professor Robbins**
	Course design	**Assignment variety**
T=Technology	Used learning management tools to effectively organize content	Assignment tool
P=Pedagogy	Study Guide design promotes active learning	Created three different types of assignments to promote student learning
C=Content	Models lesson design effective for learners with special needs	Students were encouraged to read, examined their legal consciousness, and explored gap between law in the books and law in action
	Supporting students online	**Discussion board use**
T=Technology	Use of technology tools is clarified	Discussion board
P=Pedagogy	Her syllabus defines how to be "present," recommends number of weekly hours, and encourages time management.	Promotes new ways of thinking and re-teaches course concepts that are misunderstood
C=Content	Because some students are out of the state, does not allow face-to-face group meetings that would not allow equal access	Course goal to develop critical thinkers who appreciate complexity of controversial social issues
	Streaming video	**Streaming video**
T=Technology	Links to streamed video clip of mainstreamed fourth-grade special education student	Links to streamed video clips of two Supreme Court confirmation hearings
P=Pedagogy	Promotes critical thinking by asking students to view clip and write reflections	Students use video controls to take detailed notes, compare recent Supreme Court decisions to philosophies verbalized by Justices during confirmation hearings
C=Content	To give students a better understanding of people with diverse needs	Causing students to look at the law through a sociological lens

How Professor Montgomery found her Way

Professor Montgomery demonstrated TPACK in a variety of ways. Her integration of technology, pedagogy, and content is evident in the very way she designed her course and the learning modules for her students. TPACK is also demonstrated in the way she supported her students who varied in age, technology experience, and location. Finally, Professor Montgomery used streaming video to effectively teach online and to support her content with a focus on access for all students. Let's begin by looking at her course design.

Course design.

Professor Montgomery's successful integration of technology, pedagogy, and content can be seen in the way she designed her online course. She demonstrated knowledge of technology in this design, but more importantly, showed what technology could do for her as a teacher (Koehler & Mishra, 2005b). The focus of her graduate-level education course is on mainstream instruction for students with special learning needs. The students in her course are aspiring teachers or current classroom teachers. During the screen-capture elicitation interview, Professor Montgomery guided me through her online course for education students and pointed out ways she had streamlined the course design. For example, all of her course content was divided into study guides and the activities such as discussion boards were linked directly from the left menu. In her syllabus, Professor Montgomery emphasized the importance of this design:

> The study guides are intended to accomplish two major instructional outcomes: The first is to ensure that active learning takes place—even online. The literature and research on cognitive development is clear about the need for actively engaging the cognitive processes. The second

> is to "model" or demonstrate several *types* of study guides, each designed to actually *accommodate* a specific learning need. For some Study Guides, we have provided choices (another "best practice" which current educational research indicates is related to increased achievement) for modes of task completion.

Knowing that some of her students are taking their first online course, Professor Montgomery explains her pedagogy. She wants “to ensure that active learning takes place—even online” because it promotes cognitive development. The active learning will take place through the design of the study guides which are actually Web pages (technology) within the learning management system. One of the principles of good practice is to encourage active learning and that principle carries over to the online environment (Graham, Cagiltay, Craner, Lim, & Duffy, 2001; Palloff & Pratt, 2005). The design of Professor Montgomery’s study guides models different ways of teaching (pedagogy) and she explains that each is “designed to actually *accommodate* a specific learning need” (content). Because her content is focused on teaching teachers how to work with students with special needs, she skillfully incorporates elements of technology, pedagogy, and content in the very design of her study guides.

In her syllabus excerpt Professor Montgomery also elaborated on how and why she designed the guides so her students would have examples of the theory into practice. The consistent structure of each study guide can be seen in the excerpt from Study Guide 2: Laws & Policies in Figure 6.

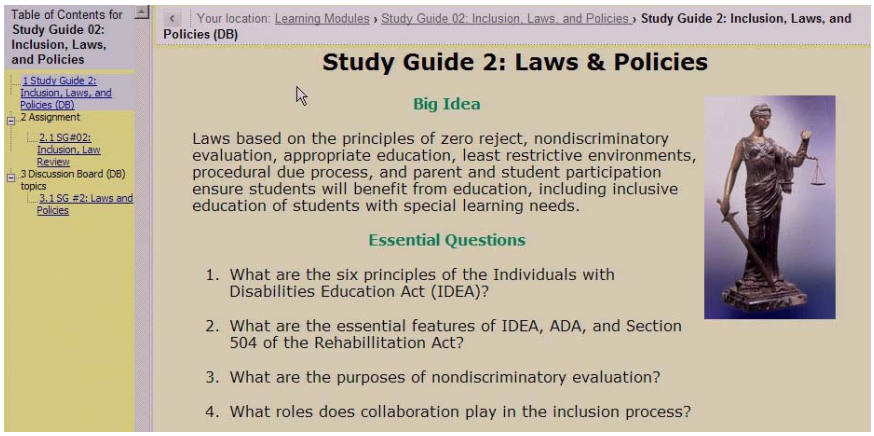


Figure 6: An excerpt from Study Guide 2 illustrates design structure.

All of Professor Montgomery's study guides have the same design structure although the elements vary. As can be seen in Figure 6, she includes an image that reinforces the content. The learning management tools that students will need for this module are linked on the left side of the screen as the assignment tool and discussion board are in this example. She explained:

> What I do is I set up every module the same way. I have the big idea, the essential questions, the lesson objectives, my performance outcomes, and my required reading for that assignment. Then I give the actual assignment and I am very specific about what I want and why. So they understand the reasoning behind that. Then I typically will have some Web sites and lectures that are linked. Because special education is such a huge field, we always have resources. Now, in this particular response, I ask for a discussion board conversation and I give them a prompt.

Professor Montgomery intentionally structured her study guides to support her pedagogical and content goals. The consistent design helps students new to online learning find the components they need without confusion. The elements of this study guide (big idea, essential questions, objectives, performance outcomes) are elements of lesson design that are part of Professor Montgomery's course content. Through her pedagogy, she is modeling content. In her syllabus she specifically states, "The study

guides are intended to accomplish two major instructional outcomes." Professor Montgomery knowingly created a course structure that integrates the elements of TPACK: technology, pedagogy, and content.

Supporting students online.

Online learning is a new experience for many students, and the students in Professor Montgomery's course may range in age from their 20s to their 50s. She is very aware of teaching her students how to be successful in this technology-intensive environment. Professor Montgomery has decades of classroom teaching experience but teaching online caused her to rethink what elements of a traditional classroom looked like in the online environment. How is a student "present" online? How do they participate? When experienced faculty begin to teach online, they often question their teaching (Peruski & Mishra, 2004) and have to develop new pedagogy. Professor Montgomery's course syllabus illustrates how she creates clear parameters for students. She includes the college's attendance policy statement, but then interprets this statement for her online students:

> The [college's] attendance policy states that "students are expected to attend all classes and participate actively." As you set your schedule for time you will devote to your online class, it is advisable to choose one consistent time to "attend" class. This course is **asynchronous.** You are learning on your own time, yet have obligations to the course timeline and to other students within the class. Please see the breakdown of time online expectations. Your participation score is derived from online time log, which is recorded every time you log into class. A full 15 points are connected to the online time to ensure participation.

Professor Montgomery clearly explains what it means to attend and participate in her online course and even advises students to "choose one consistent time to 'attend'

class.” She is teaching her students how to be successful in this online environment. Clearly defining high expectations has been linked to student success (Chickering & Gamson, 1987; Graham, Cagiltay, Craner, Lim, & Duffy, 2001) In addition, she calculates the number of hours of student time expected for a 16-week online course and clearly defines her expectations for participation. Her syllabus has a section on study guides (See study guide example in Figure 6) where she explains that time management is essential to success in an online course.

Another principle of good practice is prompt feedback but in an online course that does not mean a professor needs to respond every day of the week (Graham, Cagiltay, Craner, Lim, & Duffy, 2001). Professor Montgomery clarifies that she will respond weekly to emails and discussion posts and explains, “Though instructors are frequently online more often than this, please keep in mind that instructors do not approach this class on an all-day-every-day basis.” Guidelines for success in this online course are included in the syllabus sections “Use of Technology” and “Electronic Communication Protocol.”

Professor Montgomery’s support for her online students also ties directly into her content. One focus of her course is allowing equal access for all students. Some of her online students wanted to meet at a coffee shop to plan a group project, but she replied, "You can't do that, because then you're not allowing equal access. That's part of what special education is all about, including everyone. So let's use the mode that we were given—which is the online mode—and use that." Professor Montgomery had students in Michigan, Arizona, and Cairo who could not attend a face-to-face group meeting. One of the motivating factors faculty list for teaching online is providing access to diverse

students (Hiltz, Kim, & Shea, 2007; Liu, Kim, Bonk, & Magjuka, 2007; Shea, Pickett, & Li, 2005). Just as the professors in the online MBA program saw increased diversity as a benefit (Liu et al.), Professor Montgomery responded to an email from her student from Cairo: “You added so much to the inclusion and diversity discussion, your experience is enriching for everybody. It broadens our point of view.”

Professor Montgomery clarifies her expectations and communicates how her students can be successful both in the online environment in general and in this course specifically. These clear guidelines are part of her pedagogy but involve guidance on her use of technology to support students learning the content. She also models the content of inclusion by preventing course practices that would exclude some students. Once again, technology, pedagogy, and content are inextricably linked.

Streaming video.

Professor Montgomery harnessed the power of technology and online pedagogy to effectively teach her content. Through viewing her course and listening to her explanations, I was able to see that Professor Montgomery is intentional in the way she creates online learning experiences for her students. She collects online resources, streams videos, and develops discussion board topics and group projects to help her students better understand issues of learning diversity, inclusion, and mainstreaming in K-12 schools. She does not just link to content but structures interactive activities that encourage her students to think critically. She commented, “If I am going to remain vital and vibrant, I'd better make certain that what I'm offering is not only credible, but makes them [students] reach and allows them to find what they need to make their world real.”

For example, she streamed a video of a fourth-grade special education student who was mainstreamed into a general education classroom. Students watched the video online and and then imagined themselves as the parent of a student with a disabling condition. They wrote reflections. She discussed the impact of adding this technology element to her course:

> Streaming video solved a myriad of concerns and questions about what to do about the special education student in a general education classroom. . . . They [her education students] said, "Oh my, gosh. This changes the way I teach." "This changes my view of the world." "Oh my, gosh, maybe I have a learning disability." I mean really profound kinds of responses.

The streamed video allowed her students to connect with a mainstreamed student in a powerful way. Their reflections showed how deeply touched they were and Professor Montgomery's syllabus clarifies that this meaningful activity was created deliberately to cause her students to confront the course content. In her syllabus she explains, "The intent [of the course] is to empower you to acquire a better understanding of yourself and your relationships with people who have diverse and often challenging needs." She added video to the course but scaffolded the use of this technology for specific pedagogical and content reasons (Mishra & Koehler, 2009). In this activity, Professor Montgomery knowingly integrated technology and reached that elusive wicked spot.

How Professor Robbins found her Way

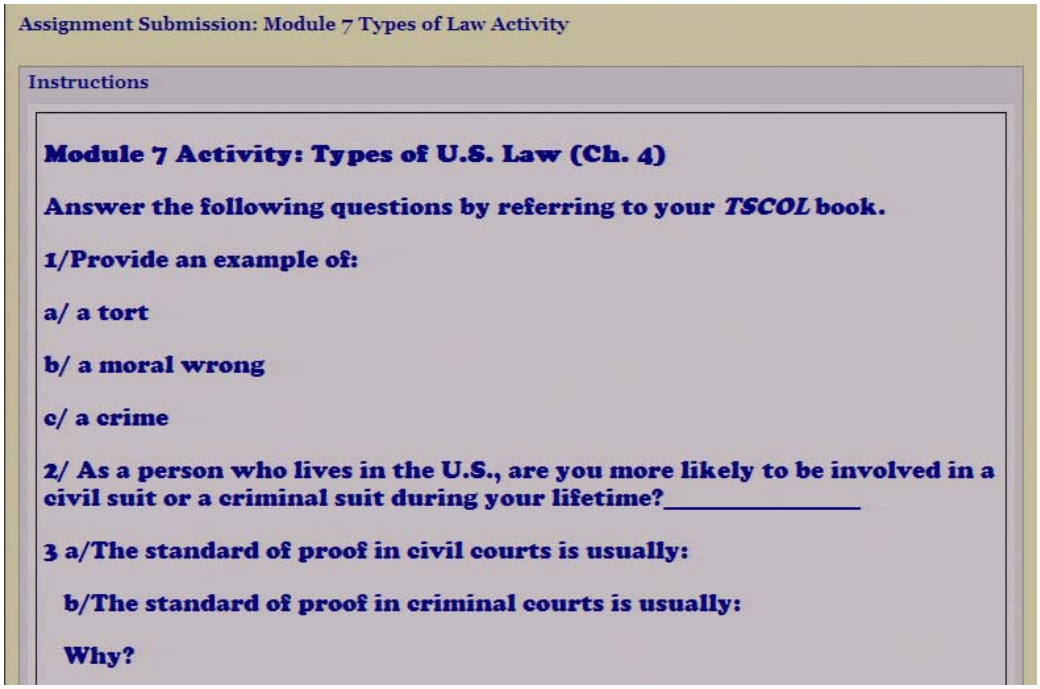
Professor Robbins also demonstrated TPACK in a variety of ways. She created different of assignment types to support her instructional needs and to support her content. Another TPACK example was the way she used the discussion board to teach

critical thinking skills. Finally, she used streaming video to challenge her students' thinking and guide them in taking a sociological stance on an issue. Let's begin by looking as the variety of online assignments she created and her reason for designing them the way she did.

Differentiated assignments.

Professor Robbins' attainment of TPACK was demonstrated in the way she created different types of online assignments to meet different learning objectives in her course. As Mishra and Koehler state, "Expert teachers consciously and unconsciously find ways to orchestrate and coordinate technology, pedagogy, and content into every act of teaching" (2009, p. 17). This skillful orchestration became evident as Professor Robbins gave me a virtual tour of an upper division, four-unit sociology course with a demanding reading schedule. She used the assignment tool to support her content through the creation of three types of assignments for this class. She explained, "Some of these assignments are really deep and conceptual and other ones are just, 'show me you're doing your reading' because they [students] need that encouragement to stay on top of things."

As an example of an assignment where students get points for doing their reading, she opened the Module 7 Activity: Types of U.S. Law (Figure 7).


Assignment Submission: Module 7 Types of Law Activity

Instructions

Module 7 Activity: Types of U.S. Law (Ch. 4)

Answer the following questions by referring to your *TSCOL* book.

1/Provide an example of:

a/ a tort

b/ a moral wrong

c/ a crime

2/ As a person who lives in the U.S., are you more likely to be involved in a civil suit or a criminal suit during your lifetime?_____

3 a/The standard of proof in civil courts is usually:

b/The standard of proof in criminal courts is usually:

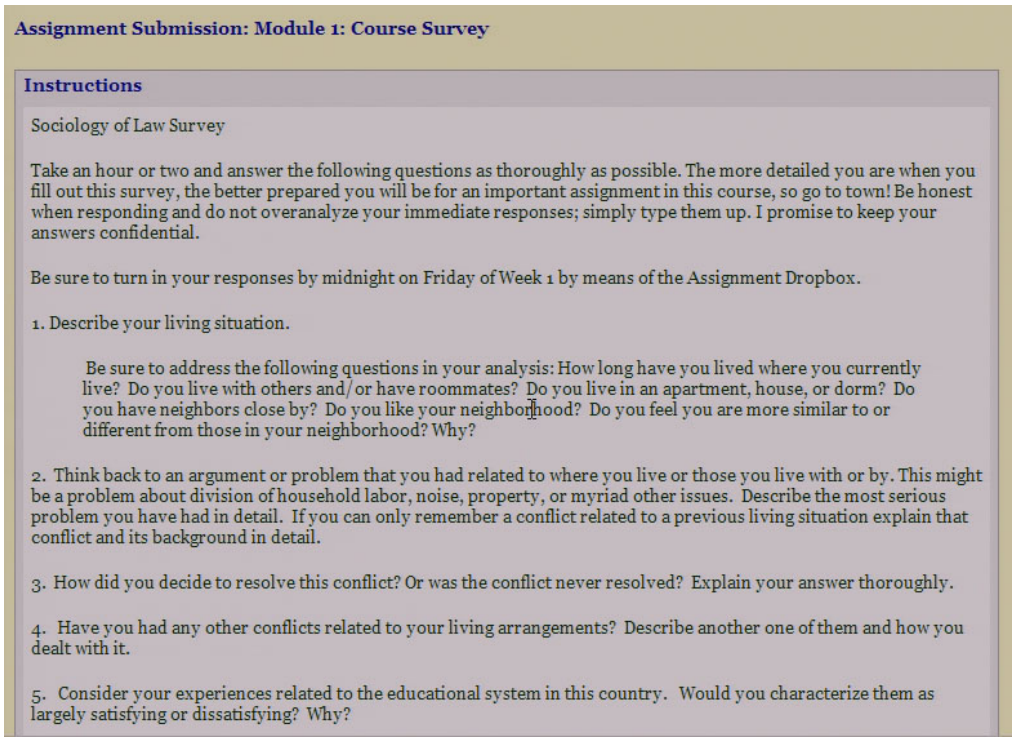
Why?

Figure 7: Excerpt of reading response assignment.

In the online environment, Professor Robbins finds these basic assignments more necessary than in her face-to-face classes. She explained, “So, this is actually a very basic sort of assignment. Do your reading, answer these questions, and turn it in.” She wants to motivate her students to complete the reading which is critical to understanding the course content. Her syllabus underscores this point: “Because this is an advanced 4-unit upper-division course, it is crucial for you to organize your time to allow for regular reading and note-taking.” Her online pedagogy is different from her pedagogy for her face-to-face classes and she has developed assignments to support learning for her online students.

Professor Robbins created a second type of assignment that is more elaborate and spans the entire course. She had students complete an online survey during the first week of class, and the students use the survey data for a culminating course paper at the

end of the semester. She said, “The survey is about how they see the law in their lives, but they don't yet know much about the law. This assignment is to examine their legal consciousness, so I have them answer all these questions. This takes a while, but it will serve as their data for their big paper in class.”



Assignment Submission: Module 1: Course Survey

Instructions

Sociology of Law Survey

Take an hour or two and answer the following questions as thoroughly as possible. The more detailed you are when you fill out this survey, the better prepared you will be for an important assignment in this course, so go to town! Be honest when responding and do not overanalyze your immediate responses; simply type them up. I promise to keep your answers confidential.

Be sure to turn in your responses by midnight on Friday of Week 1 by means of the Assignment Dropbox.

1. Describe your living situation.

Be sure to address the following questions in your analysis: How long have you lived where you currently live? Do you live with others and/or have roommates? Do you live in an apartment, house, or dorm? Do you have neighbors close by? Do you like your neighborhood? Do you feel you are more similar to or different from those in your neighborhood? Why?

2. Think back to an argument or problem that you had related to where you live or those you live with or by. This might be a problem about division of household labor, noise, property, or myriad other issues. Describe the most serious problem you have had in detail. If you can only remember a conflict related to a previous living situation explain that conflict and its background in detail.

3. How did you decide to resolve this conflict? Or was the conflict never resolved? Explain your answer thoroughly.

4. Have you had any other conflicts related to your living arrangements? Describe another one of them and how you dealt with it.

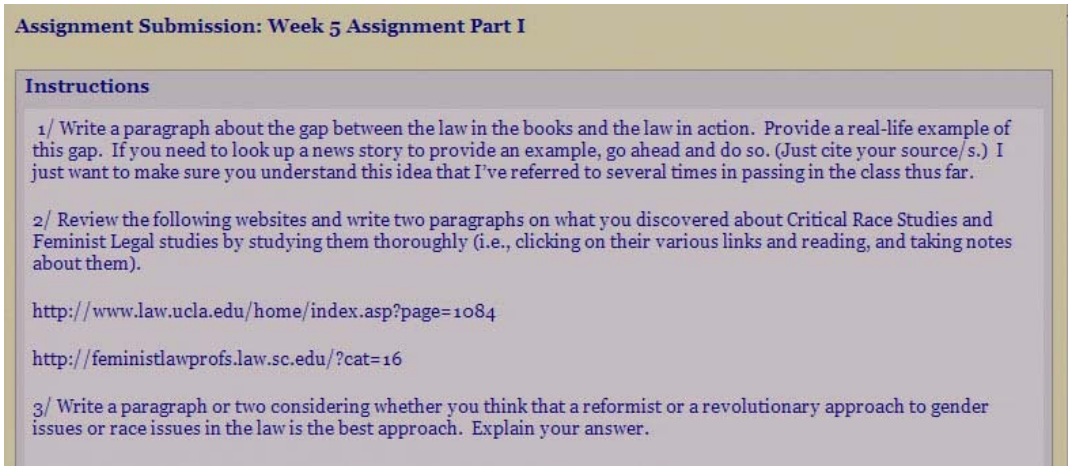
5. Consider your experiences related to the educational system in this country. Would you characterize them as largely satisfying or dissatisfying? Why?

Figure 8: Excerpt of survey questions on sense of legal consciousness.

Professor Robbins noted that having her students submit the survey online simplifies the process for herself and for the students. She explained, “It’s very organized. They can turn it in right here [pointing to assignment tool] and I have a record of it. This is better than the in-person class, because it's all very organized and it's all there for me. When I want to read the paper, I can just go back and look at what they submitted. I like that.” She is using the technology to help her teach and streamline the process of collecting this student data.

Professor Robbins also creates multiple-part assignments that require student to use the Internet. She shared an example that requires critical thinking:

> This assignment is one where I asked them to look in the news, find some information to bring this concept to life that I'm pointing out in part one, then to go to some Web sites and examine them, and once again link the content or analyze the content in light of the course concepts. The final part is bringing in issues related to the lecture, and letting them share their own opinion, based on what they learned.



Assignment Submission: Week 5 Assignment Part I

Instructions

1/ Write a paragraph about the gap between the law in the books and the law in action. Provide a real-life example of this gap. If you need to look up a news story to provide an example, go ahead and do so. (Just cite your source/s.) I just want to make sure you understand this idea that I've referred to several times in passing in the class thus far.

2/ Review the following websites and write two paragraphs on what you discovered about Critical Race Studies and Feminist Legal studies by studying them thoroughly (i.e., clicking on their various links and reading, and taking notes about them).

http://www.law.ucla.edu/home/index.asp?page=1084

http://feministlawprofs.law.sc.edu/?cat=16

3/ Write a paragraph or two considering whether you think that a reformist or a revolutionary approach to gender issues or race issues in the law is the best approach. Explain your answer.

Figure 9: This multiple-part assignment incorporates the Internet.

This assignment encourages students to think deeply, as Professor Robbins intended. Students apply a concept from her lectures, the gap between law in the books and law in action, and then provide an example from their lives or from an online news article. Professor Robbins explains that she wants to make sure that students understand this key course concept. To go even deeper, students learn about two different issues, gender and race, from selected Web sites and write about their understanding. Then to synthesize all their new knowledge, they write about two different approaches to these issues and defend which is the best approach. One element of effective online pedagogy is to

communicate high expectations to students (Graham, Cagiltay, Craner, Lim, & Duffy, 2001), which she does in her syllabus:

> The class will focus upon the ways in which social justice aims are facilitated or thwarted by the creation of law and the use of law. Throughout the class, you will be encouraged to think deeply and critically about the topics covered and to be an active participant who is making a positive contribution to the course.

In this assignment, Professor Robbins is checking for understanding of a key sociological concept and says so in step one: "I just want to make sure that you understand this idea that I've referred to several times in passing in the class thus far" (Figure 9). Then with the gap between law on the books and law in action on their minds, she sends students out to research sites on critical race studies and feminist legal studies. Finally, students reflect on different approaches to these issues and draw their own conclusions. This carefully crafted assignment is an example of the integration of technology, pedagogy, and content. Professor Robbins uses technology, including the assignment tool and Web sites, to challenge her students to come to understand key sociological concepts. She structures the three-part activity with pedagogical skill so she is almost taking students by the hand and walking them through this complex undertaking step by step—virtually.

The variety of online assignments is an example of Professor Robbins' attainment of TPACK. She does not limit her use of the assignment tool to one structured type of assignment. She creates a variety of online assignments to support her instructional objectives. She wants to ensure that her students read, so she gives them points for completing online worksheets that focus on key content she wants to

emphasize. Her survey assignment works on a higher level. Because Professor Robbins knows that some of her students will have almost no knowledge of the law, she has students examine their own sense of legal consciousness at the very beginning of the course. She helps them connect personally to the course content at the very beginning and then has them apply their personal data in a synthesis paper at the end of the course. Once again, she is skillfully interweaving her use of technology and the way she teaches to support a deep understanding of her content—a true example of TPACK in action. Her quoted responses throughout indicate that this was not a serendipitous event but that she knowingly created these assignments to integrate technology, pedagogy, and sociology. After viewing these assignments with her, I asked, "So, you're blending technology, pedagogy, and content all together?" and she responded, "Well, I would hope so!"

Discussion board use.

Sociology is a content area where students grapple with new ways of thinking and often their very beliefs are challenged. As might be expected, Professor Robbins' described her face-to-face classes as rich with debate and heated discussion. Discussion also plays a key role in her online course. In order to determine how to use a technology tool effectively, teachers need "a deep, complex, fluid, and flexible knowledge of the technology, the content to be covered, and an appropriate pedagogy (Mishra & Koehler, 2009, p. 18). As will be shown in this section, Professor Robbins succeeds in skillfully

integrating technology, content, and pedagogy through her use of the discussion board. She explained that she uses the discussion board tool in two ways:

> So in a lot of the discussions, students are engaging in the analysis of the course content, but I also use it to give summary posts . . . where I summarize the themes that came up and I clarify ideas. If something that is really off-base comes up in discussion, I sometimes need to address that and I try to do it in a way that is not so much a smack down [laughs]. I tell the whole class, "OK, some of these things that came up—this is the way that we want to look at it sociologically."

Professor Robbins noted that the summary posts are where some of the teaching occurs in her online course. She takes the opportunity to re-teach when she finds that students misunderstand course concepts. She also helps them to begin looking at these ideas as sociologists: "This is the way that we want to look at it sociologically." During the SCE, she read an example of a summary post:

> Very impressive work! Many of you created some sophisticated exercises that others learned a lot from. (Many were short, but sweet as they say.) I will clear up a few of the misconceptions that came up in your exercises as a whole below. You are all in a process of learning about these topics, so my discussion of them is not to criticize you, but to help you understand a few important distinctions and to make some useful suggestions.

Professor Robbins begins by focusing on what students succeeded in accomplishing and then goes on to explain why she wants clear up some misconceptions. During the SCE, she explained that in a face-to-face course, she can immediately step in and clarify misunderstandings if she wishes, but online she needed to find a way to address these misconceptions after they may have been discussed at length without her intervention. In this excerpt from her summary post, she addresses some misconceptions:

> First of all, be sure to read the study about racial disparity and sentencing in your lecture module as it touches upon some of the myths related to race and law that came up in some of your exercises. If you aren't familiar with the extensive research that exists to back up claims of racism, sexism, classism, etc. in the law, it is easy to make the assumption that people are simply stating their opinions when they state that institutionalized subordination exists.

In this summary post, she directs students to sources of accurate information and then discusses the research itself. She is using the discussion board (technology), to clarify misconceptions (pedagogy) about key course concepts (content). After a lively online discussion, she is not satisfied to just move on to the next concept. She is tapping into the power of a learning management tool to improve her communication with students. Many students find this interaction less intimidating and more convenient than the demands of a discussion in a face-to-face course (Chickering & Ehrmann, 1996; Pelowski, Frissell, Cabral, & Yu, 2005). At this point of student engagement, Professor Robbins uses a technology tool to step into the discussion and re-teach key sociological concepts. As she explained:

> Without this tool [the discussion board] it would be difficult. You can present the lecture and you can ask them [students] to interact, and if you just grade them and they are only seeing it one on one, a lot of people aren't getting to be exposed to the dialogue that would happen in the face-to-face class room.

In her syllabus she reinforces the importance of this dialogue. When discussing course goals, she states, "I expect that you will have begun to exhibit the characteristics of a critical thinker who appreciates the complexity of controversial social issues." Professor Robbins supports the development of critical thinking through her artful integration of technology, pedagogy, and content. Once again she has hit a bull's-eye on the wicked spot.

Streaming video.

In one of the most challenging activities in her course, Professor Robbins consciously works to harness technology to support the way she teaches her students to think as sociologists. She wanted her students to grapple with the idea that the law is considered neutral but when judges go through a confirmation process, their beliefs and politics are closely examined. In her module on the Supreme Court, she has students view online videos of the confirmation hearings of Justice Roberts and Justice Alitos. To make sure that the content is controversial, she links to sections on the discussion of abortion. She wants them to understand the difference between the law in the books versus the law in action. First, she has students watch the video of the confirmation process and take notes. She encourages them to pause the video while taking notes. Professor Robbins taps into the affordances of streaming video which gives the viewer controls for stopping, rewinding, fast-forwarding, and more (Mishra & Koehler, 2006). Unlike when she shows videos in the classroom, students can pause online video or rewind at any time so they can take more detailed notes. They turn in their notes via the assignment tool. Next, she explains:

> I ask them to review their notes and consider what the two men's responses were in terms of their judicial philosophy. Then I've told them, look at your reading. It gets them to actually open the book that they are assigned, to build on what I stated in the lecture, and to think about what their responses signify to observers falling on both sites of the abortion debate.

Then after reviewing their reading and her lecture, they think about the justices' comments and what these words would reveal to groups with different agendas.

Professor Robbins is delving deep into her content through the use of technology and pedagogy. Let's look at the assignment steps:

a. Review your notes and consider what Roberts' and Alito's responses signified in terms of their judicial philosophy (see the assigned reading for terms you may use) and what their responses probably signified to observers falling on both sides of the abortion debate.

b. Review the following website [URL] and examine the latest decision(s) on abortion that the Supreme Court has made. Consider whether Judge Roberts and Judge Alito followed the philosophies they verbalized in their hearings.

c. Write a post answering this question by incorporating information from your notes

d. Respond to one other person's post. Compare and contrast your responses thoughtfully.

Professor Robbins' students really struggle with this assignment because there is no correct answer. She wants them to think critically. She adds, "I don't really care what their final answer is as long as they are reading their material and it shows that they're trying to use the concepts or analyze their concepts." So once again, Professor Robbins is skillfully integrating all aspects of TPACK. Her deep understanding of her content is evident as she structures this activity in a way that guides her students into looking through a sociological lens. Her pedagogical approach is clearly tied to her content as she directs student to video accounts, assigned readings, and their text but forces them to draw their own conclusions in a murky area where there is no right answer. She is creating a situation where students need to think critically, process, and then share information. The technology is in service to her content and pedagogy. She uses the discussion board in a carefully choreographed way that results in creative conclusions from her students. Professor Robbins has hit the wicked "spot.

Stages of Concern Percentile Scores and Profiles

As discussed in Chapter 2, the Stages of Concern about an innovation in teaching can be grouped into three dimensions: concerns about self, task, and impact. See Table 2. Since TPACK is about the successful integration of three knowledge bases to create a learning activity, I expected to find that instructors who attained TPACK were focused on the higher level of concerns related to impact: consequences for students (Stage 4), collaboration with others (Stage 5), and refocusing (Stage 6). However, when I interpreted both professors' Stages of Concern Questionnaire (SoCQ) data, this was not what I found. Fortunately, the screen-capture elicitation interviews helped demystify these initially puzzling results.

The Stages of Concern Questionnaire data allowed me to look at process over time. In this section I first present the pre-workshop, post-workshop, and after-teaching-online SoCQ data separately and focus on the two highest scores. George, Hall, and Stiegelbauer (2006) suggest beginning by looking at the peak score for an individual and also considering the second score if it is close. These researchers provide clear guidance on interpreting these scores but emphasize the necessity to confirm or reject interpretations after checking with the individual. So I begin by interpreting peak scores for a point in time and then look at the individual profile for that point in time. Profile interpretation is the richest method for analyzing SoCQ data (George, Hall, & Stiegelbauer). Finally, I present the three sets of data together in a combined profile that reflects changes in concerns over time. During the screen-capture elicitation (SCE), each professor was shown their SoCQ profiles and asked for their interpretation. Their interpretations are presented in context with their combined profiles allowing a more

accurate interpretation. In Table 4 the SoCQ data are presented and the bolded percentile scores will be discussed in more detail in combination with the SCE comments.

Table 4: Stages of Concern over time with bolded scores to be discussed in more detail

Dimension	Stages of Concern	Pre Workshop	Post Workshop	After Teaching
Experienced Online Instructor				
Self	Awareness	61	48	55
Self	Information	75	90	84
Self	**Personal**	63	78	**83**
Task	**Management**	**80**	**80**	**65**
Impact	Consequence	54	59	63
Impact	**Collaboration**	**59**	**64**	**80**
Impact	**Refocusing**	84	87	**97**
Inexperienced Online Instructor				
Self	Awareness	55	91	99
Self	Information	**75**	45	51
Self	**Personal**	**48**	**76**	**35**
Task	Management	**52**	**56**	**73**
Impact	Consequence	38	33	11
Impact	Collaboration	76	55	28
Impact	Refocusing	52	47	**57**

Refocusing was crucial.

Table 5: Pre-workshop SoCQ percentile scores for Professor Montgomery

Awareness	Information	Personal	Management	Consequence	Collaboration	Refocusing
61	75	63	80	54	59	84

Let's begin by looking at Professor Montgomery's percentile scores for the SoCQ before the workshop in Table 5. The Experienced Instructor had over 5 years of experience teaching online. Before the workshop, her highest areas of concern were Refocusing (84) and Management (80). The concerns about management suggest that despite many semesters of experience teaching online, this professor may still be struggling with issues like time management and logistics. For the innovation of online

teaching such issues could include management of the discussion board, assignments, and communication with students in a timely manner. The high score for refocusing indicates an interest in changing the way she teaches online. When I only examine the two highest scores, concerns about management coupled with refocusing concerns could indicate an individual who is struggling with managing this innovation and considering abandoning it. However, when we look at the complete profile (Figure 10), the professor's concerns about learning new information are also high (75) indicating an interest in learning more about online teaching. Personal concerns are lower (63) than information concerns, which usually means the individual is not overly concerned about the demands of the innovation.

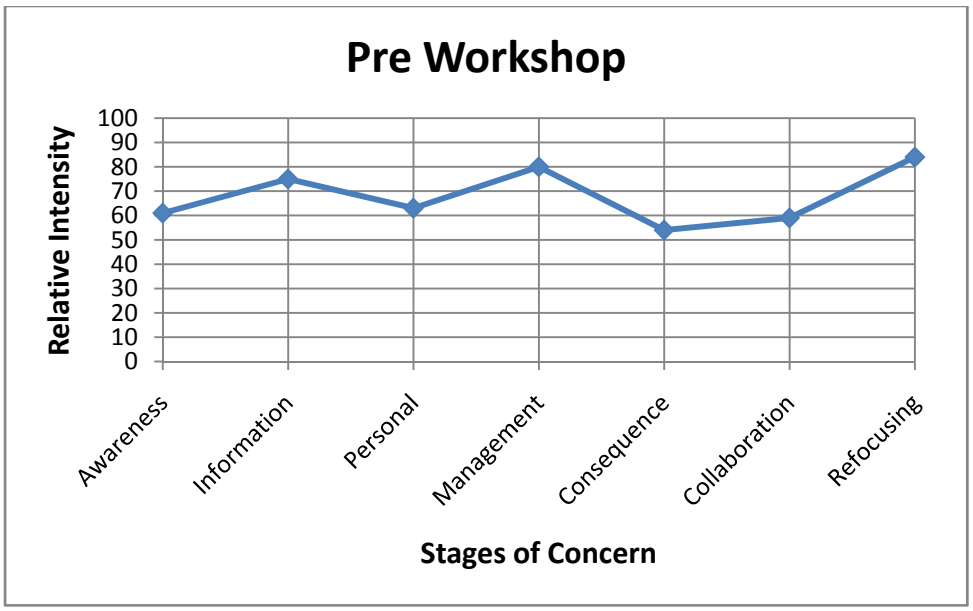


Figure 10: Pre-Workshop SoCQ Profile for Experienced Instructor

The complete profile reveals other interesting information about this professor's concerns. Personal concerns are lower (63) than concerns about information, which usually means the individual is not overly concerned about the personal demands of the

innovation, in this case the demands of teaching online. This profile suggests a professor who is interested in learning more about managing the online environment and making the innovation of online teaching her own. At this point in time, she was not concerned about collaborating with others or the impact of this innovation on her students. This profile reflects her levels of concerns before participating in the workshop.

Table 6: Pre-workshop SoC percentile scores for Professor Montgomery

Awareness	Information	Personal	Management	Consequence	Collaboration	Refocusing
48	90	78	80	59	64	87

After completing the workshop on Best Practices for Teaching Online, the experienced instructor's levels of concern clearly shift. Her highest SoCQ scores are in the areas of Information (90) and Refocusing (87). Her percentile score for Information has increased dramatically by 15 points indicating that the workshop may have increased her desire to learn even more about online teaching. Combined with a continued high concern about Refocusing, this information score may indicate that she is very interested in following up with some workshop resources to refine the way she has taught online in the past. To get a more complete picture of her concerns, it is helpful to look at her post-workshop profile as a graph to view percentile scores for all of the stages.

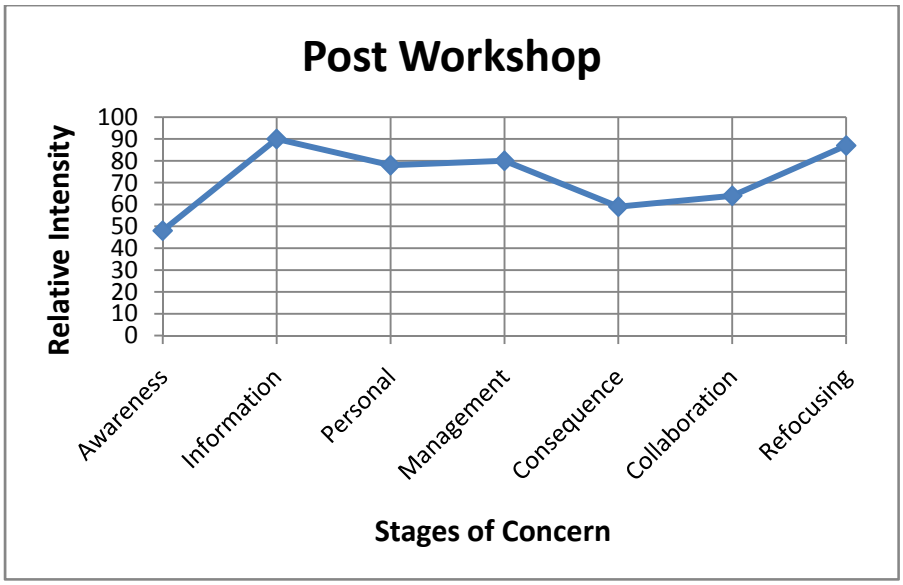


Figure 11: Post-Workshop SoCQ Profile for Professor Montgomery

Looking at the complete profile and beginning with Stage 0, we can see that Awareness is the lowest score indicating that the professor is very interested in online teaching but not concerned. Moving across the graph, the Information score (90) is much higher than the Personal score (78). The relationship between these two scores can be very revealing (George et al., 2006). When the Information score, also known as Stage 1, is much higher than the Personal score, also known as Stage 2, it is called a "positive one-two split" and indicates an individual who wants to learn more about this innovation. The Management score is the third highest score indicating that the original concerns about management issues persisted after the workshop. However, in combination with the high information score, management may be an area the instructor plans to learn more about. High concerns in both management and information indicate an individual who may want additional information to manange the innovation more smoothly (Hord, Rutherford, Huling, & Hall, 2004). Moving across the graph, consequences for students and collaboration with others are not areas of concern after

the workshop but refocusing remains a high concern as discussed above. The SoCQ was completed once again after the Experienced Instructor taught online after the workshop and the data reveal some interesting changes in her levels of concern.

Table 7: Experienced instructor's SoCQ percentile scores after teaching online

Awareness	Information	Personal	Management	Consequence	Collaboration	Refocusing
55	84	83	65	63	80	97

Professor Montgomery's highest level of concern after teaching an online course is on refocusing. With a percentile score of 97, this concern is literally almost off the chart and indicates the instructor is very focused on modifying the way she has implemented the innovation of online teaching in the past. Her second highest percentile score is information (84) which coupled with refocusing may indicate that she wants to continue to learn more about teaching online. Focusing on only the two highest scores is misleading with these data because personal concerns are only one point lower (83) than information concerns (84). Examining the graph below to see the complete profile gives a more accurate picture of the experienced instructor's levels of concerns.

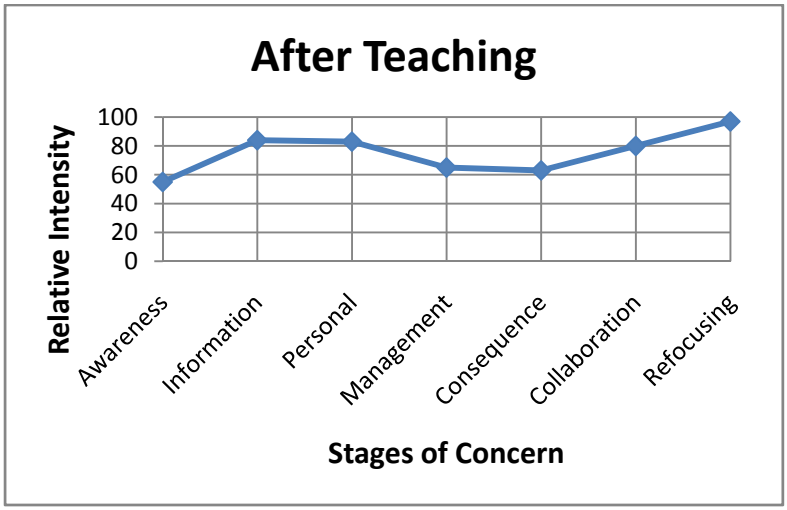


Figure 12: After Teaching SoCQ Profile for Experienced Instructor

Clearly, Professor Montgomery's greatest level of concern is on refocusing but let's begin on the far left of the above graph and walk through each stage. Her low score for Awareness (55) indicates she is still interested in this innovation. As noted above, her second highest area of concern is information followed by a slightly lower personal concern which barely qualifies for a positive one-two split with percentile scores of 84 and 83. Her personal concerns about teaching online have increased but are still out-weighed by her interest in learning more about it. Concerns about management and consequences are low but there is increased interest in working with others shown by the tailing upward for collaboration. Although the SoCQ is a highly reliable instrument, profile data interpretation can only be a hypothesis and needs to be confirmed by the respondent. For this profile, especially, it proved valuable to have input from the respondent about how to interpret her concerns after she completed the workshop and once again taught online. This qualitative data will be presented in the next section.

An agent for change.

Table 8: Professor Montgomery's SoCQ percentile scores over time (excerpted from Table 4)

Dimension	**Stages of Concern**	**Pre Workshop**	**Post Workshop**	**After Teaching**
Self	Awareness	61	48	55
Self	Information	75	90	84
Self	**Personal**	63	78	**83**
Task	**Management**	**80**	**80**	**65**
Impact	Consequence	54	59	63
Impact	**Collaboration**	**59**	**64**	**80**
Impact	**Refocusing**	84	87	**97**

Because one focus of my study was examining instructors' concerns about online teaching over time, I looked at instructors' changes in concerns at three points in time. Professor Montgomery's percentile scores are displayed in Table 8 and the resulting profile is graphed in Figure 13. Her initial profile indicated she was most concerned about information, management issues, and refocusing. As discussed earlier, high scores for both management and information indicate an individual who wants to learn more about making the innovation work more effectively (Hord et al., 2004). During the screen-capture elicitation interview, Professor Montgomery confirmed her interest in acquiring more information about course management and elaborated, "What I was looking for was more streamlined management skills . . . I don't feel like I'm fully there yet, but I feel like I've got a better handle on how to manage." As the graph (Figure 13) shows, her concerns about management dropped from the 80th percentile to the 65th after teaching online again and applying her new online course management skills.

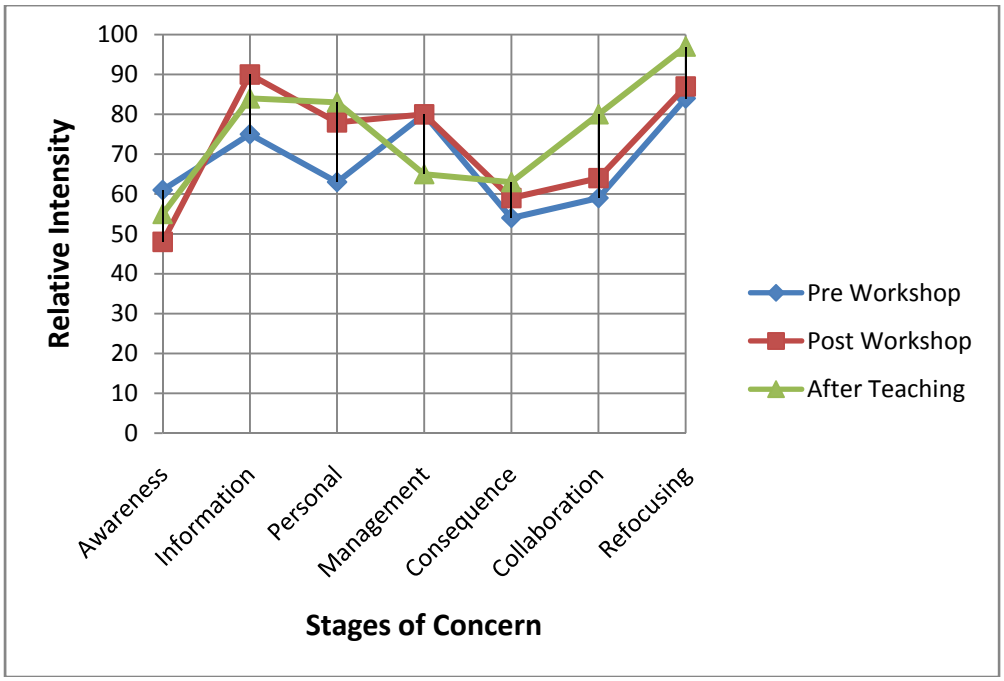


Figure 13. Combined SoC profile for Professor Montgomery.

The screen-capture elicitation provided evidence of these new skills. She made better use of the learning management system's tools and saved herself hours in grading and communicating with students. For example, in the summer workshop she learned that when she responded to and scored students discussion board postings within the discussion board tool, the scores were entered directly into the gradebook. In the past she had hand-entered all discussion board grades. Now the technology is serving the teacher.

Another course management improvement was her use of the discussion board to handle general questions about the course. Professor Montgomery explained:

> We used to call it "Main Discussion Board" and it would sit there fallow for much of the term and no one would access it because they didn't have anything "main" to say, I guess. Then we simply changed the title to "Questionarium" and described it as, "A forum to ask and answer

> questions for everyone to see. If you have a question, look here first. Someone may have already asked and answered it for you."

During the interview, Professor Montgomery navigated to the discussion board and showed questions her students began posting: "How long should this week's discussion be?" and "Is anyone having trouble getting the template for study guide three?" She was pleased that students were answering each other's questions before she even had an opportunity to read them. Professor Montgomery concluded, "Students are engaging in their own learning and that's part of the whole engagement process. So I love the 'Questionarium' switch. Now all of a sudden, we're using that where as we weren't before." The Questionarium also freed her from answering repeated emails about the same questions and now the answers were visible to all students—an improvement in online course management. Until a professor is comfortable managing the technology tools, it is almost impossible for them to reach TPACK without close support for technology issues. It is when online instructors are comfortable managing technology themselves, that they can begin to use technology in customized ways to support their own pedagogy and content.

Stepping back to look at Professor Montgomery's complete journey (Figure 13), I note that her profile is unusual in other ways. For example, experienced users tend to have very low concerns at Stages 1 and 2—information and personal issues. It is more typical for a person's concerns to move in a wavelike pattern across the graph although some users never reach the higher stages of collaboration and refocusing (George, Hall, & Stieglebauer, 2006). It is distinctly atypical for an experienced user to have growing concerns in the lower stages that focus more on the self. This finding led to an

interesting discussion with Professor Montgomery about her journey as an online instructor. As George, Hall, and Stieglebauer advise, “The focus for interpretation should be on what stages are high and low, and what the person seems to be indicating about his or her concerns” (p. 52). When shown her profile and asked if it accurately reflected her concerns, Professor Montgomery confirmed that it did. Her high level of personal concern was about finding the time to make all the changes she wanted to make. She explained:

> I don't have the time to change them [courses] all like I want to but what I did is I added to what I had and little by little these classes are coming along. I just long for the time to sit down and design because I really feel like it can be that much more powerful. . . . My angst is having the time.

Clearly her personal concerns do not reflect resistance but are about carving out time to more fully integrate technology, pedagogy, and content.

Professor Montgomery described herself as very collaborative. Her percentile score for collaboration jumped from the 59th percentile before she attended the workshop to the 80th percentile after she completed teaching her fall semester online course indicating that she is now eager to work with others on this innovation. She is currently developing online components for a program her department is revising. She noted, “I find I am being the change agent that way.” She explained, “When I see a place where I can support and be helpful and it is so simple. It would make life so much easier and better quality, then why not?” Her comments flesh out her SoCQ profile. It is clear that the grouping of second level concerns—information, personal, and collaboration—make sense in support of refocusing. She is gathering information, finding time, and working

with other professors to come up with innovative online resources based on her new understandings of the innovation of online teaching.

Professor Montgomery's highest level of concern is at the Refocusing Stage (97th percentile). Refocusing is about customizing, adapting, or personalizing the innovation which is exactly what she proceeded to do. Professor Montgomery began the process of looking at all of her courses, both online and face to face, and making revisions that made more effective use of technology. She was aiming for the wicked spot in every course she taught.

Personal concerns misleading.

Table 9: Pre-workshop SoCQ percentile scores for Professor Robbins

Awareness	Information	Personal	Management	Consequence	Collaboration	Refocusing
55	75	48	52	38	76	52

Professor Robbins had taught a fully online sociology course once before the workshop and partially online (hybrid) courses multiple times. Her SoCQ before the workshop resulted in high percentile scores for concerns about collaboration and information (Table 9). As explained earlier, higher scores indicate a higher degree of intensity of concern in that area. A high level of concern about information indicates a participant who wants to learn more about the innovation which is a reasonable expectation for someone who is attending a workshop about Best Practices in Online Teaching. A high percentile score for collaboration is less expected for an inexperienced user but the context of the workshop may explain this score. Professor Robbins was attending the workshop with another member of the sociology department. Therefore,

there could be an expectation of collaboration with her colleague from the beginning. Next, I will examine the complete profile which will reveal more about her concerns.

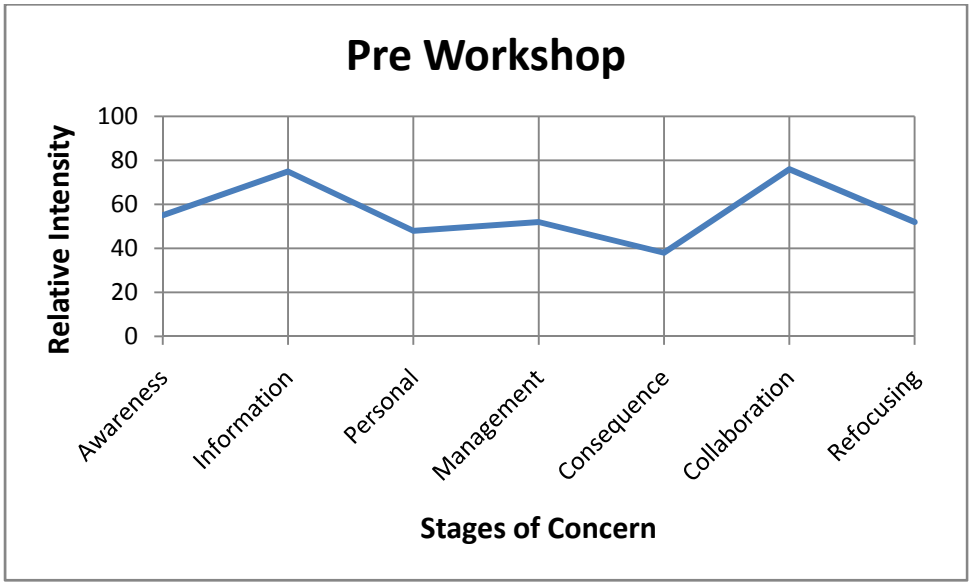


Figure 14: Pre-Workshop SoCQ Profile for Professor Robbins

Moving from Stage 0 to 6, gives a more complete picture of the Professor Robbin's concerns about teaching online as can be seen in Figure 14. Awareness, Stage 0, addresses the intensity of concern and also the degree of priority this innovation represents. In contrast to the other stages, a low score for Stage 0 indicates that the innovation is a high priority. The Inexperienced Instructor has a low score for Awareness and a high score for Information which may indicate that she is interested in learning more about the innovation of online teaching. In many studies, SoC researchers have noted high correlations between stages 1 and 2 scores and the relationship between these two scores can be important (George, Hall, & Stiegelbauer, 2006). In this instance, the information score (75th percentile) is much higher than the personal score (48th percentile) indicating an individual who probably is positive about the innovation but

has some personal concerns. As discussed earlier in the section about Professor Montgomery, this is a positive one-two split. The Inexperienced Instructor is not very concerned about management issues or consequences for her students. Her high score for collaboration was discussed above. Refocusing concerns tail off as is typical of inexperienced users (George et al.). She is interested in learning more about the innovation but not concerned about modifying it or replacing it with an alternative innovation.

Table 10: Post-workshop SoCQ percentile scores for Professor Robbins

Awareness	Information	Personal	Management	Consequence	Collaboration	Refocusing
91	45	76	56	33	55	47

After completing the workshop, Professor Robbins' scores changed in interesting ways as can be seen in Table 10. Her highest score is now for Stage 0 Awareness. Usually a high score for Awareness indicates that the respondent is more concerned about other initiatives. During the screen-capture elicitation this area was explored in more detail and her explanation will be discussed in the next section. The Inexperienced Instructor's second highest score is for the personal concerns stage. Personal concerns could include uncertainty about the demands of the innovation, time conflicts with other commitments, issues about her role, or the reward structure. When personal concerns are coupled with awareness, these scores reinforced the idea that Professor Robbins is concerned about

other innovations or initiatives and the impact on herself.

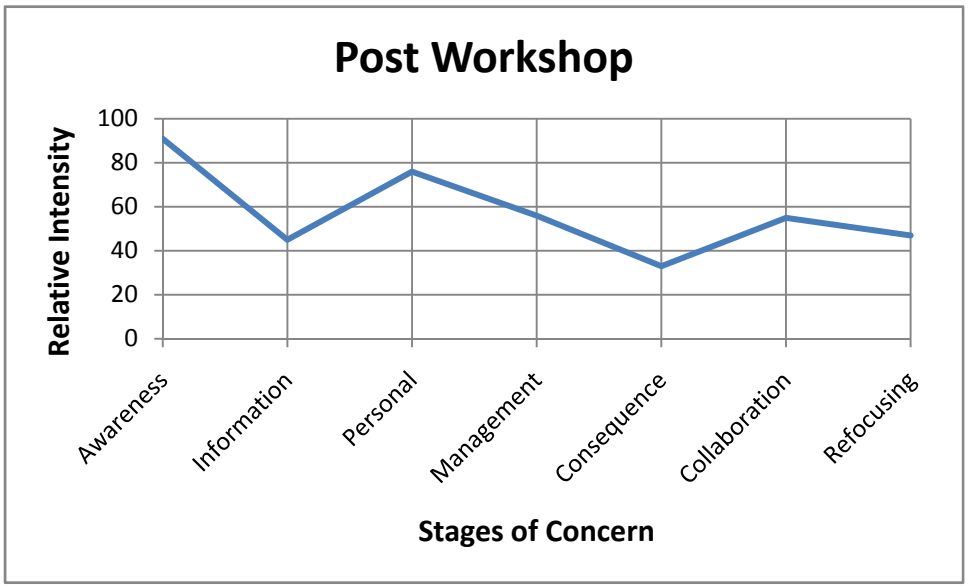


Figure 15: Post-Workshop SoCQ Profile for Inexperienced Instructor

The Inexperienced Instructor's complete post-workshop profile is even more intriguing. Her high levels of concern about the innovation itself and personal issues have been discussed, but her interest in information about online teaching is very low (45th percentile). One interpretation would be that after completing the workshop, she now has the information she needs to proceed with the innovation and is no longer concerned about obtaining that information. Her percentile scores indicate little concern about management or consequences for students. She is somewhat concerned about collaboration and refocusing tails off. At this point in time, the professor may have learned what she wanted to about online teaching and is interested in other initiatives. She clarifies her post-workshop concerns during the screen-capture elicitation interview.

Table 11: After teaching SoCQ percentile scores for Professor Robbins

Awareness	Information	Personal	Management	Consequence	Collaboration	Refocusing
99	51	35	73	11	28	57

After teaching online Professor Robbins's highest score is for the stage of awareness once again (Figure 11). However, the second highest score indicates strong concerns about management. During the management stage "the individual focuses on the processes and tasks of using the innovation and the best use of information and resources. Issues related to efficiency, organizing, managing, and scheduling dominate" (George, Hall & Stiegelbauer, p. 8). As discussed above, a high score for awareness can indicate the individual is interested in other innovations. However, when the second highest score shows strong concerns about managing the innovation, it made me wonder if the typical interpretation for awareness applied in this situation. My conversation with the Inexperienced Instructor revealed that there was more going on during that time period than these two scores revealed. Looking at the complete profile will also give a clear picture of her stages of concern after teaching.

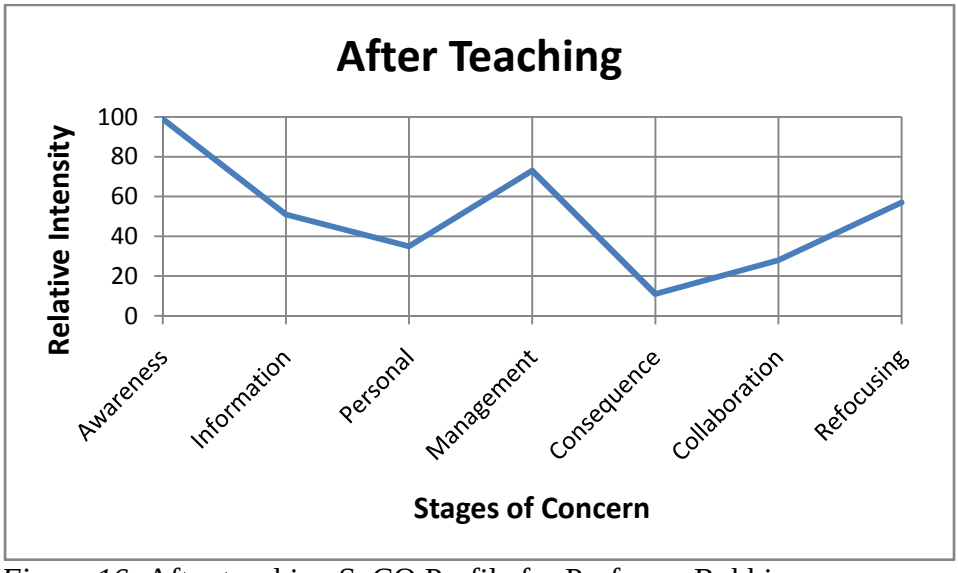


Figure 16: After teaching SoCQ Profile for Professor Robbins

Moving across the graph, Figure 16, after awareness we see that Professor Robbins's concerns for the information stage and personal stage are very low after teaching. The high management score was discussed and indicates an interest in improving course management. The 11th percentile score for consequences is the lowest percentile score overall and strongy indicates that she is not concerned about consequences for her students. This score is further explained both during the screen-capture elicitation and the document analysis of her course documents. Collaboration no longer appears to be a concern but refocusing is tailing up. Her refocusing score may indicate some interest in modifying her online course and continuing to make it her own.

Mastered technology.

Table 12: Professor Robbins' SoCQ percentile scores over time (excerpted from Table 4)

Dimension	**Stages of Concern**	**Pre Workshop**	**Post Workshop**	**After Teaching**
Self	Awareness	55	91	99
Self	Information	**75**	45	51
Self	**Personal**	**48**	**76**	**35**
Task	Management	**52**	**56**	**73**
Impact	Consequence	38	33	11
Impact	Collaboration	76	55	28
Impact	Refocusing	52	47	**57**

After examining Professor Robbins's concerns about online teaching at three points in time, I can look at her individual scores (Table 12), her combined profile (Figure 17) and include screen-capture elicitation data to get a deeper understanding of

what these data mean. The dips and peaks in Professor Robbins's SoCQ profile reflect some of the changes in her concerns about teaching online. The most dramatic change can be seen in Stage 2 (Personal). After completing the workshop, her personal concerns spike to the 76th percentile, an increase of 28 percentile points. After she had taught online again in the summer, her personal concerns dropped 41 percentile points—the greatest change for any stage in her profile. When asked about the high level of personal concerns depicted in her post-workshop profile, she said, "This is the year I went up for tenure. So it was right before I was putting my files together. And so it's a stressful, stressful time!" Preparing her tenure file explains how another initiative became more important and also explains her personal concerns for finding time to implement the plans she had made during the workshop.

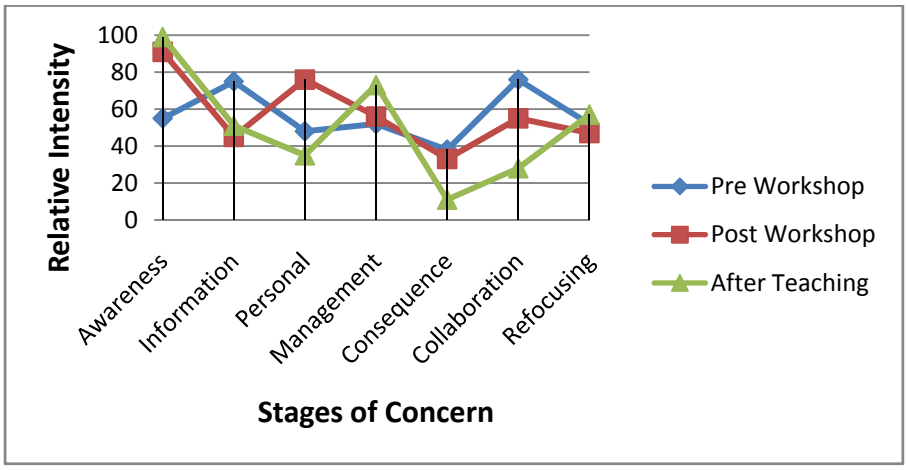


Figure 17. Combined SoC profile for Professor Robbins.

Individuals' concerns about an innovation are often developmental and move across the graph over time and with experience with the innovation (George et al., 2006). The shifting of Professor Robbins's peak concerns from Stage 1 (Information) to Stage 2 (Personal) to Stage 3 (Management) reflects this common pattern. Her highest

concerns for awareness post workshop and after teaching were explained by other projects that distracted her from concerns about online teaching. Looking at the big picture, we can see that after teaching online (and completing her file for tenure), the professor's personal concerns abated and her interest in managing the online environment and making changes in the way she currently implements online teaching are higher areas of interest.

I had expected a professor who had attained TPACK to have high concerns about the consequences of online learning for students (Stage 4). To understand the low score (33rd percentile) for concerns about consequences for students dipping to her lowest score (11th percentile), the screen-capture elicitation and document analysis were enlightening. Professor Robbins's low level of concern about consequences for her students is linked to her confidence in her online pedagogy. She explained that she has created a well-organized course and she is very available to support her students. Although her course is challenging, she knows it is a solid course. She explained,

> I think that the online class has this dynamic, especially in summer [shorter time span], of being very demanding. . . . If folks [students] are going to tell me, "I don't want to do this work. It's too much," I have to be honest and say I don't support that. You should take a face-to-face course.

Professor Robbins places responsibility for learning in the online envirnoment on her students. This emphasis explains the consistently low percentile scores for the consequences stage across all three of her profiles. Her syllabus underscored this point:

> Please note that if you don't get started on the class immediately and stay consistent in your participation, then it will be difficult for you to pass this class. Don't let this happen to you! Just remind yourself that you need to be as serious of a student as you are capable of being in order to succeed in an online class and you should do well.

Professor Robbins's detailed syllabus specifies exactly what her students need to do to be successful in her course and she is not concerned that her online course does not support her students' needs.

After teaching online again, Professor Robbins's refocusing concerns (Stage 6) are tailing up in her SoCQ profile (Figure 17). Her refocusing score may indicate some interest in modifying her online course and continuing to make it her own. In the screen-capture elicitation interview, she confirmed this interest and said she would like to add more audio files to her course and maybe try podcasting. She explained, "If I could podcast, I think that students would love to take it in their car, listen to it at the gym, etc." She wants to add images to her learning modules, which would also represent the content. Professor Robbins's final profile shows that she is not concerned about making the basic technology work anymore. She added, "I feel like I have a solid grasp on the basics so I don't have to worry at night." She has conquered the technology and is ready to make additional changes to her online course. New technology has new implications for teaching. To attain TPACK, instructors need to have mastered the technology and made it their own (Koehler & Mishra, 2005b). When instuctors have made an innovation their own and are interested in adapting or modifying the innovation, they are at the refocusing stage of the Stages of Concern. Professor Robbins, although an inexperienced user in CBAM terminology, has a refocusing score that indicates she understands online teaching and is ready to make some further improvements in her online course. Given this stage of concern, it is not suprising that she shared several examples of TPACK (discussed in the previous section).

Both participants ready for course modificiations.

Both Professor Montgomery and Professor Robbins expressed confidence in their basic use of technology for teaching online. Both also have refocusing concerns that tail up indicating an interest in making their own modifications. Each expressed specific ideas for modifying the current version of their online course. When the technology is under control and the instructors are interested in making changes in the way they use the technology (Refocusing Stage), the conditions for TPACK are in place. Conversely, when there are high levels of concern about gaining more information about how to teach online coupled with high levels of personal concern, an instructor is not ready for "highly effective and highly skilled teaching with technology" (Harris, Mishra, & Koehler, 2009, p. 401) that is TPACK. At first glance these professors' SoCQ profiles seem to reflect serious personal concerns about teaching online. The screen-capture elicitation interviews clarified that for Professor Robbins the concerns were unrelated to teaching online. For Professor Montgomery, her personal concerns were based on her desire to redesign all of her courses and her "angst" at the lack of time to do so. Harris, Mishra, and Koehler stated, "TPACK is a form of professional knowledge that technologically and pedagogically adept, curriculum-oriented teachers use when they teach" (p. 401). So I have observed that these two instructors with concerns about teaching online at the impact levels of SoC are in a better position to attain TPACK.

Other Aspects Contributing to TPACK

As I coded the screen-capture elicitation transcripts and the syllabi, other themes emerged that seemed essential to achieving effective integration of technology,

pedagogy, and content. In this section I discuss some of the common elements that were important to both the experienced and the inexperienced online instructor as they developed and then taught their online courses. Common themes not discussed earlier include the importance of communication and finding ways to support their students' use of technology.

Communication in online courses.

Both Professor Montgomery and Professor Robbins emphasized how differently and consciously they communicated in their online courses in contrast to their face-to-face classes. They also agreed that effective communication was critical to their students' success. Communicating in the online environment is an example of pedagogy, the P in TPACK. Professor Montgomery described communicating in her online courses as a different dynamic from a communication stand point. To ensure that she was able to make her points clearly, she gave more examples online than she did in her face-to-face classes and was generally more focused. She said, "Students don't have the opportunity to see my face, my body language . . . I am more intentional, because I can be more thoughtful." Professor Robbins also mentioned that the social cues are missing online. She explained that she consciously works to add "voice" to all of her online communications with students. She said, "You have to consciously . . . put effort into doing that if you want to make it more than just the old-fashioned distance learning thing, 'Well here's a book, read it, and write answers and I don't care.'" Both professors emphasized the importance of getting to know their students and adding introductory activities that allowed their students to get to know each other. Avenues for

communication online are different. Students don't sit next to each other and chat before class begins. Each professor saw the need to consciously create these initial "get acquainted" opportunities so students would later feel more comfortable discussing emotionally charged content with each other in a safe environment.

As to the T in TPACK for technology, the professors used a variety of learning management tools to communicate with their students including course mail, discussion board, audio files, and announcements. The ability to communicate asynchronously encourages student-faculty contact (Chickering & Ehrmann, 1996). Professor Montgomery and Professor Robbins felt the need to communicate more than they did in their face-to-face classes. Other studies have found that professors interact with individual students more often through communication tools like discussion boards and email (Cavanaugh, 2005; Pelowski et al., 2005; Zhen, Garthwait, & Pratt, 2008). As Professor Robbins explained, in her face-to-face classes, "You can say the same thing to them [laughs] everyday that you see them." In her online courses, she often uses the announcement tool for those reminders. Here are some examples of announcements she sends to her students: "Please do your work by tonight," "Your work is due by Sunday," and "If you don't do your work, unfortunately, you won't do well in the class. This is how I know that you are participating." Both professors emphasized how important it is to be very conscious of their students in their online courses and to be very clear about their expectations. Each used learning management tools, technology, to regularly communicate with their students.

Clear communication expectations for their students were included in each syllabus. Professor Montgomery's students were current or future classroom teachers so she also emphasized professionalism in her guidelines:

> Electronic correspondence is a part of your professional interactions. . . . Please be reminded that e-mail and on-line discussions are a very specific form of communication, with their own nuances and etiquette. For instance, electronic messages sent in all upper case (or lower case) letters, major typos, or slang, often communicate more than the sender originally intended. . . . All electronic messages must be crafted with professionalism and care.

Professor Montgomery is preparing her students both for success in the online environment and in their future (or current) classrooms as teachers. She clarifies the difference between online and face-to-face communication and gives specific suggestions like avoiding typing in all capital letters which can be interpreted as shouting. Her pedagogy here is interwoven with her content and yet she is addressing issues related to technology for communication—clear evidence of TPACK.

Professor Robbins is equally specific in guiding her students to communicate effectively. She explained that the online course environment is new to some students so clear guidelines are essential. In her "Guidelines for Online Communication" section in her syllabus, Professor Robbins first explains how online communications are different: "When we are communicating online we must consciously work to communicate in a clear fashion without the help of non-verbal cues, and without the benefit (in some cases) of having met each other outside the virtual classroom." She lists five specific guidelines for effective online communication and gives examples of each. As part of her pedagogy she is specifically spelling out her expectations for communication in her online course. Professor Robbins does not assume that her students know these elements

and takes the time to teach them how to "be present" in her course. She intertwines her content, too. For example, she warns against intentionally making statements that are racist, sexist, classist, and/or homophobic and states, "If you cannot refrain from making such statements in your sociological analysis . . . , then this is not the class for you." Technology use has to be carefully scaffolded by "specific pedagogical instructions and guidelines" (Mishra & Koehler, 2009, p. 16). Both Professor Robbins and Professor Montgomery tie together pedagogy, content, and technology in their communications with students.

Technology support for students.

Technology can interfere with the online learning experience for students due to technology glitches or technology phobias of students (Winsboro, 2002). Issues related to problems with technology infrastructure and lack of campus technology support for students is one of the top barriers preventing faculty from teaching online (Maguire, 2006). So the T for Technology in TPACK can be a show stopper. Both of these participants developed safeguards to make it unlikely that technology could derail their courses. Professor Montgomery's years of online experience can be seen in her syllabus statement on Use of Technology: "Students are expected to be responsible for and to demonstrate competency in the use of various forms of technology, including word processing, electronic mail, WebCT, use of the Internet, and/or multimedia presentations." She is very specific about the technology skills students will need to be successful in her course. She also requires students to read the Frequently Asked Questions Web page for the campus learning management system before asking for

technical assistance. Students are told to save digital copies of all assignments before submitting them online. Professor Montgomery is setting her students up for success in the online environment.

Professor Robbins also anticipated technology issues and gives students clear guidance in her syllabus: “If you write an essay exam you MUST save a back-up copy. In the highly unlikely event that the system will quit working when you want to submit your essay, but in the event it did, you can immediately email me your essay on my regular e-mail.” She is teaching her students that they are responsible for saving their exams even if there is an issue with the course technology. She is shifting the responsibility to them. In our interview she elaborated on technology issues:

> In terms of technology, it's important for them [students] to understand what they should do if there is the possible glitch. So once in a while it [the learning management system] goes down. It's gotten less and less over the years, it seems less common, but you have to tell them [students] there are ways to demonstrate you're doing your work even if WebCT happened to go down. You waited till the last hour perhaps. . . . But if it happened in the last hour, what would you do? You will email me your work, right? There's ways to show me if you’ve actually done your work.

Professor Robbins is proactive. She prepares her students so they know what to do if the technology fails. She has students think through what they would do if the learning management system was temporarily unavailable. She understands that technology may not always be reliable, but plans for such occurrences so her content is not derailed. She uses the power of technology for her pedagogy and content but also builds in safeguards to prevent frustration both for herself and for her students.

TPACK is unattainable if the technology is not stable, but both participants have found ways to support their students in dealing with the inevitable technology issues.

They give clear guidance at the beginning of the course about how students can get assistance and they build in safety nets, like saving written work before posting, to ensure that the course can proceed. Students are given responsibility for finding alternatives if there are technology glitches. If a server goes down, students are able to proceed with confidence. Learning is not interrupted which is a demonstration of pedagogical knowledge for online teaching. Both professors have demonstrated TPACK in this area of technology integration.

Surprising Findings

One surprising finding in this study was that both participants had to struggle to think of any limitations of teaching online. I had expected that both would have a list of limitations, especially the less-experienced online instructor. During the screen-capture elicitation I asked each professor what approaches or strategies they rely on in their face-to-face classroom that they felt they had to let go of when they taught fully online. Their answers were very similar even though their online pedagogy was very different. Each noted that the social cues they relied on in a traditional class were missing but each had come up with effective alternatives as is discussed in the previous section on communication. Professor Robbins said, “I don’t think there is that much that you have to let go of really except the reliance on interpersonal communication and you don’t have to, I realize, let go of it because you are just doing it differently.” Professor Montgomery, the more experienced online instructor, also paused in thought and finally said,

> I’m having a hard time coming up with something that I miss. . . . I will say that I come home from teaching face to face energized. I personally

> draw something from that interaction and time with students. That doesn't mean that I can't get all excited and start pounding on my keyboard in response to someone. That enthusiasm, I guess, and engagement with my students is still there, but it is a different kind of engagement.

Each noted that interpersonal communications were different but both had come up with strategies to overcome the initial limitations. As Professor Montgomery pointed out, the flip side was increased intimacy with her online students. Other faculty have noted that getting to know their students better is a motivating factor for teaching online (Cavanaugh, 2005; Zhen, Garthwait, & Pratt, 2008). To deal with the lack of face-to-face interaction, Professor Robbins consciously infuses her discussion board postings, email communication, and course announcements with a very personal tone. She focuses on putting personality into all her online communications and adds personal stories to her lectures just as she does in her face-to-face class. She said, "Sometimes, I look back and say, maybe that was a little too much but I do think that it helps."

Professor Robbins listed several elements of her online course that she likes better than her face-to-face classes. She uses the assignment tool extensively and finds it to be very simple to use and helps organize students' assignments. She said, "When I want to read the [student] paper, I can just go back to things and look at what they submitted. I like that." She also makes greater use of the Internet and sends students to view Web sites to learn about content she covers directly in the face-to-face class. Another difference she shared was setting clear parameters for participation. Professor Robbins noted that she set clear parameters for both her online and face-to-face class but the methods were different. For both she relied on clear statements in her syllabus, but she used a variety of technology tools discussed earlier to guide students online. She

said, “Guidelines have to be even more clear online because in class I can stop someone in mid-sentence, but in my syllabus for my online course I have very detailed discussion of the rules.”

When pressed for how she makes up for the lack of personal contact online, Professor Robbins explained that her solutions are not technologically exciting. She said, “I mean to me it is exciting but I am not behind the curtain. Through the discussion boards, email, and announcements, I am trying to keep on top of that and have a really personal tone.” One of the barriers to faculty considering teaching online is the concern about interaction with students. Professor Robbins believes she gets to know some of her online students better than she would in a face-to-face class. She shared an example of a student she only knew online, who frequently emailed her with complaints. He also took courses on campus so she offered to meet with him during her face-to-face office hours but he did not. He became increasing angry and criticized the way the course was set up in an email typed in all capital letters, which Professor Robbins interpreted as yelling. She explained:

> Over time, he’d write me long, maybe three in the morning, page-long emails that were ranting and raving and saying all sorts of things. Then he would write emails explaining that he couldn’t do his homework because he was drunk for two days and he lost his computer. So this sort of thing, I started realizing, there’s a mental health issue involved.

When his tone became violent, she reported his behavior to the dean and the campus police were called in. The campus police met with the student’s other professors but no one was aware of any problems. Professor Robbins believed that she got to know him better because of the online environment although she said his other courses may have been large or he may have been the type of person who did not engage out loud.

However, she is convinced that she gets to know her online students quite well and has had many positive experiences where students share incidents from their lives related to her curriculum.

Professor Montgomery noted that the changes she has made in her online teaching are greatly impacting her face-to-face teaching. When asked if her experience with online pedagogy had influenced the way she teaches face to face, she replied, "Absolutely! Absolutely without question! Without question!" She gave several examples including, "If I find that I am not able to finish something in class, I can always say, 'You know what, let me post this lecture.'" Her face-to-face courses all have an online component and her syllabus and handouts are posted allowing her courses to be almost paperless. In the literature, other professors have re-examined their pedagogy as a result of teaching an online course (Peruski & Mishra, 2004). My focus during the screen-capture elicitation was on losses experienced when moving online so Professor Montgomery's enthusiastic comments about the impact of her online pedagogy on her face-to-face courses was surprising. Although TPACK is often applied to online teaching, the framework is about effective integration of technology, pedagogy and content and is not limited to the online environment (Peruski & Mishra; Mishra & Koehler, 2005). Professor Montgomery understands the power of TPACK and is integrating technology with her content and pedagogy in her face-to-face courses too.

Summary of Key Findings

Through screen-capture elicitation interviews, SoCQ profiles, and document analysis; I found evidence of TPACK in both participants' courses. Although a certain

level of online teaching experience is necessary to attain TPACK, this will be explained in more detail in Chapter 5, extensive experience does not seem to be a necessary condition. A relationship was noted between the refocusing stage in the SoCQ profile and TPACK. Professors' discussion of their interest in modifying their online courses and their increased confidence in online teaching led me to conclude that they needed to master the basic technology elements to teach online before they were ready to completely integrate technology, pedagogy, and content. This point is also discussed in more detail in Chapter 5. Consistent, clear communication and dependable technology with safeguards in place were also key ingredients for TPACK for these two professors. Finally, I was surprised to learn how little these participants felt they had to let go of to teach online. Each concluded that because they found new ways to communicate with students, they really did not experience a lack of any teaching options when they taught online. Indeed, Professor Montgomery felt her online teaching was positively impacting her face-to-face teaching as she continued to develop supplemental online content for each in-person class. In Chapter 5, I discuss the significance of these findings and implications for future research.

CHAPTER 5

Discussion of Results

As millions of students enroll in online courses each year, the quality of online instructors is paramount to the success of these students, and, indeed to the future of higher education. In this chapter I provide a summary of my study and present my conclusions based on the findings in Chapter 4. I discuss the findings that are related to the literature and some surprises that emerged in this research. The significance of this study and implications for further research are also discussed.

Summary of the Study

The demand for online learning will continue to grow exponentially. Most institutions of higher education now acknowledge that online learning is an option they need to offer future students. What needs to be better understood is how to prepare faculty to successfully teach in the online environment. The TPACK framework provides a definition of the necessary teacher knowledge for effective technology integration. The main purpose of this study was to examine how faculty with different levels of online teaching experience integrated technology, pedagogy, and content in the online environment over time. These questions guided my research:

4. In what ways did instructors *knowingly* integrate technology, content, and pedagogy in these online courses?
5. How do participants' concerns about the innovation of online teaching change over time and did their relative experience teaching online shape their attainment of TPACK?

6. Did instructors have to let go of certain highly revered processes that they had used in the past? If so, what did they let go of?

To answer these questions I conducted two case studies. Based on the CBAM terminology for instructors' concerns about an innovation, I included an inexperienced and an experienced user of the innovation of teaching online. I analyzed their Stages of Concern profiles generated by the Stages of Concern Questionnaire which each participant completed at three points in time. To "visit" their online courses, I developed a method called screen-capture elicitation (SCE). Based on visual methodologies in anthropology and sociology, this method allowed me to record screen shots of participants' online course content and audio of their responses to questions probing for their implementation of TPACK and confirmation of my interpretation of their SoCQ profiles. In addition, I analyzed their courses documents for evidence related to any of the research questions.

Summary of Findings

My first research question asked in what ways instructors *knowingly* integrated technology, content, and pedagogy in these online courses. Through my study I sought evidence of instructors deliberately making decisions to create learning experiences based on these three knowledge bases. I found several examples of TPACK for each instructor. Through screen-capture elicitation I was able to discover that they "knowingly" made these instructional decisions. The analysis of their syllabi was also revealing. There is clear evidence that each professor deliberately created learning activities that integrated all three knowledge bases.

My second research question asked how participants' concerns about online teaching changed over time and did their relative experience teaching online shape their attainment of TPACK. The concerns of each participant did change over time and the screen-capture elicitation interviews clarified what their SoCQ profiles really meant. I also examined whether participants' differences in online teaching experience impacted their success in reaching TPACK. For each participant there were several examples of successful integration of technology, pedagogy, and content. Although the inexperienced instructor had little fully online experience, she did have several semesters of experience teaching hybrid courses where students met both face-to-face and online. In a hybrid course, an instructor has the opportunity to clarify any misconceptions and to communicate directly with students about any confusion about the online elements of the course. Perhaps this hybrid experience better prepared the inexperienced instructor for success in the online environment and for reaching TPACK. The difference in these professors' experience levels with online teaching did not make a difference in their demonstration of TPACK.

My final research question asked if instructors had to let go of certain highly revered processes that they had used in their face-to-face courses when they taught online. In my most surprising finding, both participants assured me they had not had to let go of anything in order to teach online although both acknowledged that they had to teach differently. The lack of personal contact was mentioned by both participants as a major difference, but each found a way to overcome this obstacle through use of communication tools. The experienced online instructor said that her online teaching was

having a positive impact on her face-to-face courses. She was adding more online resources and taking advantage of discussion boards when class time did not allow a discussion to finish. Neither participant felt they had to give up cherished instructional practices when they taught online.

Significance of Findings

The experiences of the two faculty members in this study, supported by the literature cited in Chapter 2, help us understand that we need to pay attention to the importance of mastering the technology in the context of content and pedagogy for instructors to attain TPACK in their online courses. My study looked for, and found, evidence of TPACK in fully online courses taught by an inexperienced and an experienced online instructor. An early TPACK study focused on faculty developing their first online course in a team situation (Koehler, Mishra, Hershey, & Peruski, 2004). Many later studies focused on assessing TPACK activities and clarifying definitions of TPACK and its constructs (Archambault & Crippen, 2009; Cox, 2008; Schmidt et al., 2009). My study contributes to the TPACK research by adding a case study where online instructors reflect on their integration of technology, pedagogy, and content and examples of TPACK are identified.

Confidence with technology emerged as a key factor for achieving TPACK for my participants. In comparing the different examples of TPACK in these two courses, I did not note a difference in quality based on the professors' difference in years of experience teaching online. Instead, it was their confidence in their use of the technology to teach online that set the stage for TPACK. Professor Robbins said, "I feel I have a

solid grasp on the basics so I don't have to worry at night." Professor Montgomery also expressed increased confidence in her ability to use online technology. In fact, she now develops online content for face-to-face courses she designs with other colleagues. Both participants had mastered the technology of teaching online and expressed confidence in using the basic tools for online instruction. Their confidence in their use of technology was also reflected in their Stages of Concern Questionnaire profiles. In the third administration of the questionnaire after each had taught online again after completing the summer workshop, their scores for refocusing tailed up. Refocusing scores that tail up (George et al., 2006) indicate a user who is ready to make the innovation their own. Both instructors gave examples of modifying their online courses with additional uses of technology that support their pedagogy and content.

My study may be the first to look for connections between the Concerns-Based Adoption Model and TPACK. The professors in this study were not in a position to develop TPACK when they were focused on the early Stages of Concern in the dimensions of Self and Task (George et al., 2006). Recall that self concerns are about what online teaching entails (Stage 1), what impact teaching online will have for them personally (Stage 2), and how they manage the online course (Stage 3). The SoCQ profile also identifies professors at the refocusing stage. There was a connection between the refocusing stage (Stage 6) and TPACK for the participants in this study. Both professors demonstrated evidence of TPACK and they also had percentile scores for refocusing that tailed up indicating an interest in making modifications to the way they currently taught online. In interviews they expressed great enthusiasm for modifying their online courses.

Based on their experience and the literature, we need to pay attention to this possible connection when planning professional development opportunities.

My most surprising finding was that my study participants did not feel they had to give anything up to teach online. Although the online environment was different, they found other ways of achieving the same goals and they both commented on how well they got to know their online students. Many faculty who teach online appreciate the increased interaction with their students and the opportunity to get to know their students (Cavanaugh, 2005; Zhen, Garthwait, & Pratt, 2008).

Practical Implications for Professional Development

Technology should not be taught in isolation as a set of discrete skills. The literature reviewed in Chapter 2 indicated that there is no point in focusing on technology instruction alone and ignoring content and pedagogy if the goal is a truly effective online course (Hiltz et al., 2007; Liu et al., 2007; Zayim et al., 2006). The TPACK framework holds some answers for preparing faculty to successfully teach online. Even the most accomplished face-to-face instructors cannot “step” into the online environment without engaging in a mindful reflection on their pedagogy (Peruski & Mishra, 2004). For faculty to understand how to teach online, they need to explore technology options as they are working with their own content and exploring online pedagogy. However, this is not to say that technology instruction is not important. The two participants in this study needed to master the technology to be able to fully integrate it into their content and pedagogy. For the purposes of professional development, the technology should be learned in the

context of content and effective pedagogical practices (McLean, 2005; Xu & Morris, 2007).

The ideal professional development workshop for faculty interested in teaching online should address the known barriers to online teaching (Maguire, 2006; Sammons & Ruth, 2007; Shea, 2007). Sharing some recent research on the quality of online learning may reassure faculty who are still skeptical about the rigor of online courses. Identifying faculty concerns and addressing those concerns will increase faculty motivation to teach online. Having workshop participants complete a Stages of Concern Questionnaire before the workshop begins and generating a profile can assist workshop facilitators in indentifying and addressing concerns. By administering the SoCQ and following up with open-ended questions (either in writing or an interview), facilitators can identify issues that may block progress toward TPACK, as well as trigger participant reflection as they complete the SoCQ. CBAM also provides guidelines for supporting instructors at different stages of concern (George et al., 2006). For example, a professor who is worried that his department chair thinks online courses are not rigorous, will not be ready to learn about more effective ways to integrate technology into accounting in the online environment.

Seasoned online faculty should be involved to mentor and re-assure those who are venturing online for the first time. Professors will benefit from seeing how others who teach similar content are making the transition to the online environment and discussing their new pedagogy (Parker & Howland, 2006). Enlisting the early adopters should be avoided as they may intimidate faculty from the early and late majority who are coming

later to the online environment. The early and late majority faculty have different characteristics and concerns. They need to build their confidence with technology integration through success (Parker & Howland, 2006; Zayim et al., 2006).

Time is a major barrier to developing an online course, so a professional development workshop should provide time for faculty to create new content while technical and instructional support is nearby. Hands-on time is essential to build the online course and explore the technology options. Lecturing how to create content is not as effective as supporting faculty as they create their content.

Hands-on, multi-day workshops where instructors can try new approaches in collaboration with colleagues, instructional developers, and media specialists would be fertile ground for the growth of TPACK for effective online courses. However, effective professional development is only part of the answer.

Institutional Recommendations

Many of the barriers to faculty teaching online can only be addressed at the institutional level. These are leadership issues. The literature shows that lack of institutional vision is a major barrier for faculty considering online teaching. What is needed are higher education administrators with a clear vision for online learning who are willing to build a support structure for faculty, which includes professional development opportunities and a clear path to promotion and tenure (Hiltz et al., 2007; Maguire, 2006). If the campus leaders understand that the integration of technology, pedagogy, and

content are essential for effective online learning to take place, then they will also understand how to support faculty to become effective online instructors.

Leaders who understand the different demands of online teaching will also understand that instructors need time and support to develop a new fully online course. No professor should be told in November that he will be teaching his first online course in January. It is estimated that it takes two to three times longer to create an online course than a face-to-face course (Bruner, 2007; Sammons & Ruth, 2007). Such leaders also will understand that online class size cannot be doubled just because there is no need for chairs. Faculty/student interaction is critical to the success of an online course and time spent teaching online increases proportionally as numbers of students increase (Cavanaugh, 2005; Graham et al., 2001).

Technology infrastructure and strong technology support for both faculty and students are also key motivating factors for faculty to teach online (McLean, 2005). In my study both participants benefited from a stable infrastructure and a student help desk that solved their students' technology issues.

To encourage faculty to teach online, administrators must recognize online courses as equal in value to face-to-face courses in the tenure and promotion process. Many faculty are still concerned about what peers and administrators think about online learning. Incentives for course development include release time to create the course content, stipends, and smaller classes (Shea et al., 2005). When faculty realize that their deans and provost see online learning as academically rigorous and when they are

confident that teaching online will not delay, or prevent, them from reaching tenure; the numbers of faculty who will request to teach online will grow dramatically.

Areas for Further Research

Screen-capture elicitation is a promising method for "observing" an online course. It offers the benefit of actually "seeing" the course content while listening to commentary by the course instructor. Artifacts for later analysis include viewing the packaged elements together—listening to the commentary while viewing the course content, transcripts of the audio, screen shots of the course content, and audio files. As more courses are taught online, screen-capture elicitation could be a useful tool for researchers.

Much of the new TPACK research is focusing on measuring the development of TPACK in preservice teachers through a promising survey instrument. Additional research is also needed on how to develop TPACK in experienced professors who would like to teach online. This study focused on looking for examples of TPACK in fully online courses. There is a need for additional research on a professional development model for developing TPACK for online teaching.

Another area for future research would be a study with a larger sample exploring the connections between the CBAM and TPACK frameworks. CBAM's focus on teachers' concerns about an innovation in teaching can inform TPACK research. Whenever a new technology tool is added to an online course, I would expect that the instructor would be at a different Stage of Concern. For example, although Professor Robbins is currently confident in her effectiveness teaching online, when she begins to

implement podcasting she will experience new concerns about how to use that technology for her sociology course. Once she has mastered the technique of podcasting and figured out how to best integrate this tool into her online course, she will be ready to achieve an effective integration of her technology, pedagogy, and content. So the wicked spot is wicked indeed—it is a moving target. When the technology changes, as technology always does, the instructor needs to rethink both content and pedagogy. However, part of the excitement of teaching online for many instructors is learning to use new technology and enhancing their creativity in teaching (Hiltz et al., 2007; Shea et al., 2005). When staff developers understand that seasoned online instructors may need to go back to square one when adding a new technology to their online course, they can help professors understand the process so they do not become discouraged and revert back to what has worked in the past. Understanding the change process and TPACK can help both staff developers and faculty be successful.

Conclusion

The participants in this study knowingly integrated technology, pedagogy, and content in their fully online courses. There is no one right way to use a technology tool and both study participants attained TPACK in a variety of ways. The very design of the course can represent TPACK. A variety of scaffolded assignments using the assignment tool in different ways for different purposes is another example of TPACK. Streaming video was successfully used to support two very different instructional goals in two very different courses. Template-driven courses are not the answer for creating more online courses to meet the growing demand. Instead, faculty development workshops based on

the foundations of TPACK can help faculty learn how to integrate technology in powerful ways to support both their content and pedagogy. The wicked spot should be at the center of any professional development program for online learning. Understanding TPACK can guide administrators as they create a vision and a path for supporting teaching and learning in the area of online instruction. We do not need to settle for canned courses created by technologists when content experts can learn how to create their own vibrant, online learning environments with a little support and training.

Mastering technology can unveil many possibilities for teaching online. In my study, both the experienced and inexperienced instructor became comfortable with the technology tools in their learning management system and then were able to make the technology their own. It may not take years of online experience to attain TPACK, but it does require a good understanding of the technology so its use can be customized to fit content and pedagogical needs (Mishra & Koehler, 2006). The reflections of the two participants in my study suggest that when instructors have SoCQ profiles that tail up at Stage 6 (Refocusing), they are in a better position to attain TPACK. The SoCQ could be a useful instrument for professional development as it identifies concerns about online learning which can assist facilitators in addressing these concerns (George et al., 2006). Based on the experience of these two professors and the literature, high percentile scores for refocusing may indicate a real readiness for TPACK.

Faculty do not have to give up a sense of connection with their students when they teach online (Cavanaugh, 2005; Zhen et al., 2008). This conclusion was reinforced by the experiences of my two participants. Some faculty are reluctant to teach online

because they believe they do not want to lose their connection with their students. They will need to learn different ways to communicate effectively with their online students, and professional development can be key in helping faculty make this transition. Some online instructors find that both the quantity and quality of discussions is greater online and some students who never participate in class, actively do so online.

TPACK is now moving into K-12 school districts. The San Diego Unified School District is basing their new professional development program on the TPACK framework as they strive to transform how their students are taught (Devaney, 2009). As technology is becoming more ubiquitous, this district wants to help teachers customize their use of technology to meet the needs of their students. Through TPACK, they hope to be able to do just that. I think TPACK can have a similar impact on faculty development programs in higher education. The emphasis needs to shift from “Where do I click?” to “Why should I use this technology?”

In conclusion, the increased demand for online learning in higher education cannot be ignored. Some faculty have serious concerns about moving their courses online but TPACK can be part of the solution. Enlightened leaders can dismantle the barriers to online teaching and support professional development programs that show faculty how to harness the power of technology for teaching and learning. Based on the data generated in this study, leaders in higher education must pay attention to the needs of both experienced and inexperienced faculty who are exploring and embracing technology as an instructional tool. To provide high-quality online courses, we need to take aim at that wicked spot.

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APPENDIX A

E-mail Announcement of Workshop

Subject line: Ready to put your course online? Attend summer workshop

Best Practices in Online Teaching

Because faculty have expressed an interest in learning how to move their courses fully online, we have developed a workshop on "Best Practices in Teaching Online." Professor Marisol Clark-Ibáñez (using research from her tenure as eLearning Faculty Fellow) and Linda Scott have created a six-day workshop (two days online). Learn what it takes to create an effective online course. Topics will include:

* What do students expect in the online environment?
* How to develop a sense of community
* Transition a successful face-to-face project online
* Add multimedia elements to support student learning outcomes
* Organize your content for success
* Discover best practices for online teaching

TULIP will be limited to 12 participants. We will select participants on a first-come-first-serve basis, but will make some adjustments so all colleges and a variety of departments are represented. Preference will also be given to those who have not taught online before and to those who are scheduled to teach online for the first time.

Dates: Face-to-face workshops on June 3, 5, 10 and 12 (Tuesdays and Thursdays) from 8:30 a.m to 4 p.m. plus two online days the week of May 26 and the week of June 16 (any time, any place). Please do not apply if you cannot attend all four face-to-face workshop days.

Stipend: $600.00 for the six days (4 days in face-to-face workshops and two days online).

Application: Complete the online form at URL

APPENDIX B

INFORMED CONSENT

INVITATION TO PARTICIPATE
Linda Scott is a doctoral student in the joint doctoral program in educational leadership at UCSD and CSUSM. She is conducting a study on teaching online. You are invited to participate in this study because you participated in the 2008 Summer Workshop on Teaching Online and you have taught a fully or partially online course since the workshop.

PURPOSE OF THE STUDY
This research study focuses on the **change process** that instructors experience when they learn to teach online. The purpose is to explore how higher education faculty change their instructional practice when moving from teaching face to face to teaching online and to discover if there are differences in change patterns between experienced and inexperienced online faculty as they implement online instructional strategies.

DESCRIPTION OF PROCEDURES
If you agree to participate in this study, you will be asked to complete the Stages of Concern questionnaire and to schedule an appointment (at your convenience) for a one-hour interview. During the interview you will be asked to show sections of your online course to illustrate how you used technology to teach your content and also to share examples of online pedagogy. The questions will be fairly open-ended and will be focused on your online teaching experience. The interview will be recorded using Mediasite.

At the end of the interview, you will be asked for digital copies of your syllabus, discussion guidelines and course introduction. Once the study is completed, you can request a digital copy of the dissertation.

RISKS AND SAFEGUARDS
There are some risks involved with participating in this study; however, I will explain the **safeguards**, the ways in which I will try to protect you and the data from these risks.

Risk 1: If you are new to teaching online may feel uncomfortable being studied.
Safeguard: Your participation is completely voluntary.

Risk 2: You may feel embarrassed or inadequate about your online teaching skills.
Safeguard: The research shows there is an initial learning curve even for the most gifted classroom instructors and so those initial feelings are appropriate when beginning to teach online. Also, you will lead the interview and choose the pace and content to be shared.

Risk 3: Since I co-led the workshop, you may feel nervous about sharing critiques or issues with me.
Safeguard: I will not judge or evaluate you; I am only interested in studying the change process you experienced so I can better support your colleagues in the future. I can also provide you with additional support or resources to address any of the issues that may emerge.

Risk 4: Your identity may be revealed because of the Mediasite recording.
Safeguards: To prevent your identity becoming known because of the Mediasite recording, I will password-protect access to the recordings.

Risk 5: Your identity may be revealed because transcripts of the interview may be accessed.
Safeguards: To safeguard the interview transcripts, questionnaire profiles and documents; I will not link the name of participant to the informed consent. All data will be stored with codes instead of names and data files will be kept in a password-protected folder.

BENEFITS
Direct benefits to you may result from reflecting about your online course. As issues come up, I may be able to schedule time to follow up and share additional resources, trouble shooting tips or connect you with colleagues working on similar online strategies.

You may not have any direct benefit from sharing your online journey. However, in terms of research, your story will help fill the gap in the scholarship of higher education and help me to understand how to effectively support faculty as they transition to the online environment by better understanding the change process they will experience. This research will support the growing demand for effective online courses. I plan to share the results widely.

CONFIDENTIALITY
Your interview transcript will be coded and your name will not be attached. The digital transcription file will be kept in a password-protected online folder. In addition, the Mediasite recording of your interview will be password protected.

VOLUNTARY PARTICIPATION
Your participation in this study is voluntary. You may skip any questions that you do not want to answer. You can also end the interview at any time.

QUESTIONS
If you have any questions about the study, please contact Linda Scott by telephone (XXX.XXX.XXXX), email [email], or visit her office in [building].

If you have any questions about your rights as a research participant, you may contact our Institutional Review Board at 760.750.4029.The IRB is a committee that reviews research studies to make sure that they are safe and that *the rights of the participants are protected*, which may include auditing of the research study and data.

AGREEING TO PARTICIPATE
By arranging an interview session, you are signifying that you voluntarily agree to participate in the study. (Remember, you can always withdraw from the study at any time.)

☐ I agree to participate in this research study.
☐ I agree to be videotaped

_____ _____
Participant's Name Date

_____
Participant's Signature

_____
Researcher's Signature

Thank you for your consideration